

Albina Co., Inc.

Tolerance Guide

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Draw Bend Tolerances

Degree of bend: $\pm 1^\circ$

Plane of bend: $\pm 1^\circ$ (See Figure 1)

Flat Plane of bend: 1% of centerline radius (See Figure 2)

Lineal dimensions: (See Figure 1) non-accumulative

- 0-18" = $\pm 1/8$ "
- 18.01"-36" = $\pm 3/16$ "
- 36.01" and over = $\pm 1/4$ "

Diameter tolerance for 180° bends:

- 0-12" = $\pm 1/8$ "
- 12.01"-30" = $\pm 3/16$ "
- 30.01"-48" = $\pm 1/4$ "
- 48.01" and over = $\pm 3/8$ "

Offset Dimensions:

- 0-8" = $\pm 1/16$ "
- 8.01"-24" = $\pm 1/8$ "
- 24.01"-36" = $\pm 3/16$ "
- 36.01" and over = $\pm 1/4$ "

Ovality: If required by customer, 8-12% depending upon application. (See Figure 3)

- Not all bends are required to be checked for ovality. Example: handrailing, it must look and feel good. We are not checking ovality on all projects.

Backwall Thinning: Shop standard is 12-15% from actual wall thickness. (See Figure 4)

- Not all bent parts will be checked for backwall thinning. This must be discussed prior to order and must be clearly outlined by PM as to what is acceptable. Most codes for backwall thinning state "by design" so the customer must determine the acceptable percentage of backwall thinning. Reminder: mill tolerance allows for 10-12% thickness variation in the wall, so material may already come thinner than anticipated. We should have either a minimum wall thickness dimension or percentage based upon actual wall thickness NOT theoretical wall thickness.

Bend deformation: There are occasions when buckles cannot be avoided during bending.

- All wave shapes shall blend into the pipe/tube surface in a gradual manner.
- The maximum vertical height of any wave, measured from the average height of two adjoining crests to the valley, shall not exceed 3% of the nominal pipe/tube size. (See Figure 5 note 1)
- The minimum ratio of distance between crests as compared to the height between crests and the included valley should be 12 to 1. (See Figure 5 note 2)

