Process, Power and Marine Division

SP3D Piping Reference Data

1-Piping Materials Class Data



INTERGRAPH

Understanding Piping Reference Data

SP3D Server Component

Delivered Example Catalog

- **Catalogdb.dat**

Ten_Specs_SpecificationData.xls

- All project rules

- Delivered 10 PDS piping spec rules

Ten_Specs_CatalogData.xls

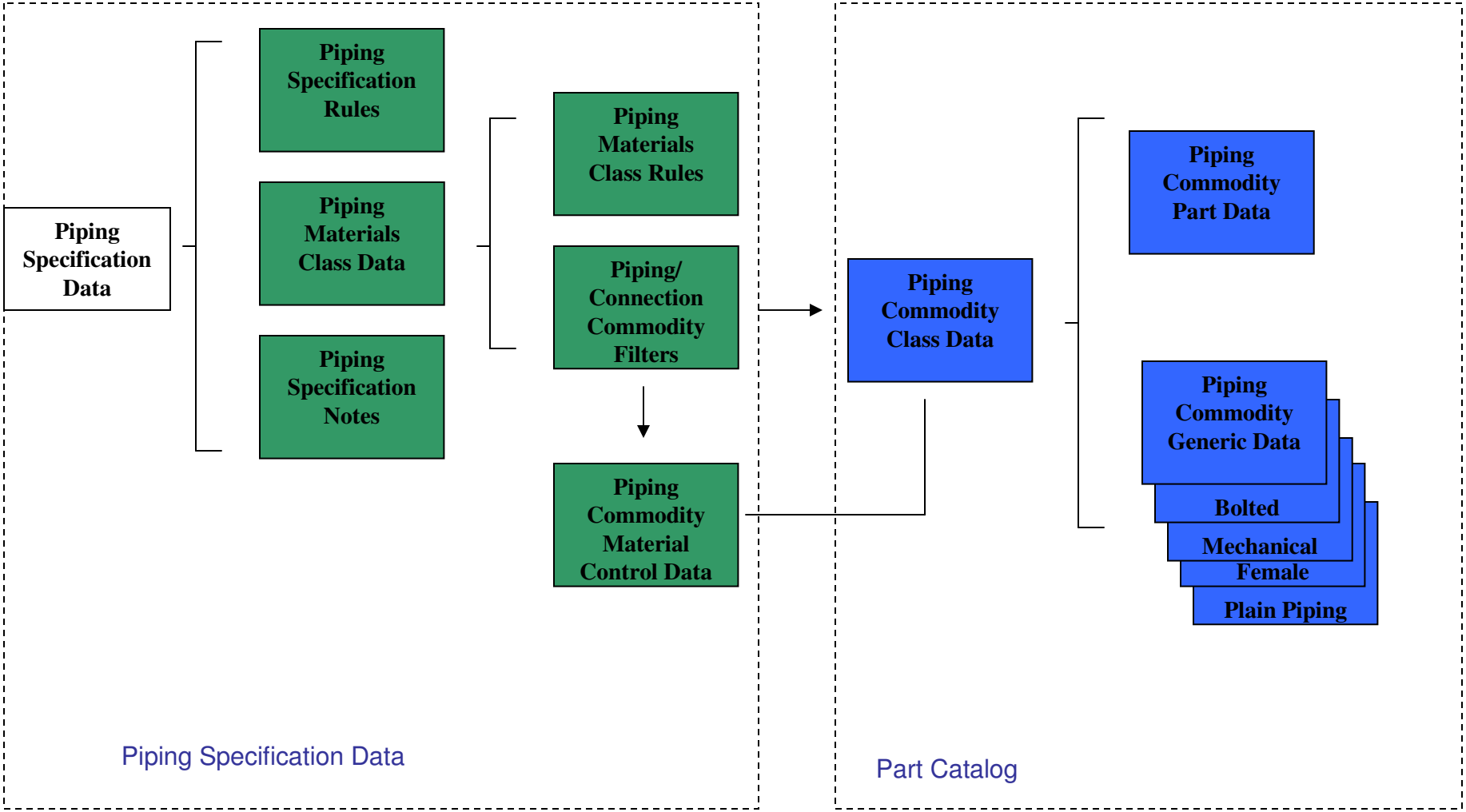
- Delivered all part classes for 10 PDS specs

