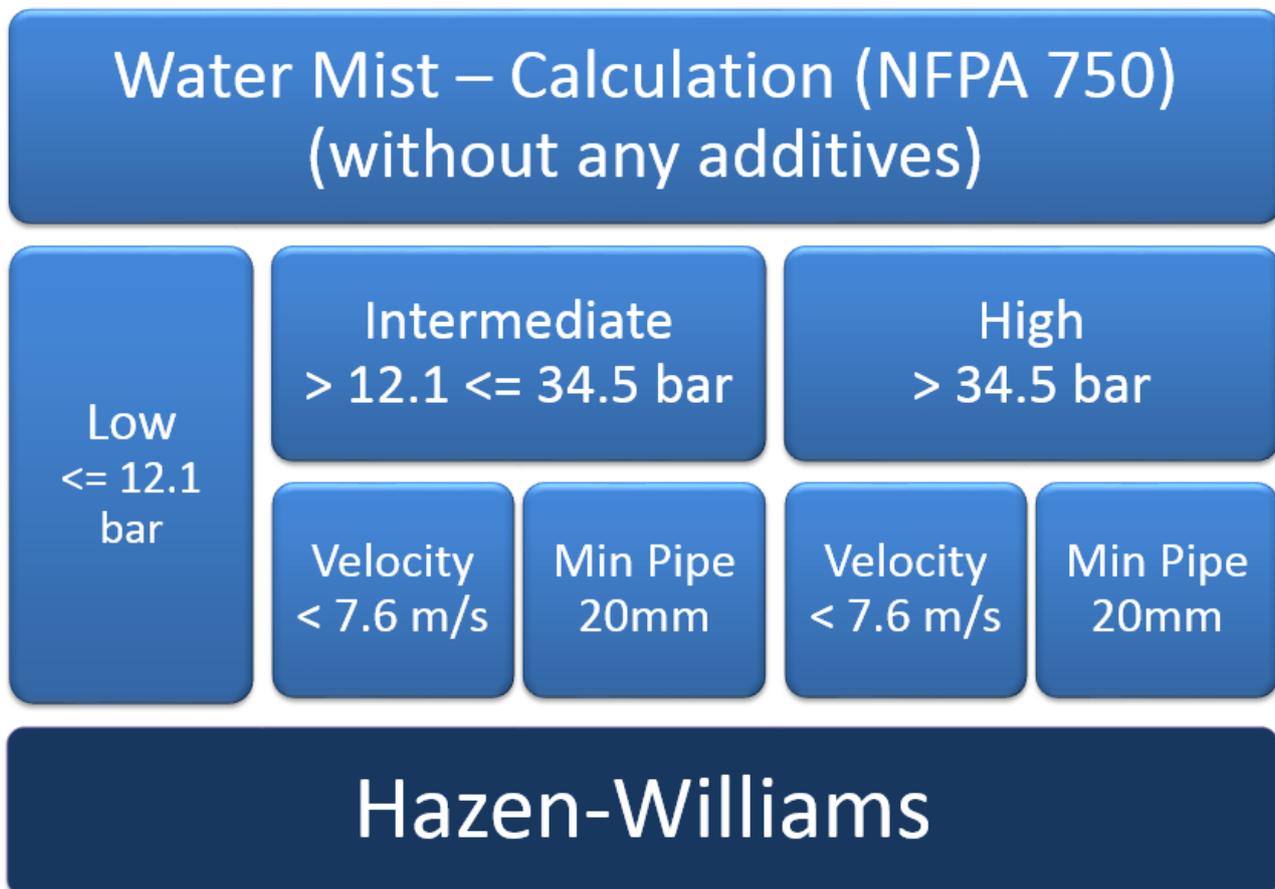


The Canute FHC hydraulic calculation software can be used for the calculation of water mist systems for low, intermediate and high-pressure systems as defined by NFPA 750. Careful consideration needs to be given on which option you use in FHC for your calculation and this will depend on the system pressure, water velocity and if the system has any additives.

NFPA 750 allows the Hazen Williams pressure loss formula to be used for water mist system including high-pressure systems (pressure exceeds 34.5 bar) if certain conditions are met, for intermediate and high-pressure systems the water velocity must be below 7.6 m/s and the smallest pipe diameter must not be less than 20mm. The infographic below summarises the differences between the three pressure classifications and when the Hazen Williams pressure loss formula can be used.

