Introduction

The Diameter Inch count is often used for estimating the amount of welding labor required. In principle, the amount of labor required to butt-weld a 10-inch carbon steel pipe with standard wall is expressed as 10 diameter inches. Hidden welds are excluded from the diameter inch calculation. On Fabrication drawings, only shop welds are included. On Installation drawings, only field welds are included, except for field welds marked with Charge Code = No Charge.

However, each company seems to have its own preferred method of allowing for different pipe wall thicknesses and different materials, and often a minimum size or a minimum diameter inch value per weld is applied.

AcornPipe allows you to customize the diameter inch calculation. Diameter inch settings are contained in the following Master Files:

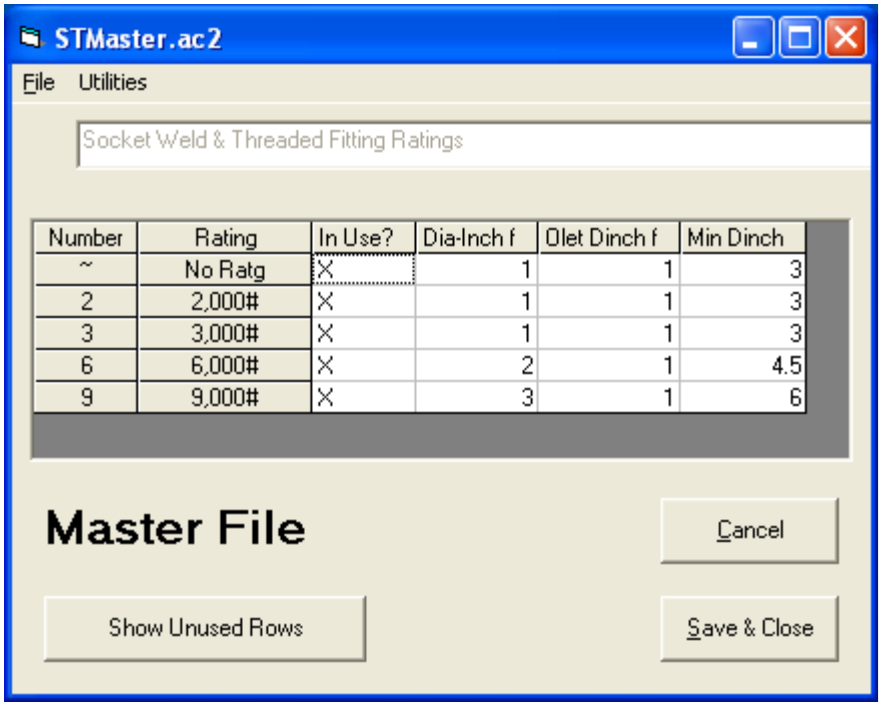
Button in Master Files	File name	Relevant Headings	Referred to as
Fitting Ratings	STMaster	Dia-Inch f Olet Dinch f Min Dinch	ST1 ST2 ST3
Flange Ratings	FRMaster	Dia-inch factor	FR1
MatGroup	MGMaster	Dia-inch factor	MG1
Weld Boxes	WMMaster	Weld factor *On fitting factor	WFA for buttwelds, WFB for socket welds, WFC for olet welds, etc.
Weld Wall Factors	WWMaster	All columns	WW1
Minimum Weld Sizes	WeldMinSizes	Min weld sizes for Socket Welds, Buttwelds WOL welds Nozzle welds, Slip-on welds	SWmin BWmin WOLmin Nozmin SOmin

*On fitting factor added in version 8-461, dated 2012-10-26

Master Files/Fitting Ratings

ST1, ST2 and ST3 are from the columns labeled as follows:

Dia-Inch f ST1
Olet Dinch f ST2
Min Dinch ST3.(applies to olet welds, not socket welds)