- Generic physical dimension tables for 10 PDS specs

Understanding Piping Reference Data

- The delivered piping reference data is defined in Excel files:
- AllCodeLists.xls
- - contains all code-listed values.
- Piping_Specification.xls
- - All project rules
- - Delivered 142 PDS piping spec rules
- Piping Catalog.xls
- - Delivered all part classes for 142 PDS specs
- - Generic physical dimension tables for 142 PDS specs
- Piping.xls
- - Flanged Pipe specs and rules
- - N1, N0 specs and rules
- - All parts classes for the above specs
- Instrument data.xls
- - Instrument & specialty items
- AllCommons.xls
- - Generic physical dimension tables for the spec (piping.xls)

Piping Specification



Piping Materials Class Data

- Define the piping specification (piping material classes) you want to use in the project.

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
1C0031		CL150 RFFE, CS, Trim 8, CA 0.063, Process, hot (-20 to 800 degF)	Process	40																
1C0035		CL150 RFFE, CS, Trim 8, CA 0.063, Process, other	Nitrogen gas	40																
1C0043		CL150 RFFE, CS, Trim 8, (ANSI-B31.1)	Low pressure CL150 steam	30																
1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
1C0031		CL150 RFFE, CS, Trim 8, CA 0.063, Process, hot (-20 to 800 degF)	Process	40																
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1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

<u>SpecName:</u> The string represents the unique alphanumeric name of the piping material class

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
1C0031		CL150 RFFE, CS, Trim 8, CA 0.063, Process, hot (-20 to 800 degF)	Process	40																
1C0035		CL150 RFFE, CS, Trim 8, CA 0.063, Process, other	Nitrogen gas	40																
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1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

Material of Construction Class

Materials of construction class is intended for grouping similar piping materials classes for the benefit of the spec writer in managing piping specs. This code list value is optional

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
1C0031		CL150 RFFE, CS, Trim 8, CA 0.063, Process, hot (-20 to 800 degF)	Process	40																
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Material Description

This is a string that represents a complete generic description.
This property is used for reporting

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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Fluid Service

Type the intended fluid service for this piping materials class

Eg:High Pressure Steam, Underground Water, or Chilled Water.