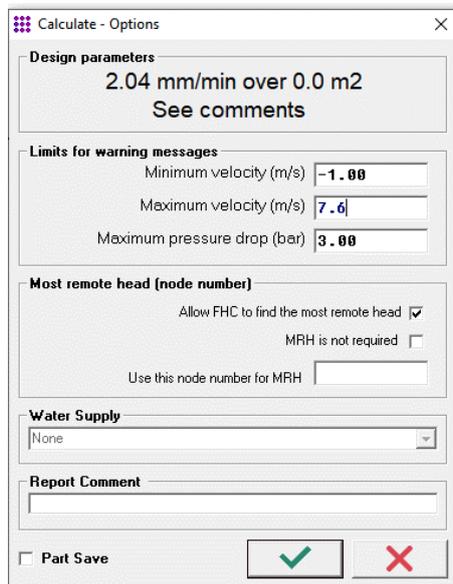


Source NFPA® 750 : 2010 Standard on Water Mist Fire Protection Systems  
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Hazen Williams pressure loss formula is the standard method used by Canute FHC when calculating pressure losses in pipework, therefore, you do not need to make any changes but you do need to be careful that you selected the appropriate minimum pipe size and your water velocity does not exceed 7.6 m/s.

Our experience has shown that by using Darcy Weisbach pressure loss formula for all water mist calculations that you will benefit from lower system pressure. If you are designing a high-pressure system, then for practical purposes you should select Darcy Weisbach pressure loss formula as by limiting yourself to pipe velocities of less than 6.7 m/s and minimum pipe size of 20 mm is probably impractical.



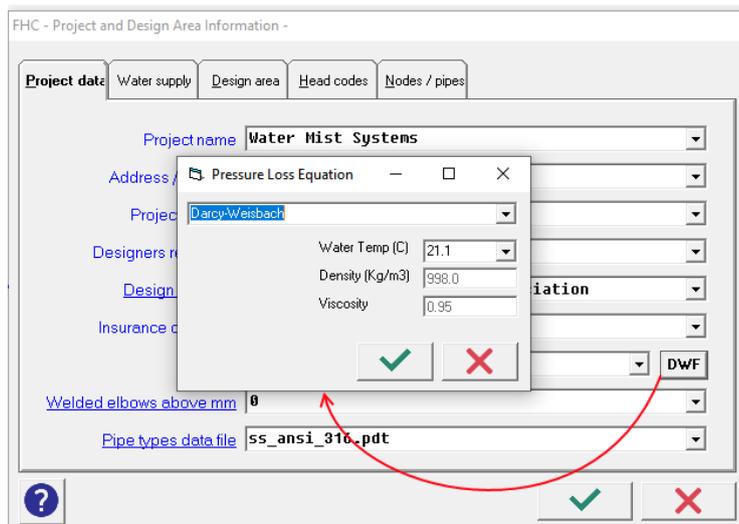
When making water mist calculations and your system meets the criteria which allow Hazen Williams pressure loss formula to be used you can specify a maximum water velocity in the *calculation options* as shown to the left. This dialogue is displayed after you select *calculate*, you can now enter 7.6 m/s as your maximum velocity and if this is exceeded FHC will display a dialogue box at the end of the calculation and will display the pipes exceeding this velocity.

You can also find the pipes the highest velocities by going to the *menu* -> *reports* -> *pipe summary* and you will find that any pipes exceeding the set velocity will be displayed in red.



## Using Darcy Weisbach pressure loss formula

If your system does not meet the requirements which allows you to use the Hazen William pressure loss formula, then you will need to switch to the Darcy Weisbach pressure loss formula.



To do this open the project data [Ctrl+P] and you will see a button to the right of *fluid* labelled 'DWF' press this button and a dialogue box will appear asking you if you wish to switch the pressure loss formula.

You can now select the Darcy Weisbach pressure loss formula and the water temperature. The temperature will change the default valves for the density and viscosity.

You can now see that a command statement is automatically inserted into the fluid line as shown below. This has two parameters which if you wish you can modify.

The command statement can be broken up into parts 'DWF' is instructing FHC to use the Darcy Weisbach pressure loss formula. The 'DENS' specifies the water density and 'VISC' is the absolute viscosity (in centipoise). If you wish you may alter these values and you will find more information various temperatures in NFPA 750 table 9.2.2 (b).