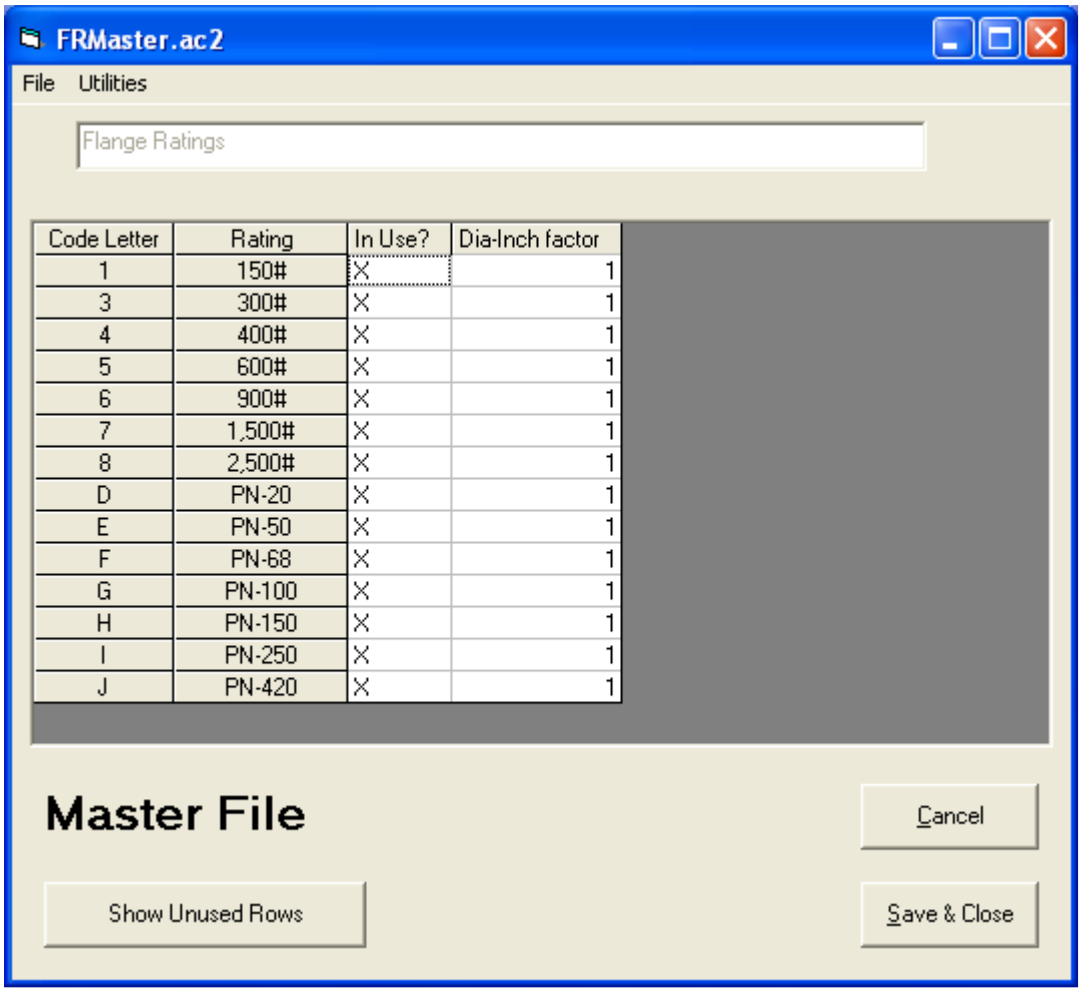


Note that ST3 is applied only to olet welds with an associated fitting rating. It enters the calculation BEFORE the on-fitting factor (OF) and BEFORE the material group factor, MG1.