Piping Materials Class Data

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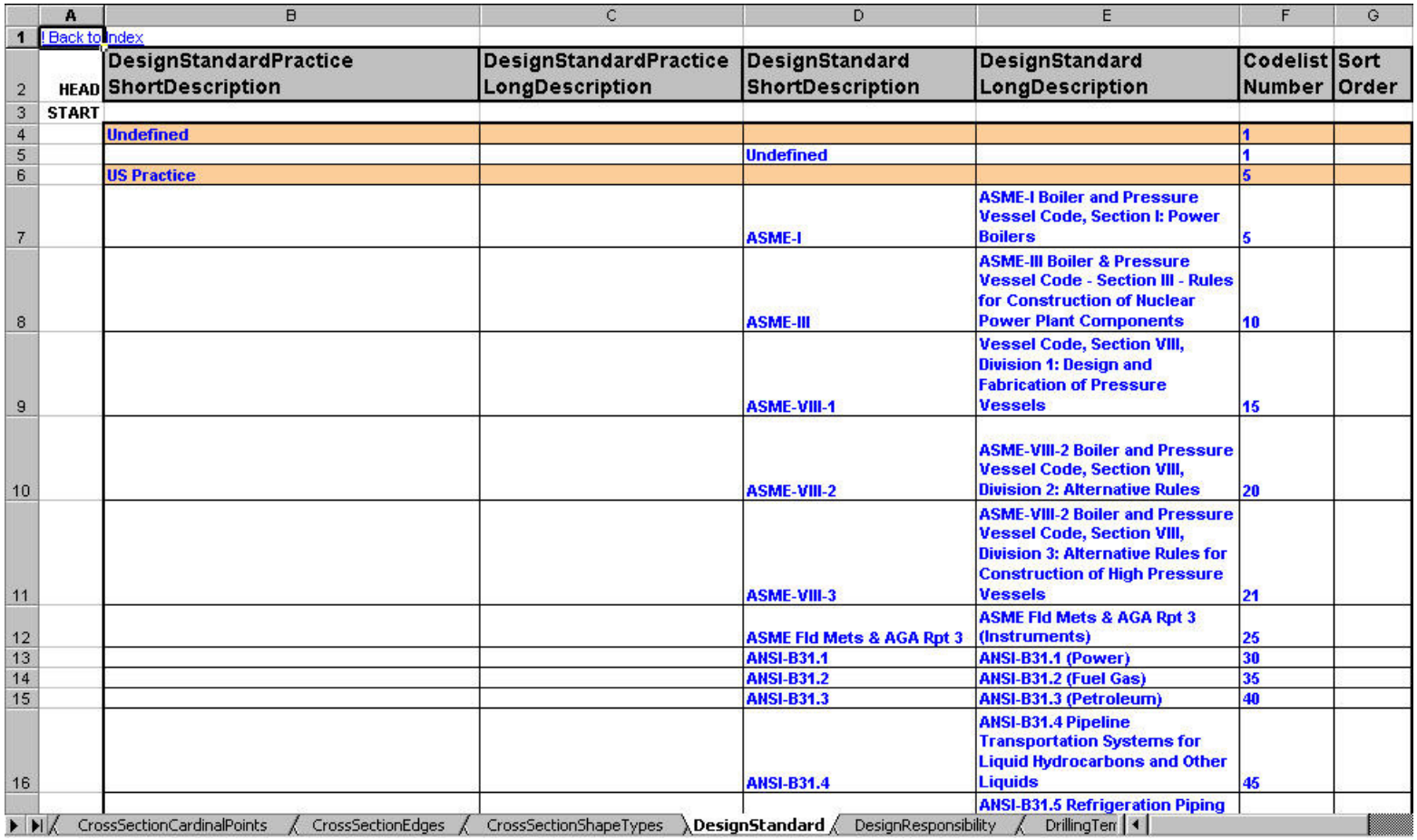
Design Standard

Specify the design standard code that you want to use in this piping materials class to calculate the piping wall thickness and the branch reinforcements. This is a code listed value (refer DesignStandard sheet)

Design Standard



	A	B	C	D	E	F	G
1	! Back to Index						
2	HEAD	DesignStandardPractice ShortDescription	DesignStandardPractice LongDescription	DesignStandard ShortDescription	DesignStandard LongDescription	Codelist Number	Sort Order
3	START						
4		Undefined				1	
5				Undefined		1	
6		US Practice				5	
7				ASME-I	ASME-I Boiler and Pressure Vessel Code, Section I: Power Boilers	5	
8				ASME-III	ASME-III Boiler & Pressure Vessel Code - Section III - Rules for Construction of Nuclear Power Plant Components	10	
9				ASME-VIII-1	Vessel Code, Section VIII, Division 1: Design and Fabrication of Pressure Vessels	15	
10				ASME-VIII-2	ASME-VIII-2 Boiler and Pressure Vessel Code, Section VIII, Division 2: Alternative Rules	20	
11				ASME-VIII-3	ASME-VIII-2 Boiler and Pressure Vessel Code, Section VIII, Division 3: Alternative Rules for Construction of High Pressure Vessels	21	
12				ASME Fld Mets & AGA Rpt 3	ASME Fld Mets & AGA Rpt 3 (Instruments)	25	
13				ANSI-B31.1	ANSI-B31.1 (Power)	30	
14				ANSI-B31.2	ANSI-B31.2 (Fuel Gas)	35	
15				ANSI-B31.3	ANSI-B31.3 (Petroleum)	40	
16				ANSI-B31.4	ANSI-B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids	45	
					ANSI-B31.5 Refrigeration Piping		

