Process, Power and Marine Division

SP3D Piping Reference Data

8-Project Rules



INTERGRAPH

Piping Specification Rules

Piping Specification Rules are general rules used across all piping material classes in the project. The rules are as follows:

- Requirement Rules:
  - DefaultProjectOptions
  - ShortCodeHierarchyRule
  - DefaultChangeOfDirection
  - DefaultCommoditySelectionRule
  - MatingPorts
  - NPDEquivalence

  - BoltExtension
  - PreferredStudBoltLength
  - PreferredMachBoltLength
  - PreferredCapScrewLength
  - MachBoltLenCalTolerance
  - StudBoltLenCalTolerance
  - CapScrewLenCalTolerance

  - WeldModelRepresentationRule
  - WeldTypeRule

Optional Rules:

- **AllowablePipingMaterialsClass**

- **MinimumPipeLengthRule**
- **MinPipeLengthPurchase**

- **PortAlignment**
- **PipeBendingElongation**

- **FlaredPipe**
- **FieldLiningThickness**
- **FluidDensityRule**

- **SlipOnFlangeSetbackDistance**
- **PlateFlangeSetbackDistance**

- **WeldGapRule**
- **FieldFitLength**

Industry Commodity code option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

IndustryCommodityCodeOption ShortDescription	IndustryCommodityCodeOption LongDescription	Codelist Number
Use industry commodity code	Use industry commodity code to access piping catalog	5
Use contractor commodity code	Use contractor commodity code to access piping catalog	10

This option enables to spec writer to designate whether the industry commodity code or contractor code from the piping commodity material control data is to be used to access the Piping Catalog.

Branch ownership option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

BranchReportingOwnership ShortDescription	BranchReportingOwnership LongDescription	Codelist Number
Undefined	Undefined	1
Header	Header owns branch component	5
Branch	Branch owns branch component	10

This option enables the spec writer to define the default value to indicate whether olet-type branches are owned by the header run or owned by the branch run in terms of reporting and extracting isometric drawings.

Stud Bolt Length Round Off Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

BoltLengthRoundOffOption ShortDescription	BoltLengthRoundOffOption LongDescription	Codelist Number
None	None	5
Use Value	Use Value	10
Use list of preferred bolt lengths	Use list of preferred bolt lengths	15

This option enables the spec writer to define method to be used for stud bolt length round off in the stud bolt length calculations.

Stud Bolt Length Round Off Value

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

If the Stud Bolt Length Round Off option has been enabled and this value has been specified, the computed stud bolt length will be rounded up to the next increment of that round off value. This rule enables the spec writer to define the stud bolt length round off to be used in stud bolt length calculations as a unitted value (length). Note that a 0.0001” tolerance (or the metric equivalent) will be applied to the computed length. (e.g. computed stud bolt length is 2.75001” will be reported as 2.75” rather than 3.00”).

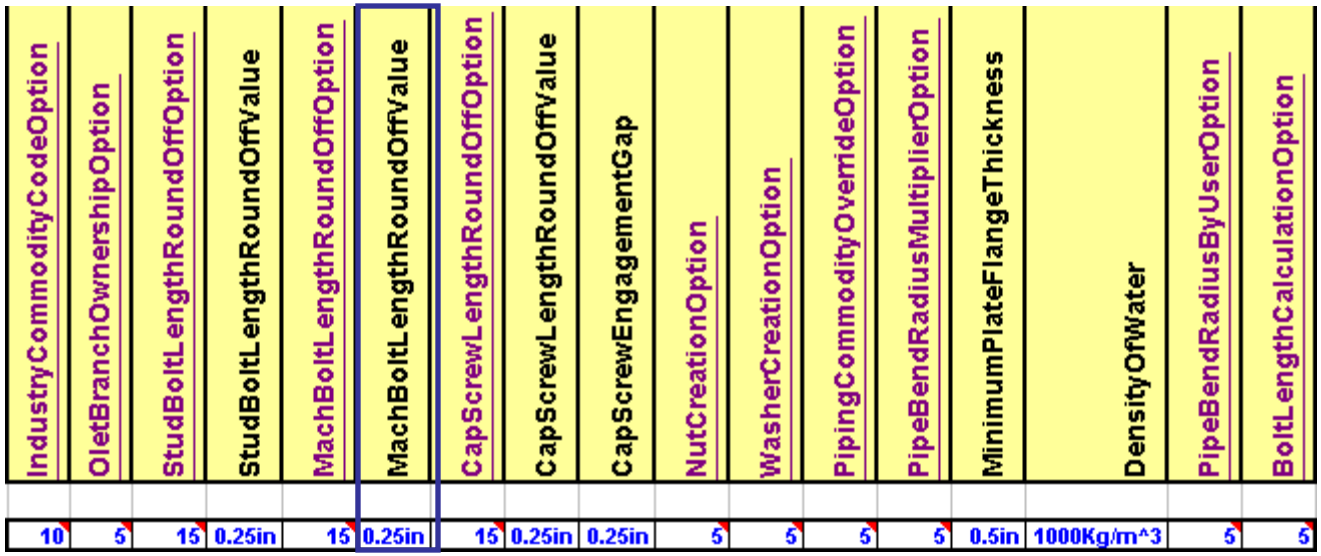
Machine Bolt Length Round-off option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

MachBoltLengthRoundOffOption ShortDescription	MachBoltLengthRoundOffOption LongDescription	Codelist Number
None	None	5
Use Value	Use Value	10
Use list of preferred machine bolt lengths	Use list of preferred machine bolt lengths	15

This option enables the spec writer to define method to be used for machine bolt length round off in the machine bolt length calculations.

Machine Bolt Length Round-off value



IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

This rule enables the spec writer to define the machine bolt length round off to be used in machine bolt length calculations as a unitted value (length).