Master Files/Flange Ratings

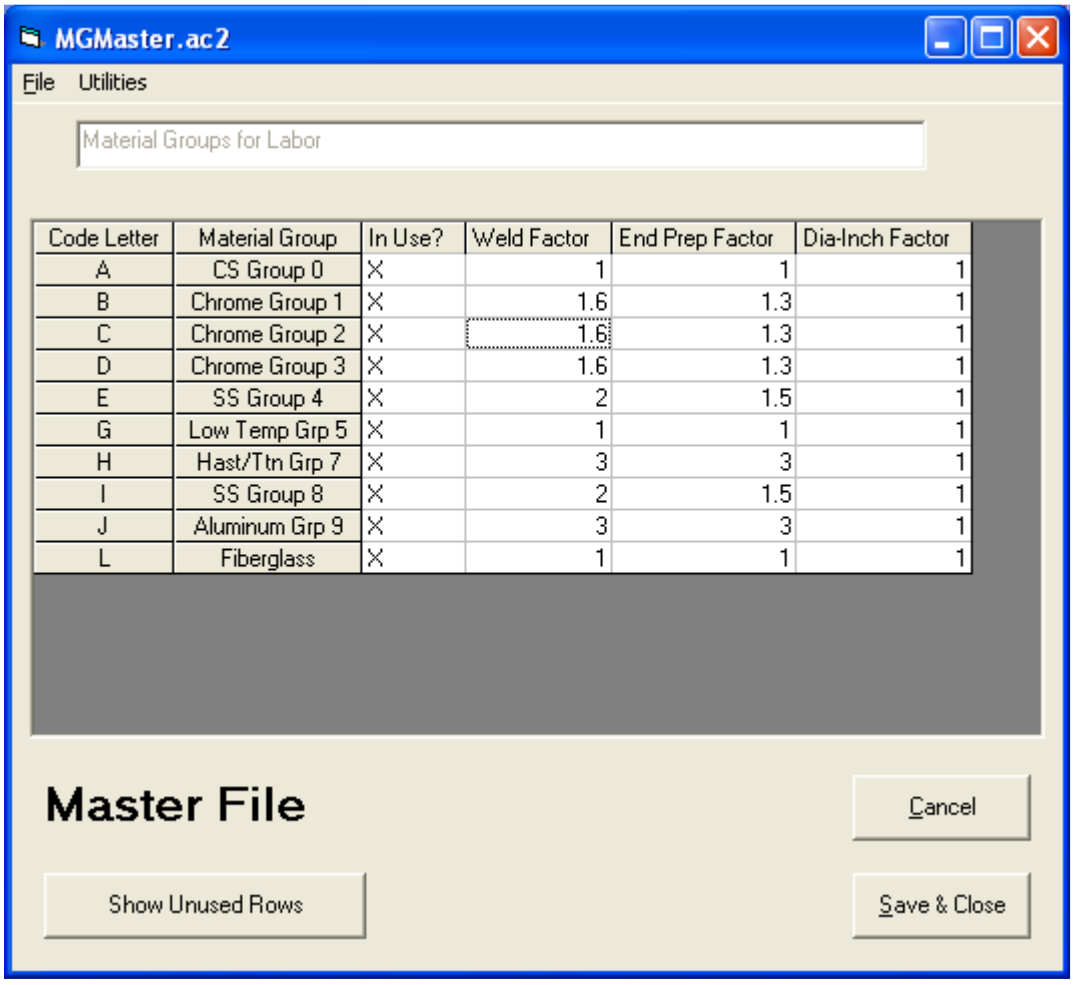
FR1 values are set in the column labeled Dia-Inch factor.
These are used for slip-on welds.

If you enter a value of 999, it will not be used. The WW1 factor based on the size and wall will be used instead.