CrossSectionCardinalPoints / CrossSectionEdges / CrossSectionShapeTypes / DesignStandard / DesignResponsibility / DrillingTem

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
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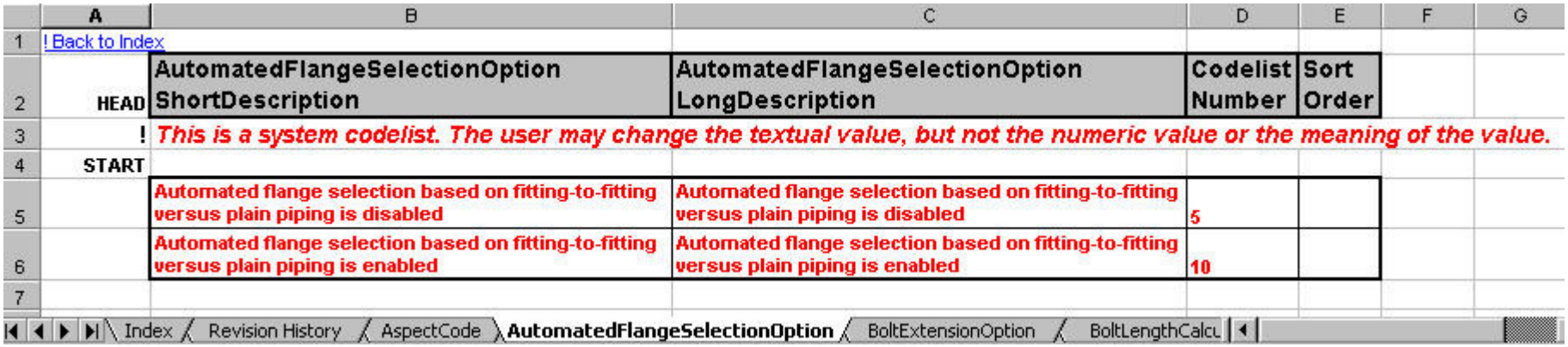
Automated Flange Selection option

Controls the logic to distinguish between flanges inserted on plain piping versus fitting-to-fitting situations. Typically, you would enable this option for piping material classes that include slip-on flanges or lap-joint flanges.