Figure 1: Lineal dimension, angular and plane of bend

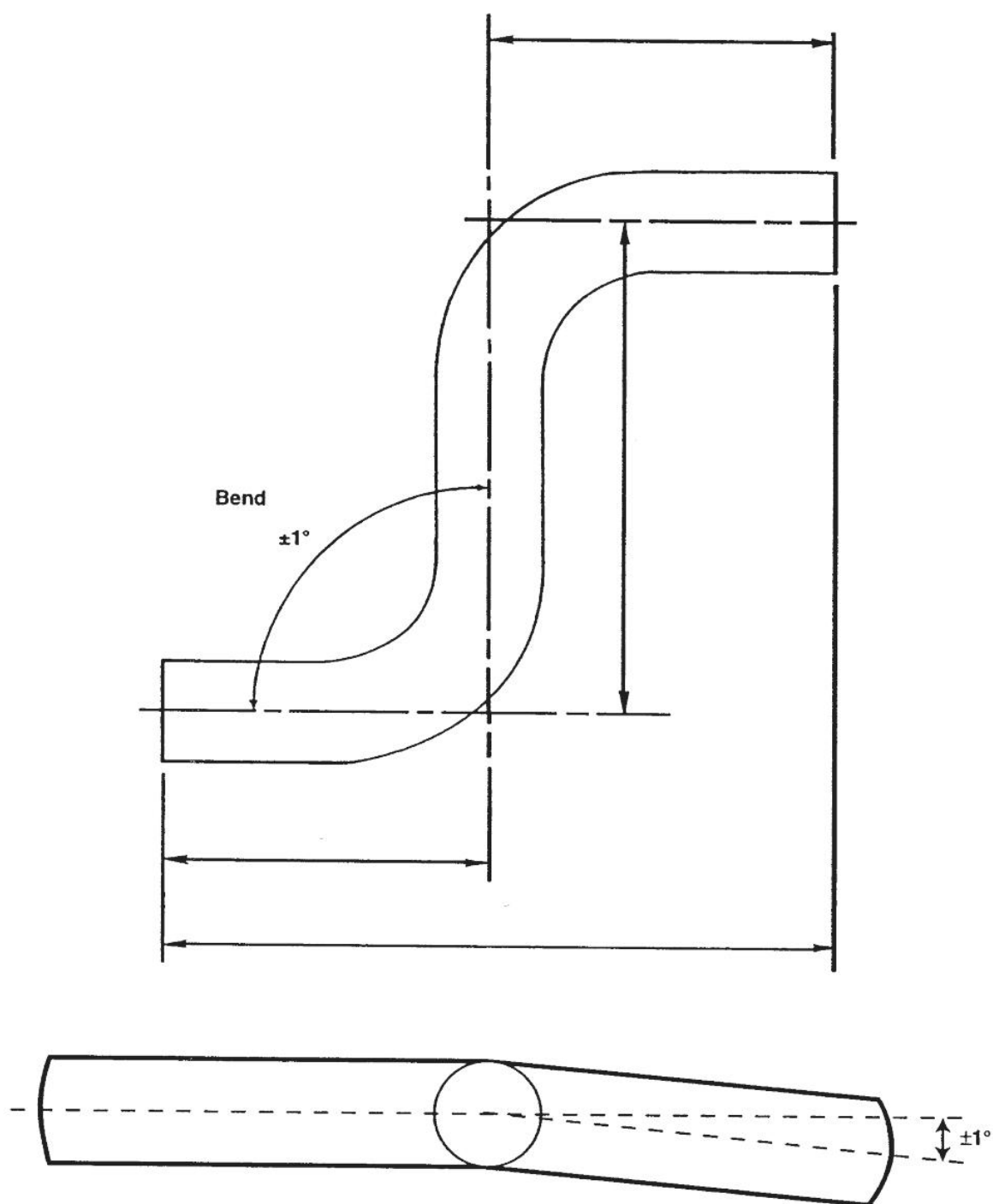


Figure 2: Flat plane of bend