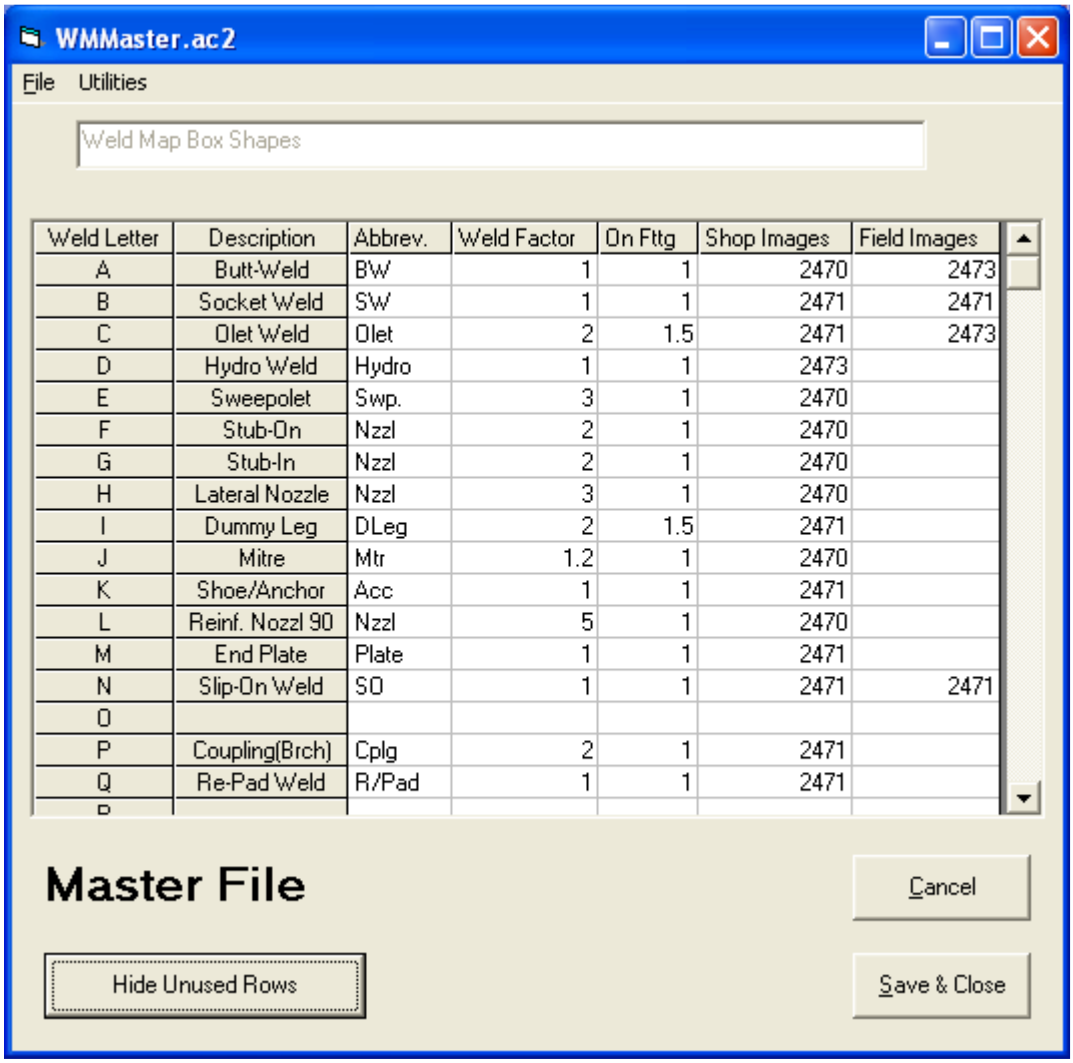
Master Files/MatGroup Factor

Parameter MG1 is set here.



Master Files/Weld Boxes

Factors WFA, WFB, WFC etc come from here.