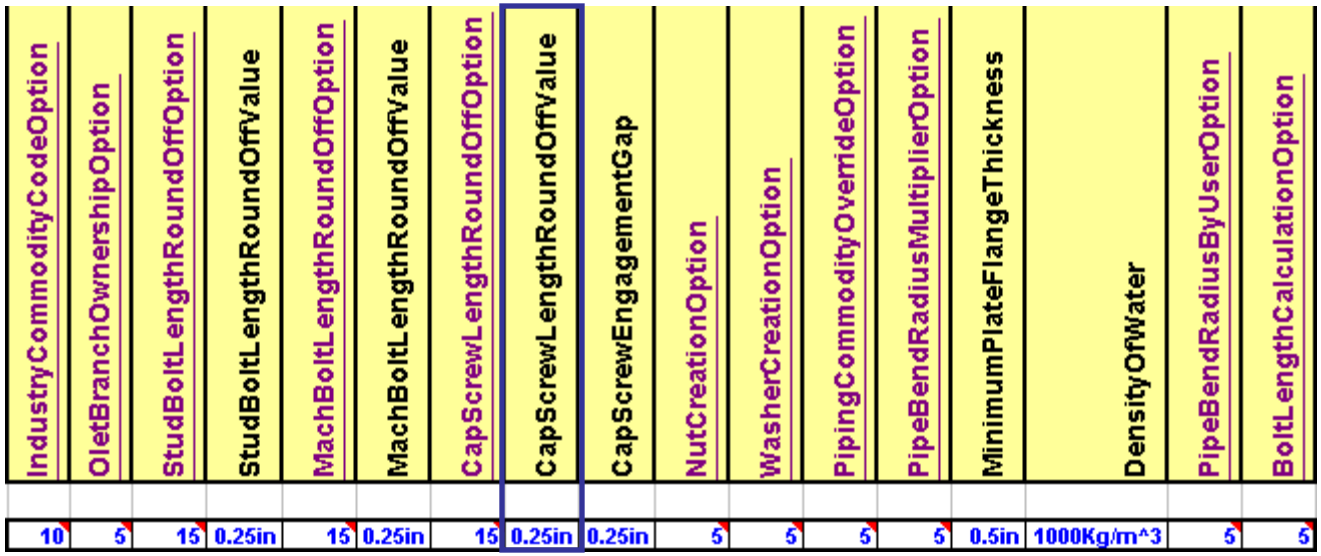
Cap Screw Length Round-Off Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

CapScrewLengthRoundOffOption ShortDescription	CapScrewLengthRoundOffOption LongDescription	Codelist Number
None	None	5
Use Value	Use Value	10
Use list of preferred cap screw lengths	Use list of preferred cap screw lengths	15

This option enables the spec writer to define method to be used for bolt length round off in the cap screw length calculations.

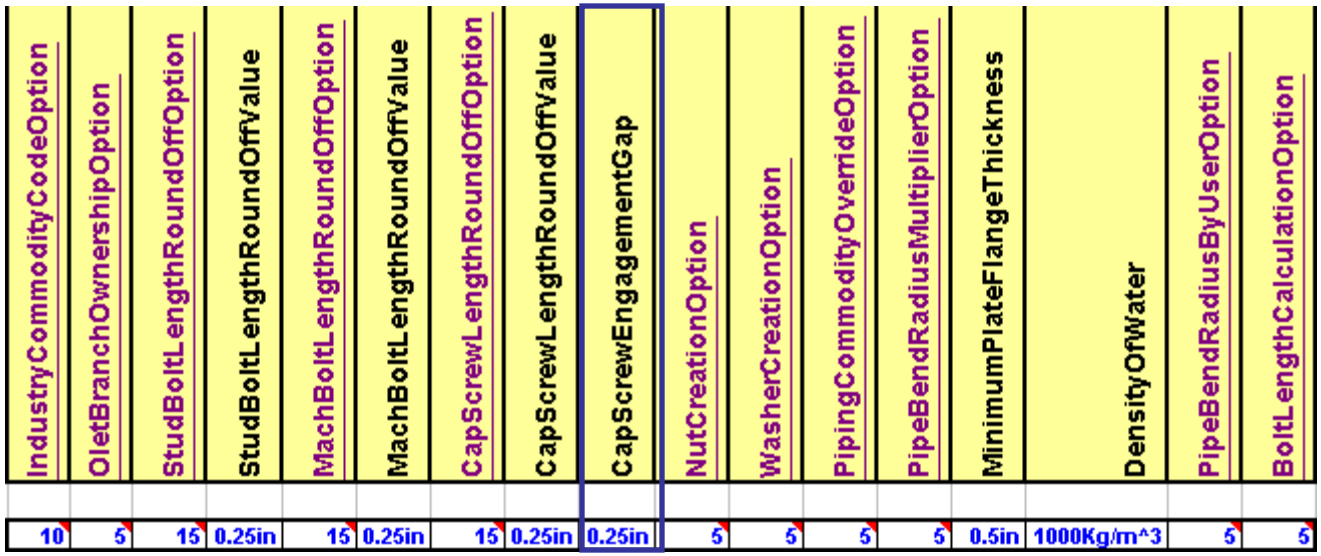
Cap Screw Length Round off Value



IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

If the Cap Screw Length Round Off option has been enabled and this value has been specified, the computed cap screw length will be rounded down to the next increment of that round off value. Note that a 0.0001” tolerance (or the metric equivalent) will be applied to the computed cap screw length value to address floating point math computational issues. As an example, if the round off value is 0.25” and the computed cap screw length is 2.74999”; the cap screw length will be reported as 2.75” rather than 2.50”.

Cap Screw Engagement Gap



IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

This rule enables the spec writer to define the engagement gap to be used in bolt length calculations for cap screws in threaded holes. The value should be specified with appropriate units. The spec writer may specify a simple value that represents one-half of the gap between the ends of the cap screws inserted into each end of the threaded hole.

Nut Creation Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

NutCreationOption ShortDescription	NutCreationOption LongDescription	Codelist Number
Disable the creation of nuts	Disable the creation of nuts at a bolted joint	5
Enable the creation of nuts	Enable the creation of nuts at a bolted joint	10

This enables the spec writer to select an option to enable (or disable) the creation of nuts at a bolted joint.

Washer Creation Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

WasherCreationOption ShortDescription	WasherCreationOption LongDescription	Codelist Number
Disable the creation of washers	Disable the creation of washers at a bolted joint	5
Enable the creation of washers	Enable the creation of washers at a bolted joint	10

This enables the spec writer to select an option to enable (or disable) the creation of washers at a bolted joint.