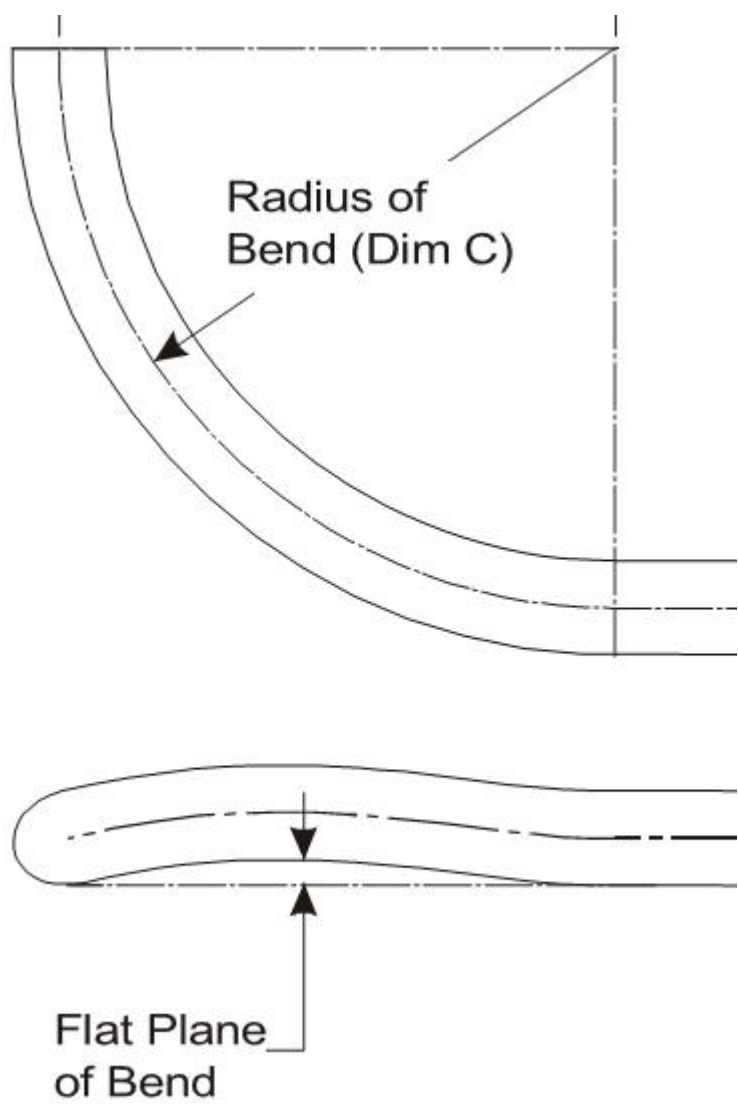
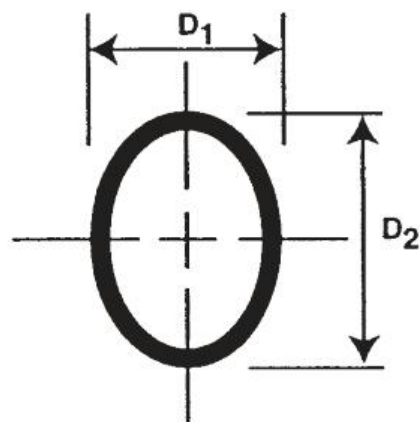
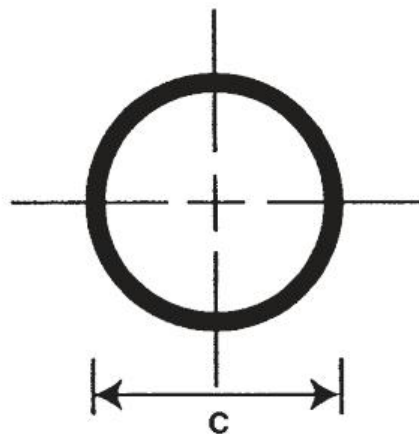


Figure 3:

Ovality

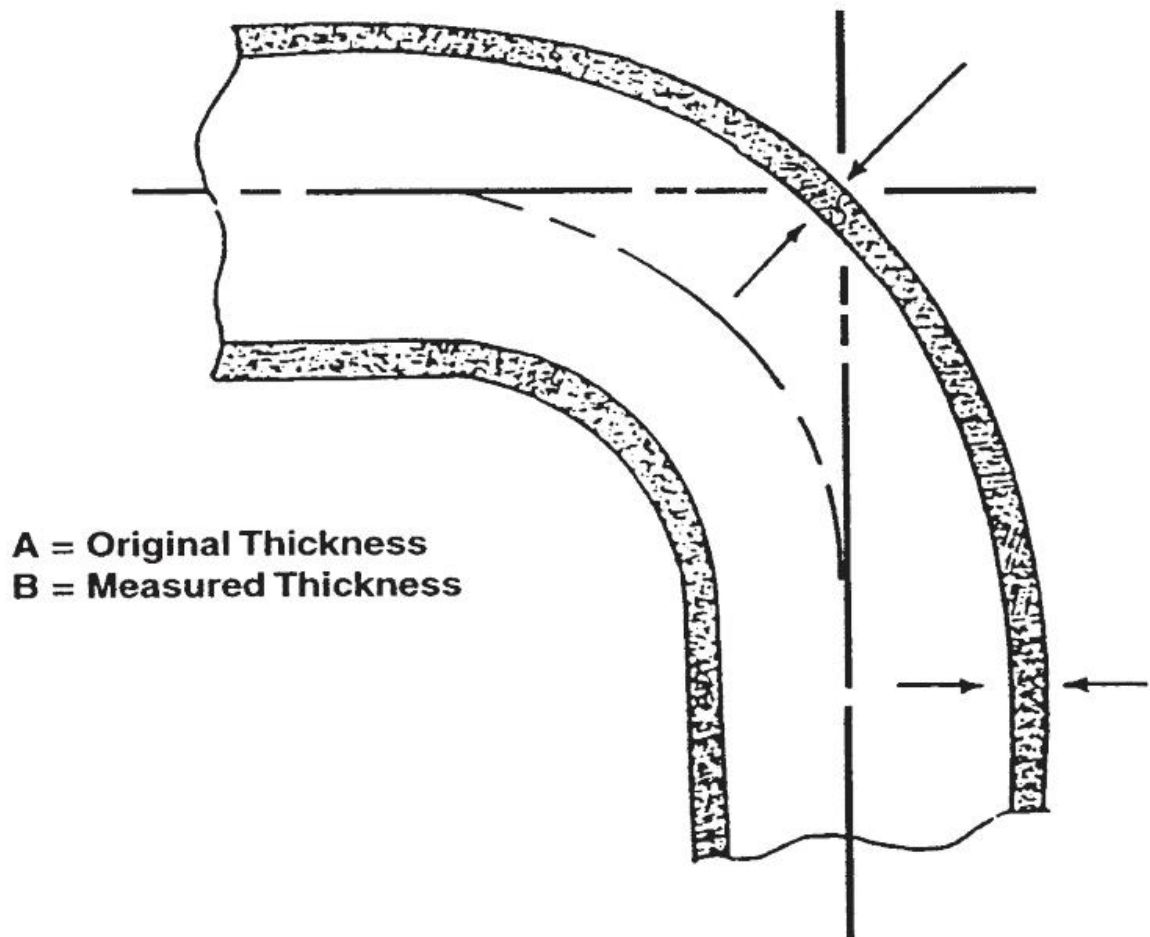
C = Original OD
D = Changed OD



$$\frac{D_2 - D_1}{C} \times 100 = \% \text{ of Ovality}$$

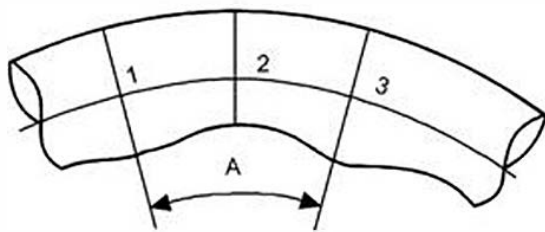
Figure 4:

Wall Thinning



$$\frac{A - B}{A} \times 100 = \% \text{ of Wall Thinning}$$

Figure 5:



**FIGURE 6.2
APPLICATION OF PIPE WALL BUCKLING
TOLERANCES**

Note 1 – Depth of average crest to valley is the sum of the outside diameters of the two adjoining crests divided by two, minus the outside diameter of the valley.

$$\text{Depth} = \frac{(\text{OD})_1 + (\text{OD})_3}{2} - (\text{OD})_2$$

Note 2 – Ratio of distance between crests to depth is:

$$\frac{A}{\text{Depth (per Note 1)}} \geq \frac{12}{1}$$

Plate Roll Tolerances

Cylinders

Plate cylinders 3/8" thick and under:

Diameter (OD) Tolerance +/-

- Up to 48" 3/16"
- 48" to 60" 1/4"
- 60" to 80" 3/8"
- 80" and over +/-1% of nominal diameter as per ASME BPVC VIII.3-2019 Section KF-131
- On thinner more flexible plate, the use of manual manipulation to hit diameter is allowed.

Plate cylinders 7/16" to 1" thick:

Diameter (OD) Tolerance +/-

- Up to 48" 1/8"
- 48" to 72" 3/16"
- 72" to 96" 1/4"
- 96" to 120" 3/8"
- 120" and over +/-1% of nominal diameter as per ASME BPVC VIII.3-2019 Section KF-131

Plate cylinders 1.12" thick and over:

Diameter (OD) Tolerance +/-

- Up to 36" 3/16"
- 36" to 60" 1/4"
- 60" to 90" 5/16"
- 90" to 144" 3/8"
- 144" and over +/-1% of nominal diameter as per ASME BPVC VIII.3-2019 Section KF-131

All cylinders will be checked for diameter in 3-4 places including both sides of seam. In addition to diameter being checked, the circumference will be checked top and bottom of cylinder to confirm proper amount of material is being supplied to net final cylinder.