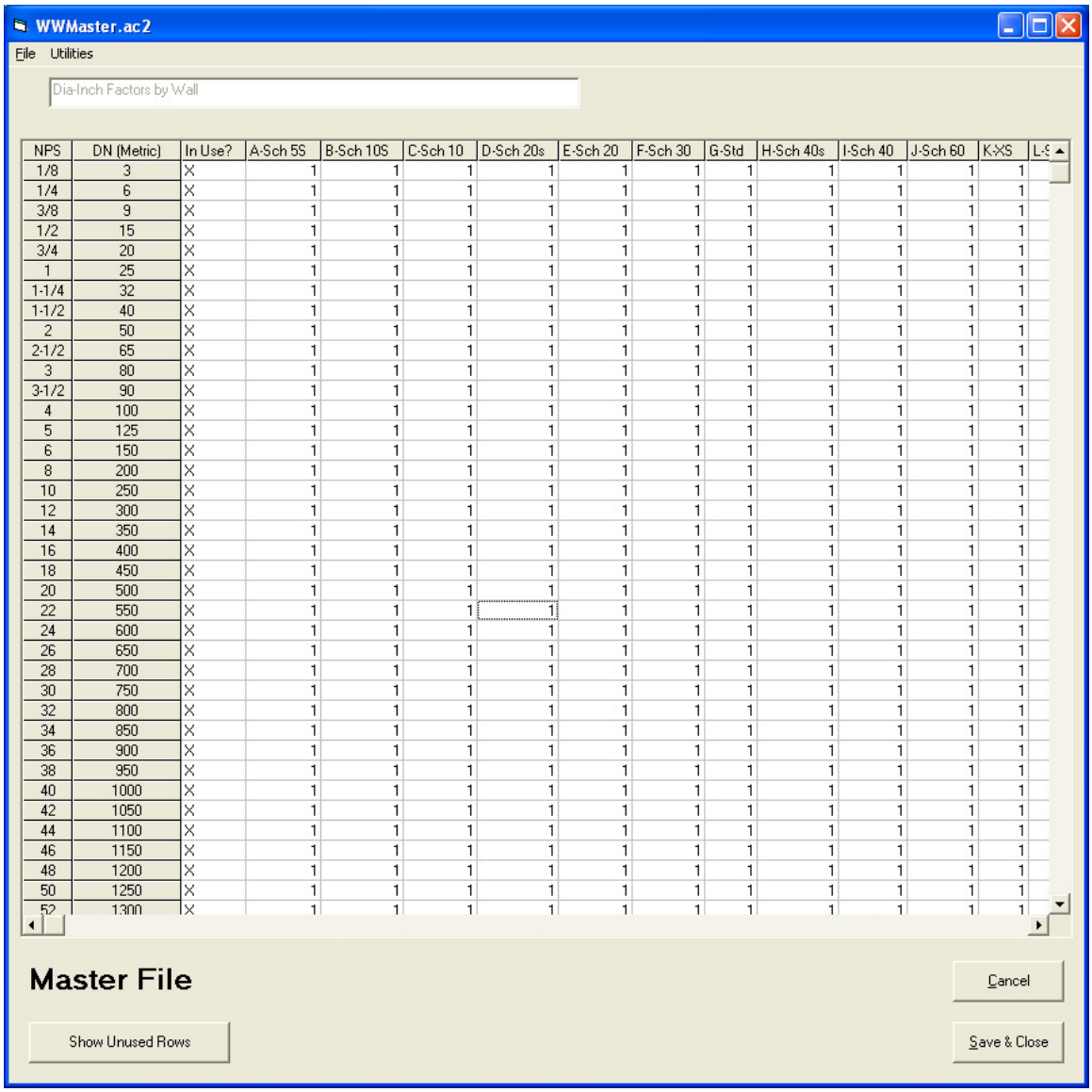


Weld Letter	Description	Abbrev.	Weld Factor	On Fttg	Shop Images	Field Images
A	Butt-Weld	BW	1	1	2470	2473
B	Socket Weld	SW	1	1	2471	2471
C	Olet Weld	Olet	2	1.5	2471	2473
D	Hydro Weld	Hydro	1	1	2473	
E	Sweepolet	Swp.	3	1	2470	
F	Stub-On	Nzzl	2	1	2470	
G	Stub-In	Nzzl	2	1	2470	
H	Lateral Nozzle	Nzzl	3	1	2470	
I	Dummy Leg	DLeg	2	1.5	2471	
J	Mitre	Mtr	1.2	1	2470	
K	Shoe/Anchor	Acc	1	1	2471	
L	Reinf. Nozzl 90	Nzzl	5	1	2470	
M	End Plate	Plate	1	1	2471	
N	Slip-On Weld	SO	1	1	2471	2471
O						
P	Coupling(Brch)	Cplg	2	1	2471	
Q	Re-Pad Weld	R/Pad	1	1	2471	

Lines D and L are not currently used.
Note that most entries in the On Fttg column do not have any effect.
Only the entries for line C (olet weld), line I (dummy leg weld) and line P (Coupling-as-branch weld) have an On Fttg factor applied.