## Darcy Weisbach pressure loss formula

Darcy Weisbach pressure loss formula is considered to be the most accurate pressure loss formula and you may find that you get beneficial results when using it. Although NFPA 750 allows you to use the Hayes Williams formula for certain systems under certain conditions it does not preclude you from using Darcy Weisbach.

## Selecting design authority

If you open the FHC project data [Ctrl+P] you should select the appropriate design authority for the design standard you are designing to this may affect the calculation we would recommend that you use NFPA 750 : 2010 - Water mist fire protection systems.

FHC will allow the Darcy Weisbach pressure loss formula to be used with any design authority however caution must be taken as not all design authorities allow the use of Darcy Weisbach pressure loss formulas.

## Further information

It is important that you are familiar with the design standard for which you are designing to and understands their methodology for the system calculations and the use of different pressure loss formulas and the criteria when they can and cannot be used.

## OTHER FHC SETTINGS

In the remainder of this technical data sheet, we will provide some additional information on how to use the FHC effectively for water mist calculations. There are several settings which you can ignore as they will not be required for your calculation and are normally used for fire sprinkler systems where it is normal practice to specify a water density in millimetres per minute (mm/min).

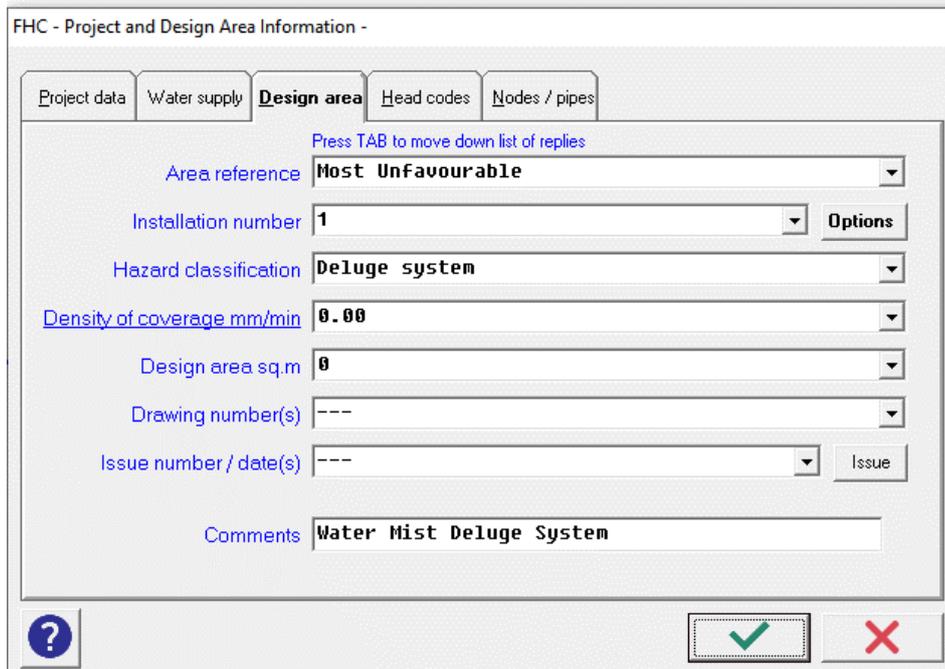
## Project data

We have already seen how we modify the pressure loss formula to use the Darcy-Weisbach instead of the Hazen-Williams formula and our recommendation is to use Darcy-Weisbach where it is allowed in the design standard. How you change the formula is covered elsewhere in this document.



## Project Data : Design Area

If you open the project data 'Edit->Project Data' [Ctrl+P] and move to the design area tab you will see the screen below:



FHC - Project and Design Area Information -

Project data | Water supply | **Design area** | Head codes | Nodes / pipes

Press TAB to move down list of replies

Area reference: Most Unfavourable

Installation number: 1 Options

Hazard classification: Deluge system

Density of coverage mm/min: 0.00

Design area sq.m: 0

Drawing number(s): ---

Issue number / date(s): --- Issue

Comments: Water Mist Deluge System

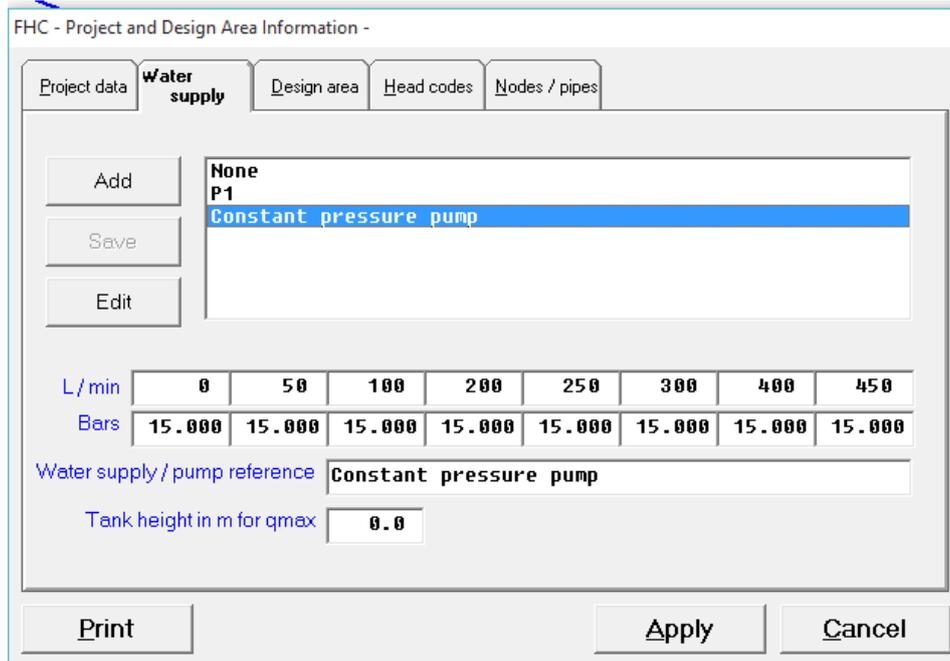
? [OK] [Cancel]

Normally for water mist calculations we can leave the '**Density of coverage mm/min**' at 0.00



## Water supply

You may wish to model water mist system against a known water supply you can do this in FHC but adding a pump curve to the 'Project data -> Water supply'. In this tab you can add and edit water supply curve by providing 8 data points. The example below shows a constant pressure pump providing 15 bars,



L/min	0	50	100	200	250	300	400	450
Bars	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000

Water supply / pump reference: Constant pressure pump

Tank height in m for qmax: 0.0

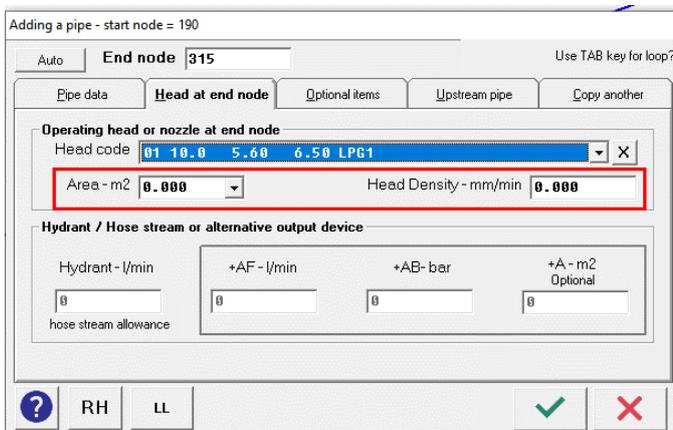
More information is available about how to use all water supplies with FHC in our technical data sheet TDS4



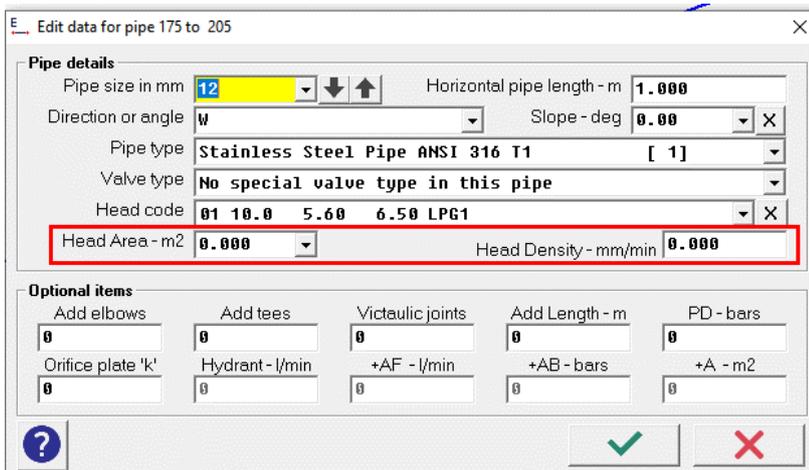
## Add pipe & edit pipe

When you add a pipe in FHC and specify a nozzle code you also have the option of specifying head area and head density, for most situations for water mist systems you will not require to enter this information. You can if you wish to enter the area per head is covering as a reference as it will also be shown in the calculation report but it will not have an effect on the calculation unless you also set the default density of coverage in the project data or the head density on the add pipe command.