Piping Commodity Override Option

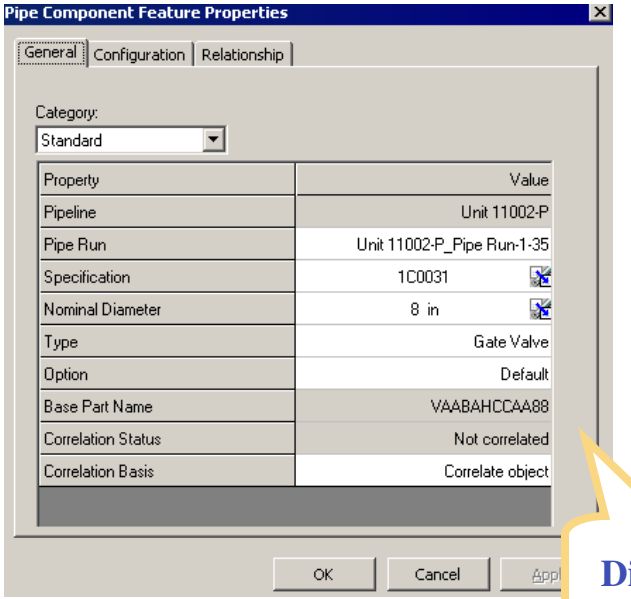
IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

PipingCommodityOverrideOption ShortDescription	PipingCommodityOverrideOption LongDescription	Codelist Number
Undefined	Undefined	1
Piping commodity overrides are disabled	Piping commodity overrides are disabled	5
Piping commodity overrides are enabled	Piping commodity overrides are enabled	10

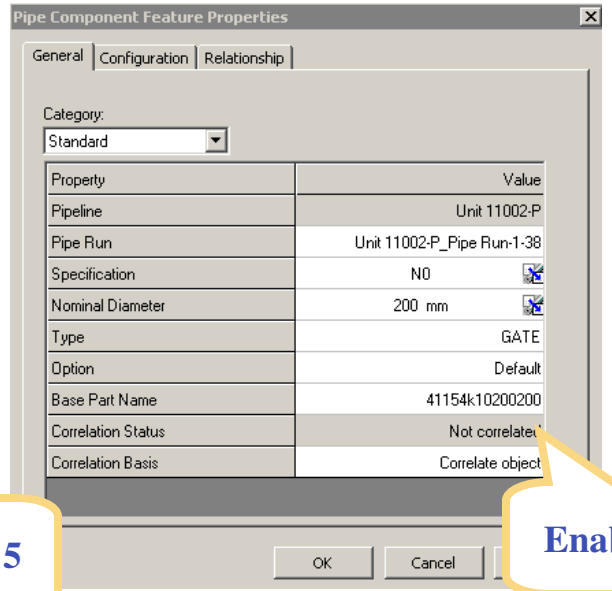
This option enables the spec writer to enable (or disable) the use of piping commodity overrides by the piping designer in the 3D model

Piping Commodity Override Option

- **Management of commodity overrides (Base Part Name)**



Disable - 5



Enable - 10

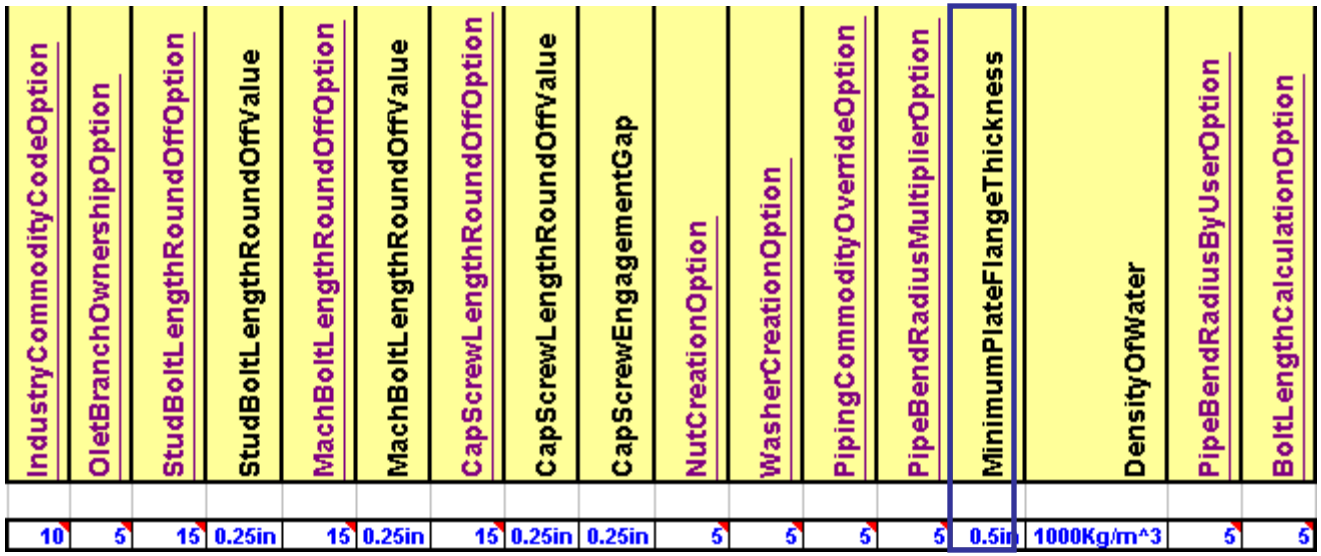
Pipe Bend Radius Multiplier Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

PipeBendRadiusMultiplierOption ShortDescription	PipeBendRadiusMultiplierOption LongDescription	Codelist Number
Pipe bend radius by computation using NPD	Pipe bend radius is to be determined by computation, using nominal piping diameter	5
Pipe bend radius by rule	Pipe bend radius is to be determined by rule	10
Pipe bend radius by computation using OD	Pipe bend radius is to be determined by computation, using outside diameter	15

This option enables the spec writer to define the basis of calculation of Pipe Bend Radius.