Master Files/Weld Wall Factors

WW1 comes from here

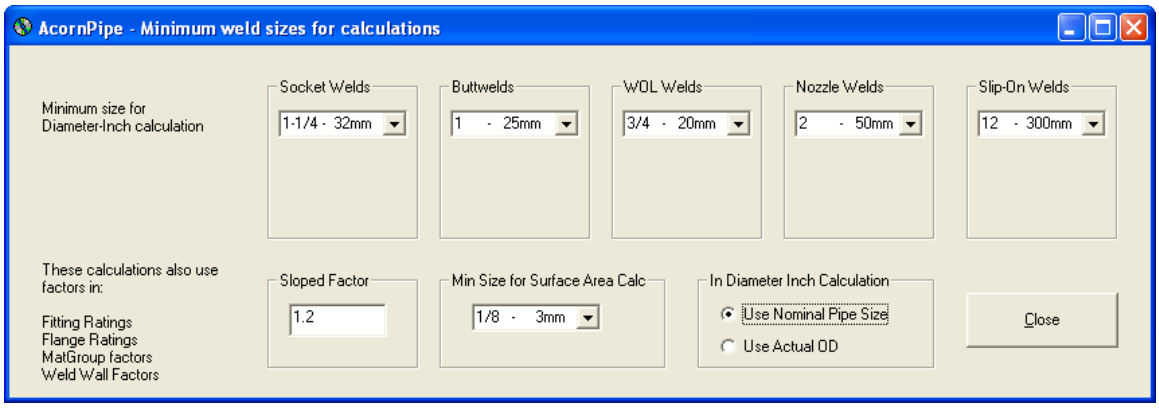


NPS	DN (Metric)	In Use?	A-Sch 5S	B-Sch 10S	C-Sch 10	D-Sch 20s	E-Sch 20	F-Sch 30	G-Std	H-Sch 40s	I-Sch 40	J-Sch 60	K-XS	L-S
1/8	3	X	1	1	1	1	1	1	1	1	1	1	1	
1/4	6	X	1	1	1	1	1	1	1	1	1	1	1	
3/8	9	X	1	1	1	1	1	1	1	1	1	1	1	
1/2	15	X	1	1	1	1	1	1	1	1	1	1	1	
3/4	20	X	1	1	1	1	1	1	1	1	1	1	1	
1	25	X	1	1	1	1	1	1	1	1	1	1	1	
1-1/4	32	X	1	1	1	1	1	1	1	1	1	1	1	
1-1/2	40	X	1	1	1	1	1	1	1	1	1	1	1	
2	50	X	1	1	1	1	1	1	1	1	1	1	1	
2-1/2	65	X	1	1	1	1	1	1	1	1	1	1	1	
3	80	X	1	1	1	1	1	1	1	1	1	1	1	
3-1/2	90	X	1	1	1	1	1	1	1	1	1	1	1	
4	100	X	1	1	1	1	1	1	1	1	1	1	1	
5	125	X	1	1	1	1	1	1	1	1	1	1	1	
6	150	X	1	1	1	1	1	1	1	1	1	1	1	
8	200	X	1	1	1	1	1	1	1	1	1	1	1	
10	250	X	1	1	1	1	1	1	1	1	1	1	1	
12	300	X	1	1	1	1	1	1	1	1	1	1	1	
14	350	X	1	1	1	1	1	1	1	1	1	1	1	
16	400	X	1	1	1	1	1	1	1	1	1	1	1	
18	450	X	1	1	1	1	1	1	1	1	1	1	1	
20	500	X	1	1	1	1	1	1	1	1	1	1	1	
22	550	X	1	1	1	1	1	1	1	1	1	1	1	
24	600	X	1	1	1	1	1	1	1	1	1	1	1	
26	650	X	1	1	1	1	1	1	1	1	1	1	1	
28	700	X	1	1	1	1	1	1	1	1	1	1	1	
30	750	X	1	1	1	1	1	1	1	1	1	1	1	
32	800	X	1	1	1	1	1	1	1	1	1	1	1	
34	850	X	1	1	1	1	1	1	1	1	1	1	1	
36	900	X	1	1	1	1	1	1	1	1	1	1	1	
38	950	X	1	1	1	1	1	1	1	1	1	1	1	
40	1000	X	1	1	1	1	1	1	1	1	1	1	1	
42	1050	X	1	1	1	1	1	1	1	1	1	1	1	
44	1100	X	1	1	1	1	1	1	1	1	1	1	1	
46	1150	X	1	1	1	1	1	1	1	1	1	1	1	
48	1200	X	1	1	1	1	1	1	1	1	1	1	1	
50	1250	X	1	1	1	1	1	1	1	1	1	1	1	
52	1300	X	1	1	1	1	1	1	1	1	1	1	1	

Before you spend a lot of time filling in values here, decide whether you want to use Actual Pipe OD instead of Nominal Pipe Size in the diameter inch calculation. That selection is shown on the next page.

Master Files/Minimum Weld Sizes

SWmin, BWmin, WOLmin come from here

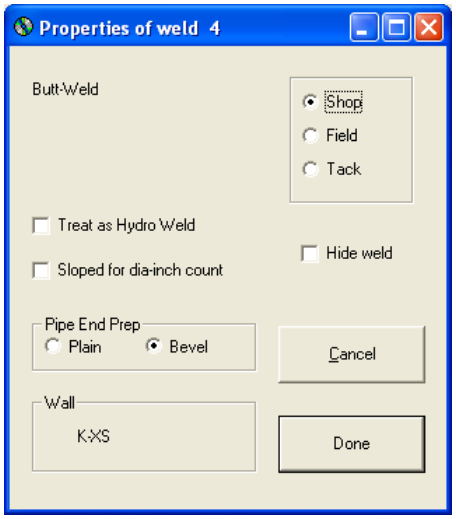


There is no minimum size for a Dummy Leg weld.

The choice of using Nominal Pipe Size or Actual OD affects all welds, except for those attachment or repad welds where an “Actual Dia-Inch” value is entered.

The Weld Properties Dialog

The Sloped Factor can apply to any type of weld, but it is only used if explicitly applied using the weld properties dialog, see below. The weld properties dialog comes up when you shift-click on a weld.



Pipe Size - Nominal Size or Actual OD

The pipe size parameter, PS, is either (a) or (b) below, depending on the setting in the Master Files under minimum weld sizes. This one setting applies to all weld types.

(a) the nominal pipe size in inches

(b) the actual OD of the pipe in inches

Diameter Inch Calculation for Buttwelds (weld type A in AcornPipe)

Dinch = PS x WFA x WW x MG1

If the pipe size is less than BWmin, then PS is based on the BWmin size. BWMin is set under Minimum Weld Sizes.

WFA is normally one for buttwelds, see Weld Boxes.

WW is normally one for standard wall, see Weld Wall Factors

MG1 is normally one for carbon steel, see MatGroup Factor.

Buttwelds never use an on-fitting factor.