For most water mist calculations, you are safe to leave these two boxes at 0.000



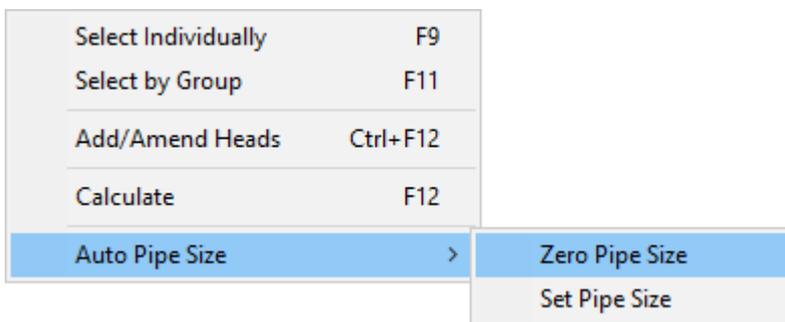
You can also modify this data in the Pipe Edit command



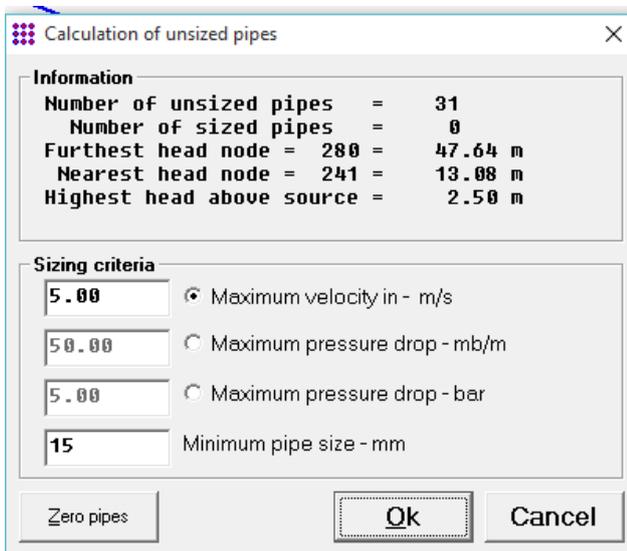

## Auto pipe sizing

Water mist systems respond that particularly well the automatic pipe sizing facility which is built into FHC. We only recommend that you use this function if you have a tree system (system without any loops). If you add pipes to an FHC hydraulic model but do not specify any pipe size (zero) then when you calculate the system FHC will offer you several options which will determine the pipe sizes. This is extremely useful in optimising the system and reducing costs.

There is also an option on the calculate menu which will allow you to remove all pipe sizes from the current project it is worth making a backup of the FHC project before you use this command as it cannot be reversed.

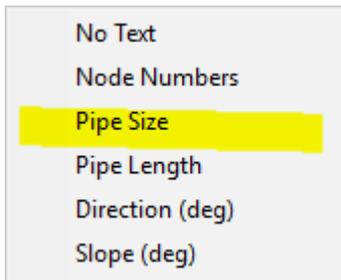


Once all the pipe sizes are set to Zero and you calculate the system you will see a calculation of unsized pipes dialogue box as below



We recommend that you use the maximum velocity as the method sizing criteria as this works most effectively, you will also need to set the minimum pipe diameter you wish to use on your system in this example we have used 15 mm.

When you press the OK button FHC will calculate the system given the parameters you have set when finished will display the standard calculation dialogue boxes. You will probably wish to review pipe sizes which the system has selected for you and you can do this by clicking the right hand mouse button and selecting pipe sizes from the context menu.



If the source pressure is too high or too low for your requirements, then reselect the calculation and change the sizing criteria. For instance, if you could accept our higher pressure then increase the maximum velocity and if you require a lower pressure decrease the maximum velocity then recalculate.

When you are happy with the source pressure and flow and the pipe sizes which have been selected you need to capture this data so the pipe sizes are permanently 'SET' after doing this FHC will not try to automatically size the pipes we would recommend that you do this after you have finished the pipe sizing exercise. To ensure that all the pipe sizes are captured go to the calculate menu -> auto pipe size -> set pipe sizes