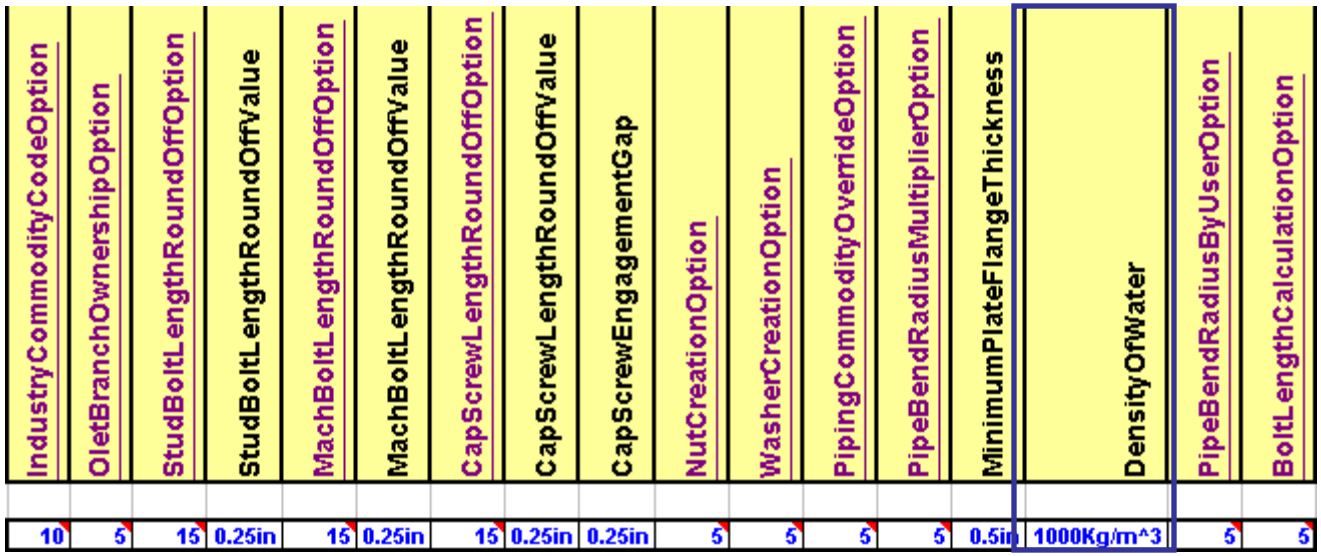
Minimum Plate Flange Thickness



IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

A plate flange requires an extra weld at the face of flange, if the flange thickness exceeds a minimum plate flange thickness for welds. This rule enables the spec writer to define the unitted value for the minimum plate flange thickness for welds. The value specified should include the units.

Density of Water



IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

This is a unitted value that represents the density of water for which the water weight data in the Piping Catalog applies.

Pipe Bend Radius by User Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

PipeBendRadiusByUserOption ShortDescription	PipeBendRadiusByUserOption LongDescription	Codelist Number
Pipe bend radius by user is disabled	Pipe bend radius by user is disabled	5
Pipe bend radius by user is enabled	Pipe bend radius by user is enabled	10

This option will enable the spec writer to determine whether piping designers are to be provided with the flexibility to override the pipe bend radius in the Piping Specification for pipe bends and mitered elbows.

Bolt Length Calculation Option

IndustryCommodityCodeOption	OletBranchOwnershipOption	StudBoltLengthRoundOffOption	StudBoltLengthRoundOffValue	MachBoltLengthRoundOffOption	MachBoltLengthRoundOffValue	CapScrewLengthRoundOffOption	CapScrewLengthRoundOffValue	CapScrewEngagementGap	NutCreationOption	WasherCreationOption	PipingCommodityOverrideOption	PipeBendRadiusMultiplierOption	MinimumPlateFlangeThickness	DensityOfWater	PipeBendRadiusByUserOption	BoltLengthCalculationOption
10	5	15	0.25in	15	0.25in	15	0.25in	0.25in	5	5	5	5	0.5in	1000Kg/m^3	5	5

BoltLengthCalculationOption ShortDescription	BoltLengthCalculationOption LongDescription	Codelist Number
Bolt length calculations are enabled	Bolt length calculations are enabled	5
Bolt length calculations are disabled	Bolt length calculations are disabled	10

This option enables the spec writer to define whether bolt lengths are to be calculated. The default state will be that the calculation of bolt lengths is enabled.

Non-Radial Tangent Branch Outside Diam Multiplier

- Type the multiplier for the piping header outside diameter to be used to determine the protrusion of the branch pipe into the header pipe when the non-radial branch is tangential with respect to the header pipe. Typically, the protrusion of the branch into the header is 0.5 x the header outside diameter for a tangential, non-radial branch.

Non-Radial Offset Branch Outside Diam Multiplier

- Type the multiplier for the piping header outside diameter to be used to determine the protrusion of the branch pipe into the header pipe when the non-radial branch is offset from the header centerline, but not tangential. Typically, the protrusion of the branch into the header is 0.375 x the header outside diameter for an offset, non-radial branch.

Piping Commodity Catalog Part No Basis Option

- This option allows you to enable the use of the size-dependent commodity code as the piping commodity catalog part number in lieu of concatenating the piping commodity catalog part number from the industry commodity code and the nominal piping diameter for each of the piping points.

Piping Commodity Procurement Data Option

- Specifies whether the contractor commodity code or the industry commodity code is to be used to query the piping commodity procurement data:

- Not applicable (5)
- Determine procurement data based on contractor commodity code (10)
- Determine procurement data based on industry commodity code (15)

If you do not specify a value, the not applicable option is used by default.

Bolt Diameter Equivalence Option

- Specifies whether the bolt diameter equivalence rule for reporting the bolt diameter is enabled (10) or disabled (5). If you do not specify a value, the default is to disable the rule.
For example, enable this option when you are required to use ASME fittings in a metric model, but also use real metric bolts.

GsktSInForMismatchBltdEndsOpt

-

Undefined Service Limits Rule Option

- Specifies whether to allow pressure/temp for service limits to be left undefined by the user at the start of a new line.

Short Code Hierarchy

This option enables to spec writer to designate which short codes are to be exposed to the piping designer under which Hierarchy Type.

This rule will validate the short code name.

ShortCodeHierarchyType	ShortCode
Valves	Ball Valve
Valves	BFYLP
Valves	Butterfly Valve
Valves	Check Valve
Valves	Deluge Valve
Valves	Diaphragm Valve
Valves	GATE
Valves	Gate Valve
Valves	GATEAO
Valves	GLO
Valves	Globe Valve
Valves	Horizontal Lift Check Valve
Valves	Instrument Root Valve
Valves	Needle Valve
Valves	Plug Valve
Valves	SCHK
Valves	Swing Check Valve
Valves	Vent-Drain Valve
Valves	Vertical Lift Check Valve
Valves	Wafer Check Valve
Valves	Y Globe Valve
Flanges	Flange
Flanges	Flange at Fitting
Flanges	FSO
Flanges	FWN
Flanges	Socket Weld Flange
Flanges	Weld Neck Flange
Flanges	Orifice Flange

Default Commodity Selection Rule

This rule enables the spec writer to define the short code to be used to select the correct piping commodity in the automated placement of fittings. These can be considered as functional short codes (generic short codes).