Diameter Inch Calculation for Socket Welds (weld type B in AcornPipe)

Dinch = PS x WFB x ST1 x MG1

If the pipe size is less than SWmin, then PS is based on Swmin. SWMin is set under Master Files/Minimum Weld Sizes.

WFB is the factor for Socket Welds, see Weld Boxes.

ST1 depends on the fitting rating, see Fitting Ratings.

MG1 is depends on Material Group, see MatGroup Factor.

Socket welds never use an on-fitting factor.

Diameter Inch Calculation for Olet Welds (weld type C in AcornPipe)

(a) For BW branches only:

Dinch = PS x WFC x WW x MG1 [x OF]

If the pipe size is less than WOLmin, then PS is based on the WOLmin size, see Minimum Weld Sizes.

WFC is the factor for Olet Welds, see Weld Boxes.

WW is based on the branch wall thickness, see Weld Wall Factors

MG1 is normally one for carbon steel, see MatGroup

OF is the “on fitting” factor, see Weld Boxes. It applies if the branch is on a fitting rather than a pipe. It also applies to all laterolets.

(b) For Socket Weld branches only:

Dinch = PS x WFC x ST2 x MG1 [x OF]

WFC is the factor for Olet Welds, see Weld Boxes.

ST2 is based on the fitting rating, see Fitting Ratings

MG1 is normally one for carbon steel, see Master Files/MatGroup

The result of the PS x WFC x ST2 portion of the calculation is subject to a minimum of ST3, see Fitting Ratings. Note that WOLmin is not applied to SW/TH branches.

OF is the on “fitting” factor, see Weld Boxes. It applies if the branch is on a fitting rather than a pipe. It also applies to all laterolets.

Diameter Inch Calculation for Coupling-as-branch Welds (weld type P)

Coupling-as-branch welds use exactly the same calculation as olet welds in (b) above, except WFP is used in place of WFC. So we get

Dinch = PS x WFP x ST2 x MG1 [x OF]

Diameter Inch Calculation for Dummy Leg Welds (weld type I in AcornPipe)

Dinch = PS x WFX x WW x MG1 [x OF]

There is no minimum size for a dummy leg weld.

WFX depends on the weld type, see Weld Boxes.

WW is normally one for standard wall, see Weld Wall Factors

MG1 is normally one for carbon steel, see MatGroup Factors.

OF is the on “fitting” factor, see Weld Boxes. It applies if the dummy leg is on a fitting rather than a pipe. It also applies to all laterolets.

Diameter Inch Calculation for Slip-On Welds (weld type N in AcornPipe)

Dinch = PS x WFN x FR x MG1

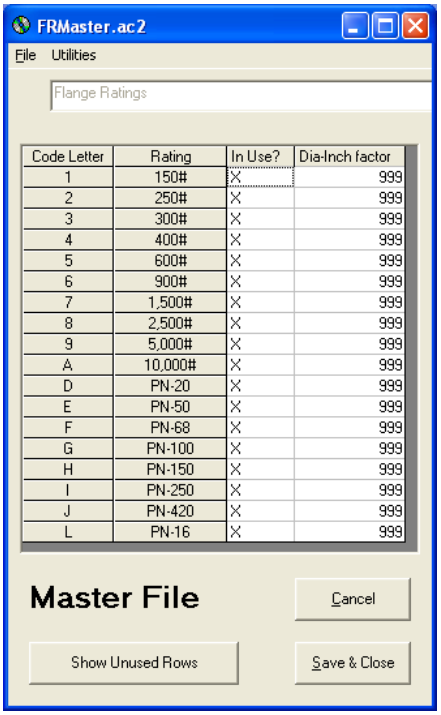
If the pipe size is less than SOmin, then SOmin is used in place of PS, see Minimum Weld Sizes.

WFN is the weld type factor for slip-on welds, see Weld Boxes.

FR is the Dia-inch factor for the flange rating, see Flange Ratings.

MG1 is normally one for carbon steel, see MatGroup Factors.

If you prefer to treat slip-on welds as an “Other Weld Type”, you can do so by entering the value 999 for the Flange Rating factors, as illustrated. This causes the Weld Wall factor to be used instead of the Flange Rating factor.



Diameter Inch Calculation for Other Weld Types

This section covers all weld types except buttwelds, socket welds, olet welds, and dummy leg welds.

Dinch = PS x WFX x WW x MG1

If the pipe size is less than BWmin, then BWmin is used in place of PS, see Minimum Weld Sizes.