Automated Flange Selection option

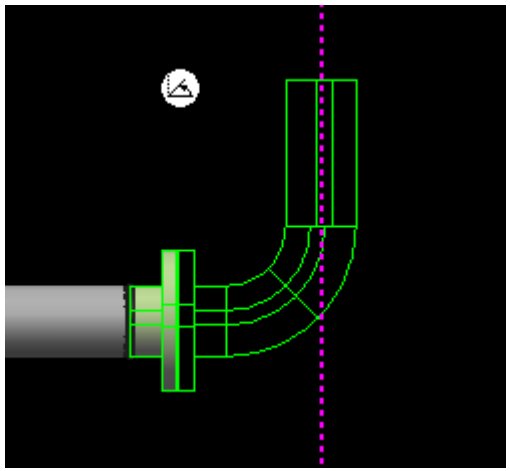


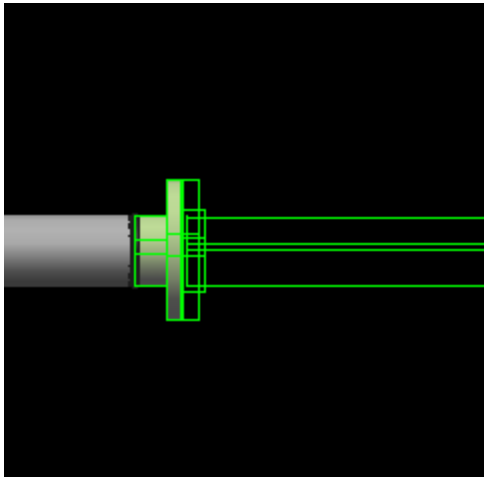
	A	B	C	D	E	F	G
1	! Back to Index						
2	HEAD	AutomatedFlangeSelectionOption ShortDescription	AutomatedFlangeSelectionOption LongDescription	Codelist Number	Sort Order		
3	!	*This is a system codelist. The user may change the textual value, but not the numeric value or the meaning of the value.*					
4	START						
5		Automated flange selection based on fitting-to-fitting versus plain piping is disabled	Automated flange selection based on fitting-to-fitting versus plain piping is disabled	5			
6		Automated flange selection based on fitting-to-fitting versus plain piping is enabled	Automated flange selection based on fitting-to-fitting versus plain piping is enabled	10			
7							

Index / Revision History / AspectCode / **AutomatedFlangeSelectionOption** / BoltExtensionOption / BoltLengthCalcL

If you type 5 (disabled), the generic short code for the flange that is subject to automated flange selection is used for this piping material class. If you type 10 (enabled), the software selects the generic short code for the flange for plain piping or selects the flange for a fitting based on where the flange is inserted. This field is optional.

Piping Materials Class Data





Automated Flange Selection option

Controls the logic to distinguish between flanges inserted on plain piping versus fitting-to-fitting situations. Typically, you would enable this option for piping material classes that include slip-on flanges or lap-joint flanges.

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

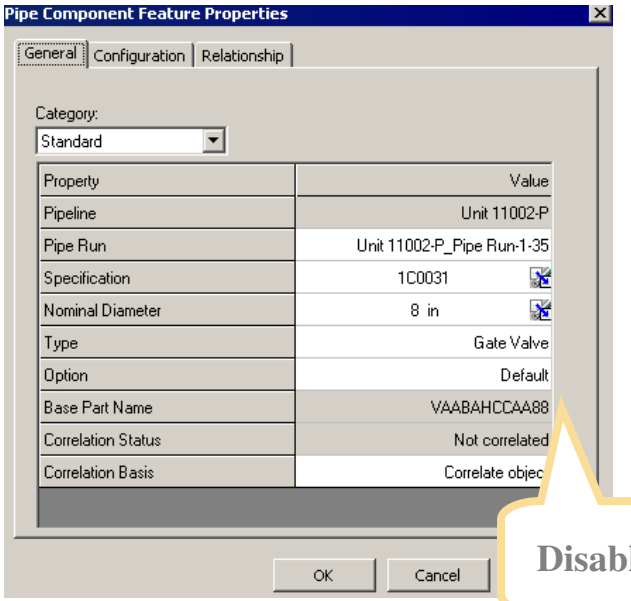
PipingCommodityOverrideOption ShortDescription	PipingCommodityOverrideOption LongDescription	Codelist Number	Sort Order
Undefined	Undefined	1	
Piping commodity overrides are disable	Piping commodity overrides are disable	5	
Piping commodity overrides are enable	Piping commodity overrides are enabled	10	

Piping Commodity Override option

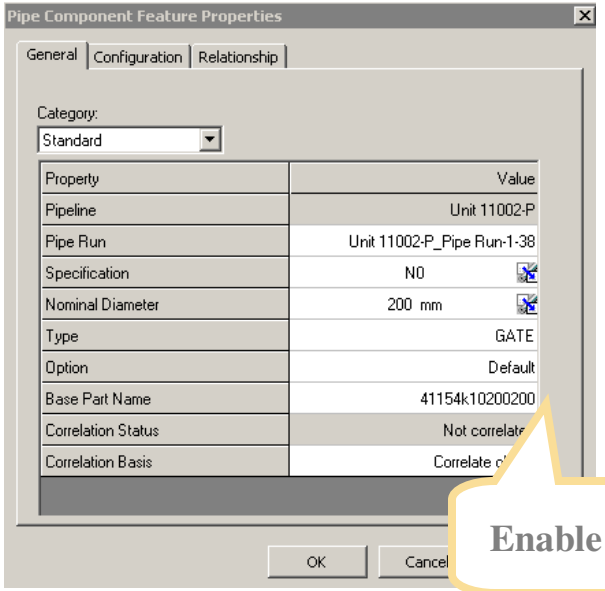
Specifies whether piping commodity override is allowed or not. Note: This value overrides the option defined in Default Project Options