Arcs

Plates that are rolled to a single radius will be checked using a chord stick to confirm the radius is consistent throughout the arc. If possible, the plate may be stood on edge and checked to a radius line on the floor to confirm it is within +/-1/4" of the radius line. This can be done under its own weight OR by manually moving material to fit within +/-1/4" of the radius line.

Elliptical arcs

Plates will be checked using a full-scale layout on the floor and stood on edge to fit lay out. Tolerance will vary depending on requirement, radius sizes, and/or length of part. This will be defined by QC prior to production.

Roll Tolerances

Diameter:

SR/R3/R4/MCP11		R7/R7/MCP30		R11/R13	
	+/-		+/-		+/-
0-30"	1/8"	0-48"	3/16"	0-72"	1/4"
30-54"	1/4"	48-96"	1/4"	72-96"	5/16"
54-78"	3/8"	96-120"	3/8"	96-120"	3/8"
78-120"	1/2"	over 120"	1/2"	over 120"	1/2"
over 120"	5/8"				

Angle: +/-1°

Height:

SR/R3/R4/MCP11		R7/R7/MCP30		R11/R13	
	+/-		+/-		+/-
0-24"	1/8"	0-36"	3/16"	0-48"	1/4"
24-48"	3/16"	36-72"	1/4"	48-96"	3/8"
over 48"	1/4"	over 72"	3/8"	over 96"	1/2"

Length:

0-48" = 1/2"

48-96" = 3/4"

over 96" = 1"

Template or Pattern: +/- 3/8" Actual tolerance will depend on template/pattern and customer needs.

Elliptical or Layout: Workpoint tolerance +/-1/2" End points are to be at "0". Adjacent workpoint will have a gradual transition from point to point. You cannot be full tolerance in both direction at adjacent workpoints.

Good (0", +1/4", +3/8", +1/8", 0", -1/8", -3/8", 0")

Bad (0", +1/2", -1/2", +3/8", 0", -1/2", +1/2", 0")

Coil Diameter:

SR/R3/R4/MCP11		R7/R7/MCP30		R11/R13	
	+/-		+/-		+/-
0-18"	1/8"	0-48"	1/4"	N/A	
18-36"	3/16"	48-84"	3/8"	N/A	
36-54"	1/4"	over 84"	1/2"	N/A	
over 54"	3/8"				

Please note the coil tolerances are subjective and should be discussed at time of quote or at latest the time of order. There are many variables that can/will impact actual dimensions. The pitch tolerance is turn to turn, there needs to be a set overall height of the coil tolerance determined at time of order.

Coil Pitch (c-c of turns):

SR/R3/R4/MCP11		R7/R7/MCP30		R11/R13	
	+/-		+/-		+/-
0-6"	1/4"	0-6"	3/16"	N/A	
6-12"	3/8"	6-12"	1/4"	N/A	
over 12"	1/2"	12-18"	3/8"	N/A	
		over 18"	1/2"	N/A	

FLAT: Flat will be checked on the floor while material is under its own weight. Typical tolerance is 3/8". If the part exceeds 3/8" but you can apply a small amount of pressure to material and the part sets flat on the floor, this is acceptable.

SQUARE:

Material Height	Tolerance
0-4^	1 / 8^
5-12^	1 / 4^
14" and over	3 / 8^

TWIST: Using the same dimensional rules for square but applied from end to end of material being checked. End to end can use full tolerance in opposite directions.

Spiral Handrail Tolerances

Tolerances for Cold Spiral bending

Plan view radius of 12' 0" or less

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft	+/- ½"	NA	+/- 2½°	+/- 1"	+/- ½"
10 ft - 17 ft	+/- ¾"	NA	+/- 3°	+/- 2"	+/- 1"
17+ ft - 24 ft	+/- 1"	NA	+/- 4°	+/- 3"	+/- 2"

*To properly QC, all handrails are stood up at full scale pitch.