FeatureType	*GenericShortCode*
Concentric Size Change	Concentric Size Change
Eccentric Size Change	Eccentric Size Change
Flange	Flange
Flange at Fitting	Flange at Fitting
Piping	Piping
Hub or Ferrule	Ferrule
Female Threaded against Female Threaded Connector	Male Threaded by Male Threaded Connector
Female Threaded against Female Welded Connector	Male Threaded by Male Welded Connector
Male Threaded against Male Threaded Connector	Female Threaded by Female Threaded Connector
Male Threaded against Male Welded Connector	Female Threaded by Female Welded Connector
Spacer	Spacer
Distance Piece	Distance Piece
Jacket Closure	Jacket Closure Fitting

Default Change of Direction Rule

This optional rule enables the spec writer to define the boundaries of the default change-of-direction fittings *during the automatic placement.*

BendAngleFrom	BendAngleTo	FunctionalShortCode
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

Mating Ports Rule

This rule enables the spec writer to define the rules of compatibility for the end preparation of two mating ends.

EndPrep1	EndPrep2
11	11
11	21
11	61
11	71
11	111
11	121
21	21
21	61
21	71
21	111
21	121
21	201
21	202
21	211
21	212
31	31
31	131
31	221

NPD Equivalence Rule

This optional rule enables the spec writer to define a correlation between the nominal piping diameters of the primary system of units for nominal piping diameter with the nominal piping diameters of the secondary system of units

NPDInPrimaryUnitsOfMeasu	PrimaryUnitsOfMeasure	NPDInSecondaryUnitsOfMe	SecondaryUnitsOfMeasure
0.125	in	6	mm
0.1875	in	7	mm
0.25	in	8	mm
0.375	in	10	mm
0.5	in	15	mm
0.625	in	18	mm
0.75	in	20	mm
1	in	25	mm
1.25	in	32	mm
1.5	in	40	mm
2	in	50	mm
2.5	in	65	mm
3	in	80	mm
3.5	in	90	mm

Bolt Extension Length Rule

The Bolt Extension rule will enable the spec writer to define the required bolt extensions for stud bolts and machine bolts.

NominalPipingDiameter	NominalPipingDiameterUnits	PressureRating	EndPreparation	EndStandard	StandardBoltExtensionForStuds	AltBoltExtensionForStuds2	AltBoltExtensionForStuds3	AltBoltExtensionForStuds4	AltBoltExtensionForStuds5	AltBoltExtensionForStuds6	StandardBoltExtForMachBolts	AltBoltExtensionForMachBolts2	AltBoltExtensionForMachBolts3	AltBoltExtensionForMachBolts4	AltBoltExtensionForMachBolts5	AltBoltExtensionForMachBolts6
150# Flange Rating																
150-11-5	150# Flat Face End Standard 5 (Default)															
Source: ANSI B16.5 1996																
0.5	in	150	11	5												
0.75	in	150	11	5												
1	in	150	11	5												
1.25	in	150	11	5												
1.5	in	150	11	5												
2	in	150	11	5												
2.5	in	150	11	5												
3	in	150	11	5												
3.5	in	150	11	5												

Preferred Stud Bolt Length

This rule enables the spec writer to define the list of available purchased, or preferred, stud bolt lengths, as a function of the stud bolt diameter, and optionally the materials grade of the bolt.

BoltDiameterFrom	BoltDiameterTo	BoltDiameterIncrement	MaterialsGrade	PreferredBoltLengthFrom	PreferredBoltLengthTo	PreferredBoltLengthIncrement
0.5in	1.875in	0.125in	4031	1in	24in	0.25in
2in	2.875in	0.25in	4031	6in	30in	0.5in
3in	4in	0.25in	4031	12in	36in	1in
0.5in	1.875in	0.125in	4034	1in	24in	0.25in
2in	2.875in	0.25in	4034	6in	30in	0.5in
3in	4in	0.25in	4034	12in	36in	1in
0.5in	1.875in	0.125in	4038	1in	24in	0.25in
2in	2.875in	0.25in	4038	6in	30in	0.5in
3in	4in	0.25in	4038	12in	36in	1in

Stud Bolt Length Tolerance Rule

This enables the spec writer to define the tolerance to be applied to the bolt length calculation for studs on the basis of the stud length. The value is specified along with its units

BoltLengthFrom	BoltLengthTo	BoltDiameterFrom	BoltDiameterTo	BoltLengthTolerance
1in	12in	0.25in	4in	-0.06in
12.0001in	18in	0.25in	4in	-0.12in
18.0001in	48in	0.25in	4in	-0.25in

Bolt Length Calculation Studs for Flanged Ends

- Example:

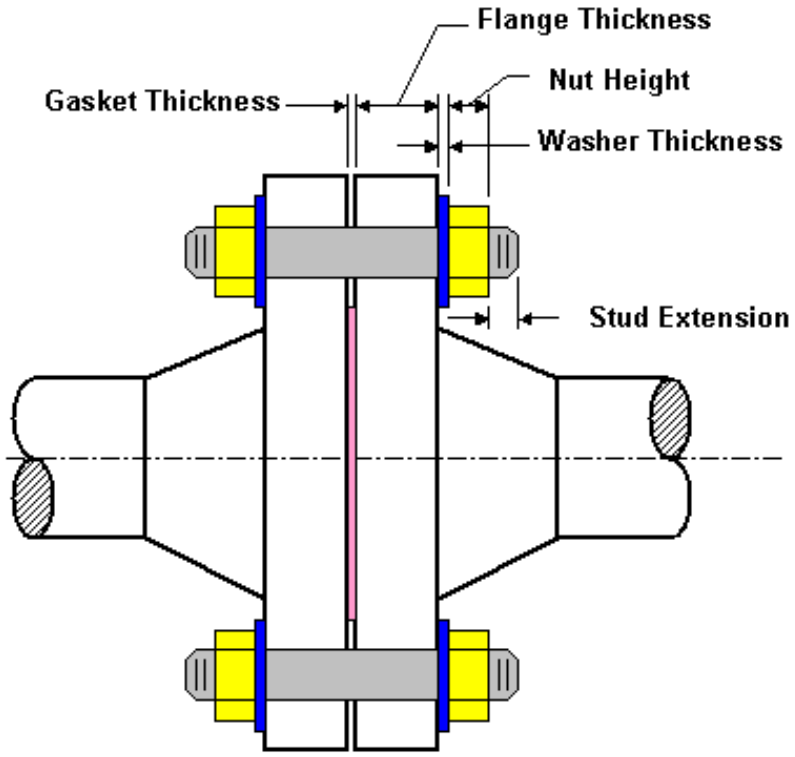
Per ASME 16.5 (1996), Annex F, bolt lengths are to be computed for stud bolts and machine bolts, as follows.