Piping Commodity Override option

Management of commodity overrides (Base Part Name)



Disable - 5



Enable - 10

SpecName	PipingCommodityOverrideOption
1.5.1	1.5.8
1C0031	5
2C0032	5
N0	10
N1	10

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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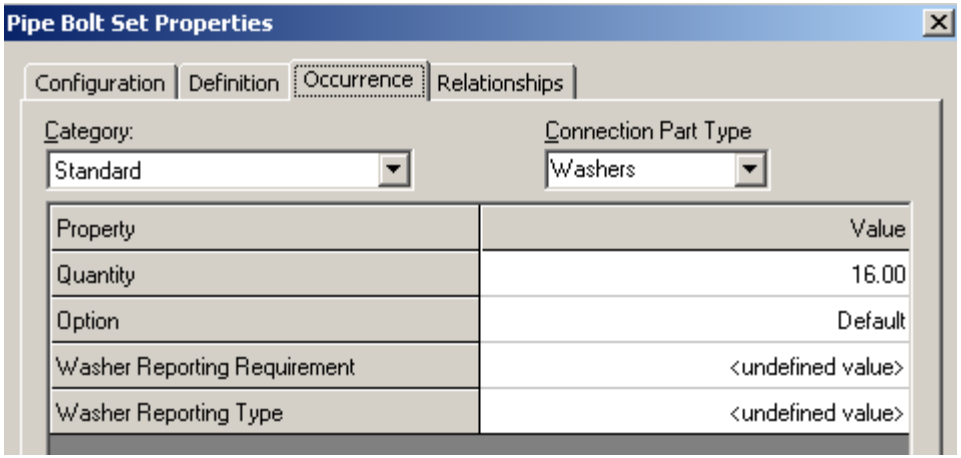
	A	B	C	D	E	F
1	! Back to Index					
2	HEAD	WasherCreationOption ShortDescription	WasherCreationOption LongDescription	Codelist Number	Sort Order	
3	!	*This is a system codelist. The user may change the textual value, but not the numeric value*				
4	START					
5		Disable the creation of washers	Disable the creation of washers at a bolted joint	5		
6		Enable the creation of washers	Enable the creation of washers at a bolted joint	10		
7						
8	END					

ValveOperatorType | ValveTrim | Vendor | WasherCreationOption | WasherOption | Wa

Washer Option

Specifies whether the software should create washers at a bolted joint or not

Piping Materials Class Data



Washer Option

Specifies whether the software should create washers at a bolted joint or not

Piping Materials Class Data

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Piping Note1: This is an enumerated value, i.e. the standard note number that is related to a standard note that applies to the data within this piping materials class, as denoted by the spec writer.

Standard Notes Data

Name	Purpose	Description
1	10	
3	10	Valve and flange protectors required.
22	10	Valves shall be in accordance with NACE MR-01-75.
50	10	The Manufacturer shall be consulted for special boltingrequirements where both the design temperature is above 800 degFand the valve bonnet is insulated.
54	10	Unions shall not be used.
56	10	Gasket seating surfaces shall have 125 Ra surface finish.
57	10	Unions shall not be used. Gasket seating surfaces shall have125 Ra surface finish.
58	10	Unions shall not be used. Gasket seating surfaces shall have125 Ra surface finish. Valves shall be in accordance withNACE MR-01-75.
60	10	All welds shall use compatible rod and shall be PWHT regardlessof thickness and/or joint configuration.
61	10	All welds shall use compatible rod and shall be PWHT regardlessof thickness and/or joint configuration unless specificallyapproved by Contractor and permitted by ANSI-B31.3 Code.