Procedure for QC of Spiral Handrails Cold Bent (12 ft. plan view radius and tighter)

Spiral handrails are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Each different inside Plan View Radii is drawn out full scale on the floor.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along this drawn Plan View Radius arc. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed handrail is then mocked up at full elevation and plumbed using plumb bobs to match the inside of the handrail to the drawn Plan View Radius.

Each handrail is then checked to verify compliance to provided tolerances according to the following criteria:

Dimensions / features of geometry are checked at each of the three Point locations:

1 - Height – Calculated based on specified rise over run (i.e., 7" rise over 12" run). Tolerance would be the variance in height as measured from the calculated height as required at each point.

2 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

3 – Plumb to Radius Line – Projected Plan View Radius measured using plumb bobs down from handrail to drawn Plan View Radius on the floor. Tolerance would be variation of plumb bob point to the drawn line.

Additionally – Handrails are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Tolerances for Cold Spiral bending

Plan view radius greater than 12' 0"

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft	See Note 1	NA	+/- 2½°	NA	NA
10 ft - 17 ft	See Note 1	NA	+/- 3°	NA	NA
17+ ft - 24 ft	See Note 1	NA	+/- 4°	NA	NA

*To properly QC, all stringers are stood up at full scale pitch.

Notes:

1. Plumb to radius line tolerance is not applicable. Instead, Albina will use our standard shop chord and rise tolerances.

Procedure for QC of Spiral Handrails Cold Bent (Greater than 12 ft. plan view radius)

Spiral handrails are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along the arc of the handrail itself. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed handrail is then mocked up at full elevation and pitch.

Each handrail is then checked to verify compliance to provided tolerances according to the following criteria:

Dimensions / features of geometry are checked at each of the three Point locations:

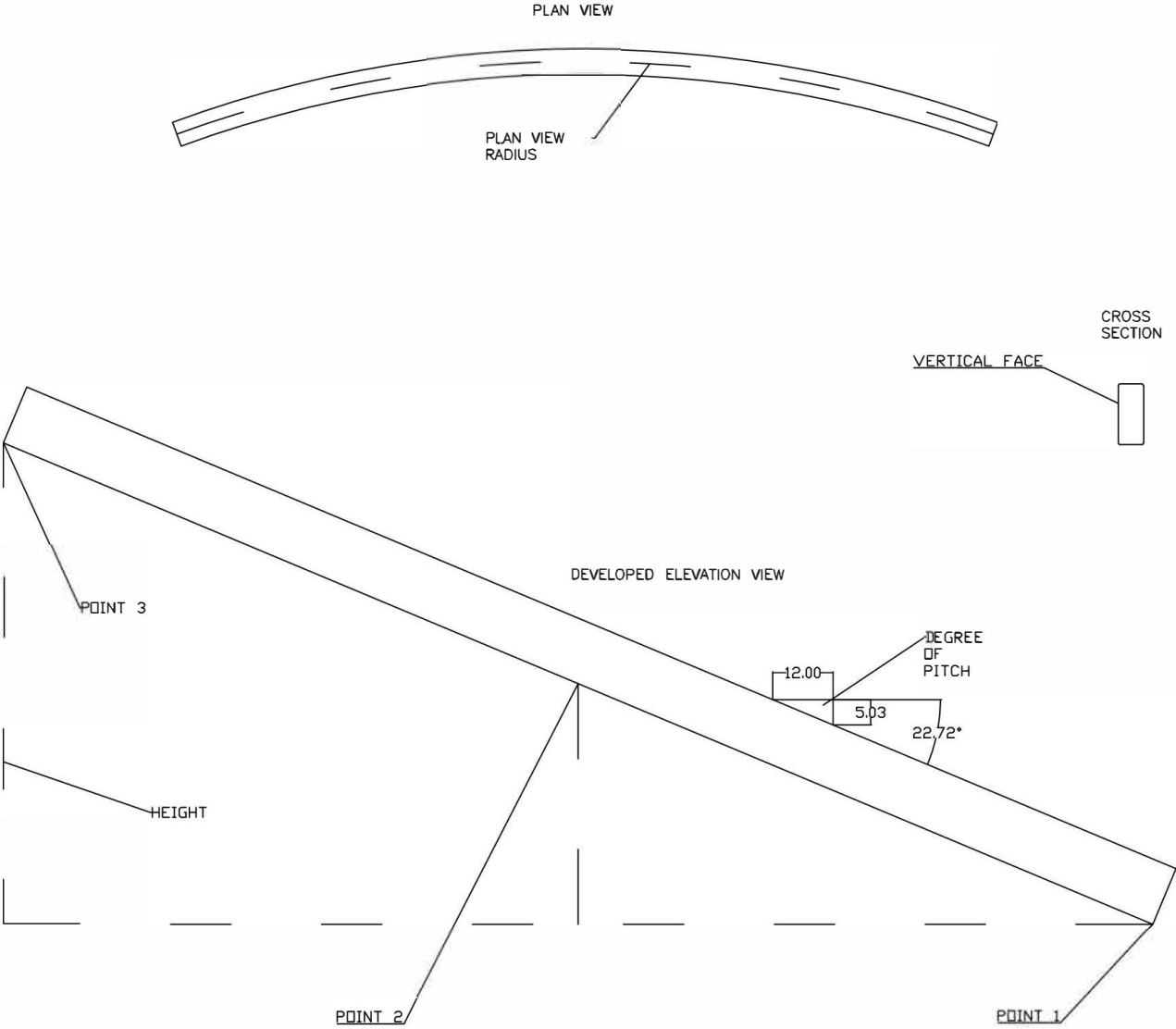
1 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