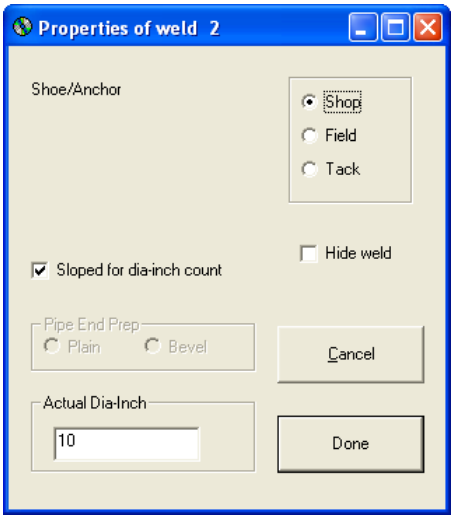
WFX depends on the weld type, see Weld Boxes.

WW is normally one for standard wall, see Weld Wall Factors

MG1 is normally one for carbon steel, see MatGroup Factors.

The above formula applies to Accessory Welds and RePad Welds, but you also have the option of supplying the “Actual Dia-Inch” value in the weld properties dialog as shown.

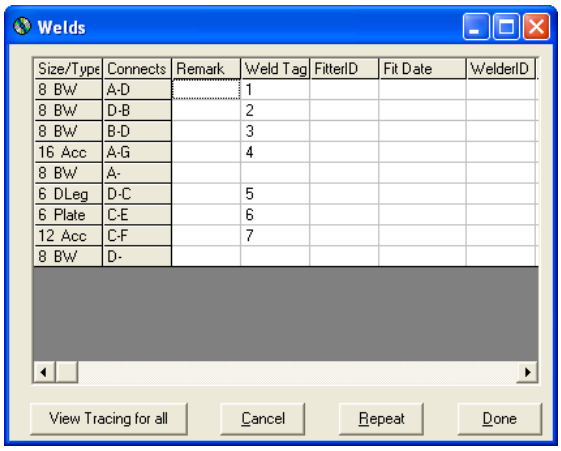
The Actual Dia-Inch value is not subject to any factor for Material Group, etc. but it is subject to the Sloped factor if it is checked in the dialog as shown.



Different Material Groups on the Same Drawing

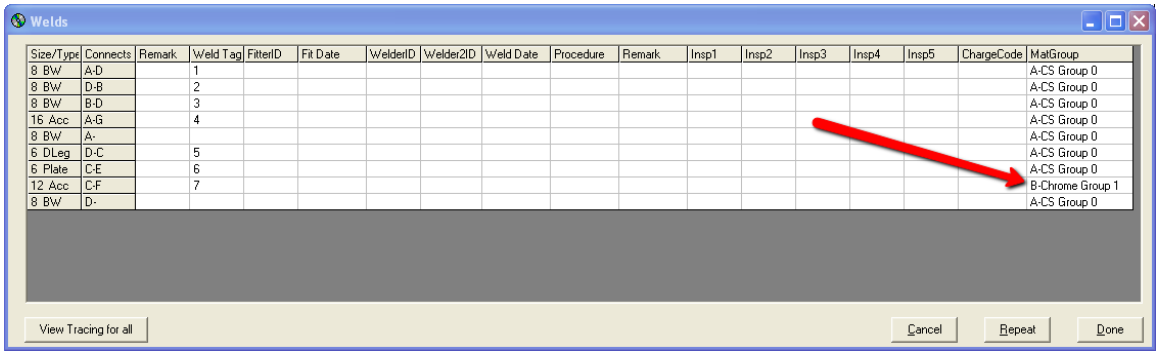
If necessary, you can edit the Material Group for an individual weld as follows:

Bring up the drawing. Select Edit/Welds/Edit Weld Tags or press ctrl-T.



In the Welds window, scroll to the extreme right or expand the window by dragging its right side to the right.

For example, to change the material group on weld 7 to group B, select its cell in the MatGroup column, indicated by the red arrow below, and press B. Or you can bring up the material group menu by pressing the Alt key.



Factoring an Individual Weld's Diameter Inch Count

Sometimes an individual weld's diameter inch value may need to be factored, perhaps due to some special requirement such as hard surfacing. For example, if you need to factor the diameter inch count for a given weld by 1.8, just enter "fdi*1.8" in the weld's Remark3 field as shown.

WelderID	Welder2ID	Weld Date	Procedure	Remark	Remark2	Remark3
						fdi*1.8

If the Remark3 field is not visible, select Set/Edit Column Widths and Headers and edit line 11 of WeldColumnHeaders.txt as shown.

Save the Notepad window, close the weld edit window, and use Ctrl-T to bring it up again with the Remark3 column visible.