Piping Materials Class Data

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<u>Piping Spec Status</u>: This is an enumerated value representing the status of piping material class

	A	B	C	D	E
3	HEAD	PipingSpecStatus ShortDescription	PipingSpecStatus LongDescription	Codelist Number	Sort Order
4	START				
5		Undefined	Undefined	1	
6		Draft	Draft	5	
7		Issued for approval	Issued for approval	10	
8		Issued for design	Issued for design	15	
9		Issued for construction	Issued for construction	20	
10	END				
11					

PipingCommodityOverrideOption / PipingCommodityType

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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<u>Responsibility:</u> This is a string providing the name, or other identifier, of the person, group, etc. responsible for the specifying the status of the piping materials class

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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<u>Last Modified On:</u> This is a time/date value indicating the time the status change occurred. This value will be under the control of the spec writer.

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
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<u>Comments:</u> This is a string representing a brief note describing the justification for the assignment of the status value. .

Piping Materials Class Data

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<u>Revision Number:</u> This is a string that represents the revision number of the piping materials class, as assigned by the spec writer.

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
1C0031		CL150 RFFE, CS, Trim 8, CA 0.063, Process, hot (-20 to 800 degF)	Process	40																
1C0035		CL150 RFFE, CS, Trim 8, CA 0.063, Process, other	Nitrogen gas	40																
1C0043		CL150 RFFE, CS, Trim 8, (ANSI-B31.1)	Low pressure CL150 steam	30																
1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

<u>Approved By and Approved Date:</u> Specifies the name of the approver and date

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1C0043		CL150 RFFE, CS, Trim 8, (ANSI-B31.1)	Low pressure CL150 steam	30																
1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

	D	E	F
2	StressRelief ShortDescription	StressRelief LongDescription	Codelis Numbe
8			5
9	ASME-I	ASME-I Boiler and Pressure Vessel Code, Section I: Power Boilers	5
10	ASME-III	ASME-III Boiler & Pressure Vessel Code - Section III - Rules for Construction of Nuclear Power Plant Components	10

SteamoutRequirement | StressRelief | StressR

<u>Stress Relief:</u> This is an enumerated value indicating the standard to be used for relieving stress

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
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1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

	D	E	F
1			
2	Examination ShortDescription	Examination LongDescription	Codelist Number
9	ASME-I	ASME-I Boiler and Pressure Vessel Code, Section I: Power Boilers	5
10	ASME-III	ASME-III Boiler & Pressure Vessel Code - Section III - Rules for Construction of Nuclear Power Plant Components	10

EquipmentTypes | EndStandard | Examination

<u>Examination:</u> This is an enumerated value indicating the standard to be used for examination, inspection, and testing.

Piping Materials Class Data

SpecName	MaterialsOfConstructionClass	MaterialsDescription	FluidService	DesignStandard	AutomatedFlangeSelectionOption	PipingCommodityOverrideOption	WasherCreationOption	GasketRequirementOverride	LiningMaterial	PipingNote1	PipingSpecStatus	Responsibility	LastModifiedOn	Comments	RevisionNumber	ApprovedBy	ApprovalDate	StressRelief	Examination	HyperlinkToHumanSpec
1C0019		CL150 FFFE, CS Cement Lined	Underground fire water	40						63										
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1C0045		CL150 RFFE, CS, Trim 8, CA 0.063, Steam B31.3	Low pressure CL150 steam	40																

<u>Hyperlink To Human Spec:</u> This represents an optional hyperlink to an electronic version of the 'human' Piping Specification.

Piping Materials Class Rules

- These rules define the characteristics of the piping material class. These include:
- Service Limits Rule
- Nominal Piping Diameter
- Branch Insertion Rule
- Minimum Pipe Length Rule
- Default Change of direction
- etc.