$$\text{Stud Length} = 2 * (C + t + d) + G + F - a + n$$

$$\text{Machine Bolt Length} = 2 * (C + t) + d + G + F + p - a + n$$

C	flange thickness
G	gasket thickness (1/8") for raised face, male and female, and tongue and groove - also approximate distances between ring joint flanges
F	total height of facings or depth of ring joint groove for both faces (flange face projection or groove depth)
a	Seating depth – this value is zero, except where the small female face is on the end of pipe, a = 3/16"
d	heavy nut height (equals nominal bolt diameter) or nut part
n	negative tolerance on bolt length
p	allowance for height of point of machine bolt (= 1.5 times thread pitch)
t	tolerance for flange thickness

Bolt Length Calculation Studs for Flanged Ends



Piping Commodity
Material Data Control
Gasket & Bolt requirement options

Nut Selection Filter
Nut Height option

Washer Selection Filter
Washer Thickness option

Bolt Selection Filter
Bolt Extension option

Nut Height	*CL*
Default	*1*
Option 2	*2*
Option 3	*3*

Washer Thk.	*CL*
Option 2	*2*
Option 3	*3*

Bolt Ext.	*CL*
Option 2	*2*
Option 3	*3*

Bolted End Generic Data

Flange Thickness
- Nut Height
- Washer Thickness
- Bolt Extension

Gasket Part Data
Gasket Thickness

Bolt Part Data
Bolt type

Bolt Type	*CL*
Stud bolt	*5*
Machine bolt	*10*
Cap screw	*15*

Preferred Machine Bolt Length Rule

This rule enables the spec writer to define the list of available purchased, or preferred, machine bolt lengths, as a function of the machine bolt diameter, and optionally the materials grade of the machine bolt.

BoltDiameterFrom	BoltDiameterTo	BoltDiameterIncrement	MaterialsGrade	PreferredBoltLengthFrom	PreferredBoltLengthTo	PreferredBoltLengthIncrement
0.5in	1.875in	0.125in	4031	1in	24in	0.25in
2in	2.875in	0.25in	4031	6in	30in	0.5in
3in	4in	0.25in	4031	12in	36in	1in
0.5in	1.875in	0.125in	4034	1in	24in	0.25in
2in	2.875in	0.25in	4034	6in	30in	0.5in
3in	4in	0.25in	4034	12in	36in	1in
0.5in	1.875in	0.125in	4038	1in	24in	0.25in
2in	2.875in	0.25in	4038	6in	30in	0.5in
3in	4in	0.25in	4038	12in	36in	1in

Machine Bolt Length Calc. Tolerance

This enables the spec writer to define the tolerance to be applied to the bolt length calculation for machine bolts on the basis of the bolt length and the bolt diameter.

BoltLengthFrom	BoltLengthTo	BoltDiameterFrom	BoltDiameterTo	BoltLengthTolerance
0.5in	1in	0.25in	0.75in	-0.03in
1.0001in	2.5in	0.25in	0.375in	-0.04in
1.0001in	2.5in	0.4375in	0.5in	-0.06in
1.0001in	2.5in	0.5625in	0.75in	-0.08in
1.0001in	2.5in	0.875in	1in	-0.10in
1.0001in	2.5in	1.125in	1.5in	-0.12in
1.0001in	2.5in	1.625in	4in	-0.18in
2.5001in	4in	0.25in	0.375in	-0.06in
2.5001in	4in	0.4375in	0.5in	-0.08in
2.5001in	4in	0.5625in	0.75in	-0.10in
2.5001in	4in	0.875in	1in	-0.14in
2.5001in	4in	1.125in	1.5in	-0.16in
2.5001in	4in	1.625in	4in	-0.20in

Bolt Commodity Code Substitution Rule

This enables the spec writer to

Head	ContractorCommodityCode	BoltDiameter	BoltLength	BoltCommodityCode
Start				
	BAZZZZZZAAYBETZZUS	0.25in	2in	BAZZAAAEAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.25in	2.25in	BAZZAAAFAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.25in	2.5in	BAZZAAAGAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.25in	2.75in	BAZZAAAHAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	2in	BAZZABAEAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	2.25in	BAZZABAFAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	2.5in	BAZZABAGAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	2.75in	BAZZABAHAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	3in	BAZZABAIAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	3.25in	BAZZABAJAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	3.5in	BAZZABAKAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	3.75in	BAZZABALAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.375in	4in	BAZZABAMAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.5in	2in	BAZZACAEAAYBETZZUS
	BAZZZZZZAAYBETZZUS	0.5in	2.25in	BAZZACAFAAYBETZZUS

Preferred Cap Screw Length

This rule enables the spec writer to define the list of available purchased, or preferred, cap screw lengths, as a function of the cap screw diameter, and optionally the materials grade of the cap screw.

BoltDiameterFrom	BoltDiameterTo	BoltDiameterIncrement	MaterialsGrade	PreferredBoltLengthFrom	PreferredBoltLengthTo	PreferredBoltLengthIncrement
0.5in	1.875in	0.125in	4031	1in	24in	0.25in
2in	2.875in	0.25in	4031	6in	30in	0.5in
3in	4in	0.25in	4031	12in	36in	1in
0.5in	1.875in	0.125in	4034	1in	24in	0.25in
2in	2.875in	0.25in	4034	6in	30in	0.5in
3in	4in	0.25in	4034	12in	36in	1in
0.5in	1.875in	0.125in	4038	1in	24in	0.25in
2in	2.875in	0.25in	4038	6in	30in	0.5in
3in	4in	0.25in	4038	12in	36in	1in

Cap Screw Calculation Tolerance

This enables the spec writer to define the tolerance to be applied to the bolt length calculation for cap screws on the basis of the cap screw length and the cap screw diameter.

BoltLengthFrom	BoltLengthTo	BoltDiameterFrom	BoltDiameterTo	BoltLengthTolerance
0.5in	1in	0.25in	0.75in	-0.03in
1.0001in	2.5in	0.25in	0.375in	-0.04in
1.0001in	2.5in	0.4375in	0.5in	-0.06in
1.0001in	2.5in	0.5625in	0.75in	-0.08in
1.0001in	2.5in	0.875in	1in	-0.10in
1.0001in	2.5in	1.125in	1.5in	-0.12in
1.0001in	2.5in	1.625in	4in	-0.18in
2.5001in	4in	0.25in	0.375in	-0.06in
2.5001in	4in	0.4375in	0.5in	-0.08in
2.5001in	4in	0.5625in	0.75in	-0.10in
2.5001in	4in	0.875in	1in	-0.14in
2.5001in	4in	1.125in	1.5in	-0.16in
2.5001in	4in	1.625in	4in	-0.20in

Weld Model Representation Rule

This rule enables the spec writer to define a rule for describing the representation of a weld in the 3D model for visualization purposes. The weld visualization data should be determined from the Piping Specification on the basis of the nominal piping diameter (a range), and the weld class, i.e. the determination of 'by pipe erector' versus 'by pipe fabricator' welds.