2 – Calculated actual bending radius is measured by chord and rise along length of stringer.

Additionally – Handrails are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Sample Drawing for reference dimensions



SPIRAL QC REPORT

Customer _____ SO# _____ PO# _____
 Material _____ Operator _____ Inspector _____

Direction of Rotation: CW / CCW DWG#/Part# _____

	Planview Radius	Actual Radius	Degree of Turn
CLR	_____	_____	Arc Required _____
Inside	_____	_____	Arc Supplied _____

Pitch in Degrees _____

	Required	
	Height	Chord
Height @ Top		
Height @ Middle		

	CHORD	RISE
1		
2		
3		
4		

Math/Layout Confirmed: _____

CHECKED AT

	Pc #1	Pc #2	Pc #3	Pc #4
Top				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				
Middle				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				
Bottom				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				

CHORD / RISE

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Spiral Tolerance

Tolerances for Cold Spiral bending *Plan view radius of 12' 0" or less*

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft**	+/- ½"	Within 3° overall	+/- 1°	+/- ½"	+/- ¼"
10 ft - 17 ft	+/- ¾"	Within 3½° overall	+/- 1°	+/- 1"	+/- ½"
17+ ft - 24 ft	+/- 1"	Within 4° overall	+/- 1½°	+/- 1½"	+/- 1"
over 24 ft	+/- 1"	Within 5° overall	+/- 1½°	+/- 2"	+/- 1"

*To properly QC, all stringers are stood up at full scale pitch.

**When arc is under 10ft, you are to use a ratio of the allowed tolerance. (ie 6ft = 60%, 5ft = 50%, 4ft = 40% etc). You are to round the required arc with extra to the nearest foot and use that percentage. (ie 33" would be 3ft, 51" would be 4ft).

Notes:

1. The level to vertical face is a cumulative tolerance. You cannot be more than half the allowed tolerance out at any one point.

Example: If your tolerance is 1.5° for the vertical face, you can be .75° out at the bottom, 0° out at the midpoint and .75° out at the top. This would be 1.5° out total. You would not be allowed to be more than .75° out at any given point since that would be more than half of your tolerance in one spot.

Procedure for QC of Spiral Stringers Cold Bent (12 ft. plan view radius and tighter)

Spiral stringers are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Each different inside Plan View Radii is drawn out full scale on the floor.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along this drawn Plan View Radius arc. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed stringer is then mocked up at full elevation and plumbed using plumb bobs to match the inside of the stringer to the drawn Plan View Radius.