Service Limits Rule

Head	SpecName	Temperature	Pressure
Start			
	1C0031	-20F	285psi
		100F	285psi
		200F	260psi
		300F	230psi
		400F	200psi
		500F	170psi
		600F	140psi
		650F	125psi
		700F	110psi
		750F	95psi
		800F	80psi

This rule enables the spec writer to include the sets of temperatures and corresponding pressures, including the units of measure, that define the boundaries of acceptability for a piping materials class.

Linear interpolation with a tolerance of 0.1 Pa

Nominal Piping Diameter Rule

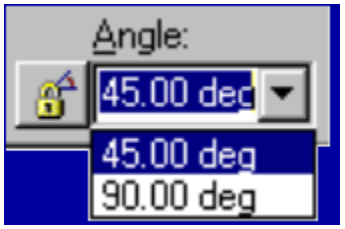
Head	SpecName	Npd	NpdUnitTy
Start			
	1C0031	0.5	in
		0.75	in
		1	in
		1.5	in
		2	in
		3	in
		4	in
		6	in
		8	in
		10	in
		12	in
		14	in
		16	in
		18	in
		20	in
		24	in
		26	in
		28	in
		30	in
		32	in
		34	in
		36	in

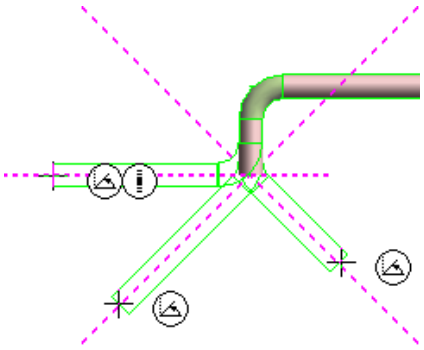
This rule defines the nominal piping diameters and the units that are permissible for this piping materials class.

Bend Angles

Head	SpecName	Npd	NpdUnitType	BendAngle
Start				
	1C0031	0.375	in	90deg
		0.5	in	90deg
		0.75	in	90deg
		1	in	90deg
		1.5	in	90deg
		2	in	90deg
		3	in	90deg
		4	in	90deg
		6	in	90deg
		8	in	90deg
		10	in	90deg
		12	in	90deg
		14	in	90deg
		16	in	90deg
		18	in	90deg
		20	in	90deg
		24	in	90deg
		26	in	90deg
		28	in	90deg
		30	in	90deg
		32	in	90deg
		34	in	90deg
		36	in	90deg

This lists the automated "snap" angles when routing a turn feature.





Default Change of Direction

Head	BendAngleFrom	BendAngleTo	FunctionalShortCode
Start			
	10deg	44.5deg	<45 Degree Direction Change
	44.5deg	45.5deg	45 Degree Direction Change
	45.5deg	89.5deg	45-90 Degree Direction Change
	89.5deg	90.5deg	90 Degree Direction Change
End			

This rule enables the spec writer to define the default type of change-of-direction fitting on the basis of the piping materials class, the nominal piping diameter, and the bend angle.

In addition, it should be possible that both elbows, pipe bends, and miters exist in the same piping materials class, in the same size range, and for the same bend angle.

Weld Clearance Rule

Head	SpecName	NominalPipingDiameterFrom	NominalPipingDiameterTo	NominalPipingDiameterUnits	WeldClass	WeldClearanceRadiusIncrease	WeldClearanceLength
Start							
	1C0031	0.375	36	in	5	24in	36in
		0.375	36	in	10	36in	72in
		0.375	36	in	15	36in	72in
		0.375	36	in	20	36in	72in

This optional rule enables the spec writer to define a rule for defining the clearance to be associated with a weld in the 3D model for clash checking purposes. The weld clearance data is determined on the basis of the piping materials class, the nominal piping diameter range and the Weld Class (i.e. the determination of 'by pipe erector' versus 'by pipe fabricator' welds)