NominalPipingDiameter	NominalPipingDiameter	NominalPipingDiameter	WeldClass	WeldRadiusIncrease	WeldThickness
0.5	1.5	in	5	0.125in	0.5in
2	12	in	5	0.1875in	0.75in
14	24	in	5	0.25in	1in
26	36	in	5	0.375in	1.5in
0.5	1.5	in	10	0.125in	0.5in
2	12	in	10	0.1875in	0.75in
14	24	in	10	0.25in	1in
26	36	in	10	0.375in	1.5in
0.5	1.5	in	15	0.125in	0.5in
2	12	in	15	0.1875in	0.75in
14	24	in	15	0.25in	1in
26	36	in	15	0.375in	1.5in
0.5	1.5	in	20	0.125in	0.5in
2	12	in	20	0.1875in	0.75in
14	24	in	20	0.25in	1in
26	36	in	20	0.375in	1.5in

Weld Type Rule

This rule enables the spec writer to define the data that determines the Weld Type on the basis of the Fabrication Type of the two welded ends forming the welded joint.

WeldClass ShortDescription	WeldType ShortDescription	Codelist Number
Undefined		1
	Undefined	1
	Pipe Connector	2
By Pipe Fabricator		5
	Shop weld	5
	Shop weld at job site fabrication shop	10
	Automatic shop weld	15
	Miter weld	20
	Miter weld at job site fabrication shop	25
By Pipe Erector		10
	Field weld at assembly site	30
	Field weld at job site, including offshore	35
By Pipe Erector, Loose Material		15
	Field weld at job site for loose flange	50
By Pipe Erector, Field Fit		20
	Field fit weld at assembly site	40
	Field fit weld at job site	45
	Field fit for nozzle at assembly site	50
	Field fit for nozzle at job site	55

ConstructionRequirement ShortDescription	Codelist Number
Undefined	1
New	2
Existing	3
Future	8

FabricationTypeOfEnd1	ConstructionRequirementOfEnd1	FabricationTypeOfEnd2	ConstructionRequirementOfEnd2	WeldType
SF	2	SF	2	5
SF	2	SF	3	35
SF	2	SF	8	35
SF	3	SF	2	35
SF	3	SF	3	35
SF	3	SF	8	35
SF	8	SF	2	35
SF	8	SF	3	35
SF	8	SF	8	35

Minimum Pipe Length Rule

This rule enables the spec writer to define the minimum pipe length and the preferred minimum pipe length for random length plain piping or tubing based on the nominal piping diameter.

The minimum pipe length values that are specified in this rule should be considered as the minimum acceptable value. Any value less than the minimum pipe length minus a computational tolerance should be considered unacceptable.

The preferred minimum pipe length should be considered as a warning that should result in an inconsistency being reported, but should not prohibit the placement of the plain piping or tubing.

NominalPipingDiameter	NominalPipingDiameterUnits	MinimumPipeLength	PreferredMinimumPipeLength
0.125	in	2in	2in
0.25	in	2in	2in
0.375	in	2in	2in
0.5	in	2in	2in
0.75	in	2in	2in
1	in	2in	2in
1.25	in	2in	2in
1.5	in	2in	2in

Port Alignment Rule

NominalPipingDiameterFrom	NominalPipingDiameterTo	NominalPipingDiameterUnits	EndPreparation	MethodOfTrimming	AcceptableAlignmentTolerance
0.5	1.5	in	421	10	5deg
0.5	1.5	in	441	10	5deg
0.5	4	in	401	10	5deg
2	8	in	301	5	3deg
2	8	in	541	15	3deg
2	8	in	542	15	3deg

This rule enables the spec writer to define whether a fitting is to be trimmed by adding more weld material or by trimming the end based on the true angle.

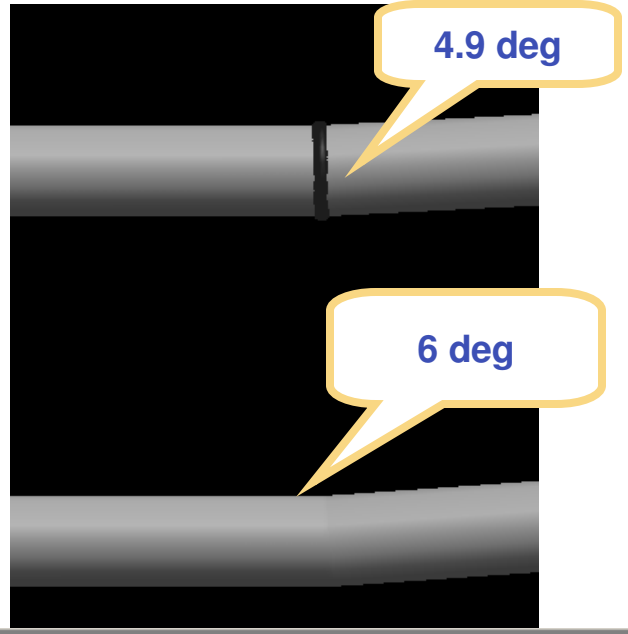
MethodsOfTrimming ShortDescription	MethodsOfTrimming LongDescription	Codelist Number
This is a system codelist. The user may change the textual value, but not the numeric value o		
By adding more weld material	Trim branch end by adding more weld material	5
On basis of true branch angle	Trim branch end on the basis of the true branch angle	10
Linear misalignment for mechanical end pipe	Linear misalignment for mechanical end pipe	15

MethodsOfTrimming | MirrorBehaviorOption | MiscRequisitionClassification

Port Alignment Rule

Port flexibility to allow connection of non-aligned objects

NominalPipingDiameterFrom	NominalPipingDiameterTo	NominalPipingDiameterUnits	EndPreparation	MethodOfTrimming	AcceptableAlignmentTolerance
0.5	1.5	in	421	10	5deg
0.5	1.5	in	441	10	5deg
0.5	4	in	401	10	5deg
2	8	in	301	5	3deg
2	8	in	541	15	3deg
2	8	in	542	15	3deg



To Do List

	Object name	State	Changed by	Date modified
	Pipe Turn Feature	In Error	INGRPPO\rhim	6/25/2003 5:01:00 PM

Pipe Bending Elongation Rule

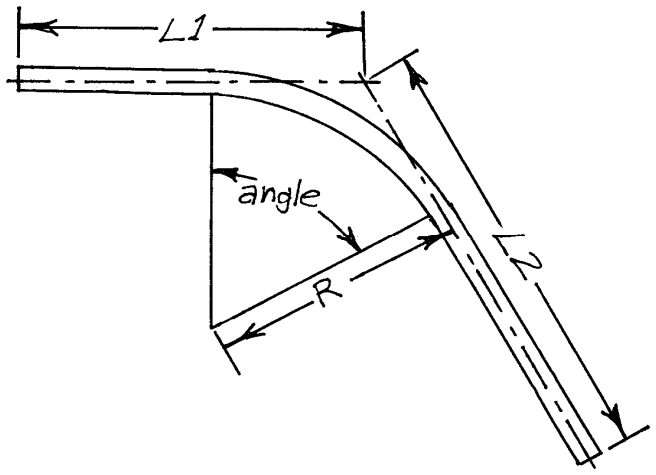
NominalPipingDiameter	NominalPipingDiameterUnits	PipeBendRadius	PipeElongationUnitBendAngle	BendAngle	PipeElongation
15	mm	22.5mm		1deg	0mm
15	mm	22.5mm		20deg	0mm
15	mm	22.5mm		30deg	0mm
15	mm	22.5mm		45deg	3mm
15	mm	22.5mm		50deg	4mm
15	mm	22.5mm		55deg	5mm
15	mm	22.5mm		60deg	6mm
15	mm	22.5mm		65deg	8mm
15	mm	22.5mm		70deg	10mm
15	mm	22.5mm		75deg	13mm
15	mm	22.5mm		80deg	15mm
15	mm	22.5mm		85deg	19mm
15	mm	22.5mm		90deg	23mm
15	mm	22.5mm		180deg	42mm

This optional rule enables the spec writer to define the pipe bending elongation data that is applicable to this piping materials class. The goal is to be able to report the correct cut length on the bill-of-materials for the isometric drawing.

Lcut = Lcc – e

Lcut	**Cut length**
Lcc	**Calculated centerline length**
e	**Pipe elongation**

$$L_{cc} = L_1 + L_2 - 2.0 * R * \tan (\alpha / 2.0) + R * \alpha$$



Field Fit Length Rule

This rule enables the spec writer to define the data for the field fit adjustment to increase the reported pipe lengths to account for installation practices based upon the Weld Type at each end of the pipe, the pipe's nominal piping diameter, and the Construction Requirement for each end of the welded joint.

WeldType ShortDescription	Codelist Number
	1
Undefined	1
Pipe Connector	2
	5
Shop weld	5
Shop weld at job site fabrication shop	10
Automatic shop weld	15
Miter weld	20
Miter weld at job site fabrication shop	25
	10
Field weld at assembly site	30
Field weld at job site, including offshore	35
	15
Field weld at job site for loose flange	50
	20
Field fit weld at assembly site	40
Field fit weld at job site	45
Field fit for nozzle at assembly site	50
Field fit for nozzle at job site	55

ConstructionRequirement ShortDescription	Codelist Number
Undefined	1
New	2
Existing	3
Future	8

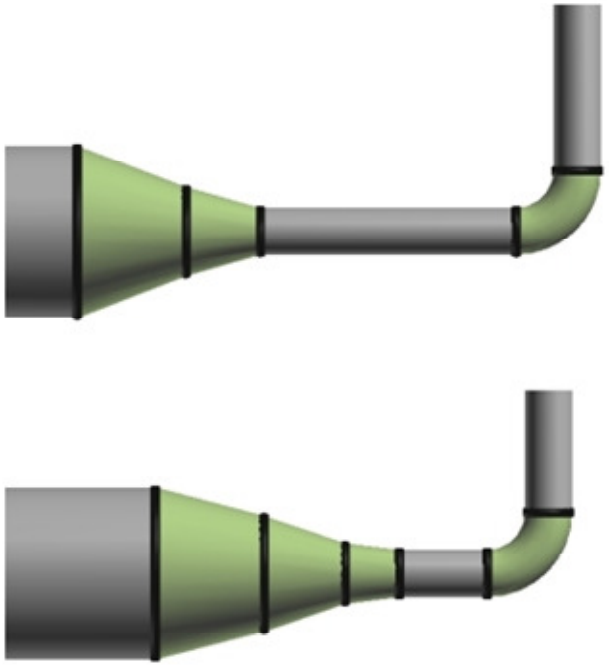
WeldType	NominalPipingDiameterFrom	NominalPipingDiameterTo	NominalPipingDiameterUnits	ConstructionRequirementEnd1	ConstructionRequirementEnd2	FieldFitLength
New against New						
40	0.5	1.5	in	2	2	6in
40	2	12	in	2	2	4in
40	14	36	in	2	2	3in
45	0.5	1.5	in	2	2	6in
45	2	12	in	2	2	4in
45	14	36	in	2	2	3in

Adjacent Reducers

Enables the spec writer to define the permissible size reductions for both concentric and eccentric reducers.

Ability to Have Multiple Adjacent Reducers

- Modification ribbon bar (feature)



SpecName	SizeReductionType	FirstSize	FirstSizeUnits	SecondSize	SecondSizeUnits	SizeReductionPreference	Fitting2FirstSize	Fitting2FirstSizeUnits	Fitting3FirstSize	Fitting3FirstSizeUnits	Fitting4FirstSize	Fitting4FirstSizeUnits
	Concentric Diameter Change											
1C0031	1	12	in	0.5	in	1	6	in	3	in		
	1	12	in	0.75	in	1	6	in	3	in		
	1	12	in	1	in	1	6	in	3	in		
	1	12	in	1.25	in	1	6	in	3	in		
	1	12	in	1.5	in	1	6	in	3	in		
	1	12	in	2	in	1	6	in	3	in		
	1	12	in	2.5	in	1	6	in				
	1	12	in	3	in	1	6	in				
	1	12	in	3	in	2	8	in	4	in		
	1	12	in	3.5	in	1	6	in				
	1	12	in	4	in	1	6	in				
	1	12	in	4	in	2	8	in				

…\SampleDataFiles\Sample Data Piping Specification.xls