Each stringer is then checked to verify compliance to provided tolerances according to the following criteria:

Four dimensions / features of geometry are checked at each of the three Point locations:

1 - Height – Calculated based on specified rise over run (i.e., 7" rise over 12" run). Tolerance would be the variance in height as measured from the calculated height as required at each point.

2 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

3 – Plumb to Radius Line – Projected Plan View Radius measured using plumb bobs down from stringer to drawn Plan View Radius on the floor. Tolerance would be variation of plumb bob point to the drawn line.

4 – Level to Vertical Face – Theoretically 90 Degrees from Level to Vertical Face of stringer. Measurements are taken with a bubble level protractor in degrees. Tolerance would be the variation from 90 degrees.

Additionally – Stringers are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Tolerances for Cold Spiral bending

Plan view radius greater than 12' 0"

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft**	See Note 1	Within 3° overall	+/- 1°	NA	NA
10 ft - 17 ft	See Note 1	Within 3½° overall	+/- 1°	NA	NA
17+ ft - 24 ft	See Note 1	Within 4° overall	+/- 1½°	NA	NA
over 24 ft	See Note 1	Within 5° overall	+/- 1½°	NA	NA

*To properly QC, all stringers are stood up at full scale pitch. **When arc is under 10ft, you are to use a ratio of the allowed tolerance. (ie 6ft = 60%, 5ft = 50%, 4ft = 40% etc). You are to round the required arc with extra to the nearest foot and use that percentage. (ie 33" would be 3ft, 51" would be 4ft).

Notes:

1. Plumb to radius line tolerance is not applicable. Instead, Albina will use our standard shop chord and rise tolerances.
2. The level to vertical face is a cumulative tolerance. You cannot be more than half the allowed tolerance out at any one point.

Example: If your tolerance is 1.5° for the vertical face, you can be .75° out at the bottom, 0° out at the midpoint and .75° out at the top. This would be 1.5° out total. You would not be allowed to be more than .75° out at any given point since that would be more than half of your tolerance in one spot.

Procedure for QC of Spiral Stringers Cold Bent (Greater than 12 ft. plan view radius)

Spiral stringers are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along the arc of the stringer itself. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed stringer is then mocked up at full elevation and pitch.

Each stringer is then checked to verify compliance to provided tolerances according to the following criteria:

Three dimensions / features of geometry are checked at each of the three Point locations:

1 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

2 – Calculated actual bending radius is measured by chord and rise along length of stringer.

3 – Level to Vertical Face – Theoretically 90 Degrees from Level to Vertical Face of stringer. Measurements are taken with a bubble level protractor in degrees. Tolerance would be the variation from 90 degrees.

Additionally – Stringers are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Tolerances for Hot Spiral bending

Plan view radius of 20' 0" or less

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft**	+/- ¼"	Within 1½° overall	+/- ½°	+/- ½"	+/- ¼"
10 ft - 17 ft	+/- ½"	Within 2° overall	+/- ¾°	+/- ¾"	+/- 3/8"
17+ ft - 24 ft	+/- ¾"	Within 2½° overall	+/- 1°	+/- 1"	+/- ¾"
over 24 ft	+/- 1"	Within 3° overall	+/- 1½°	+/- 1½"	+/- 1"

*To properly QC, all stringers are stood up at full scale pitch.

**When arc is under 10ft, you are to use a ratio of the allowed tolerance. (ie 6ft = 60%, 5ft = 50%, 4ft = 40% etc). You are to round the required arc with extra to the nearest foot and use that percentage. (ie 33" would be 3ft, 51" would be 4ft).

Notes:

1. The level to vertical face is a cumulative tolerance. You cannot be more than half the allowed tolerance out at any one point.

Example: If your tolerance is 1.5° for the vertical face, you can be .75° out at the bottom, 0° out at the midpoint and .75° out at the top. This would be 1.5° out total. You would not be allowed to be more than .75° out at any given point since that would be more than half of your tolerance in one spot.

Procedure for QC of Spiral Stringers Hot Bent (20 ft. plan view radius and tighter)

Spiral stringers are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Each different inside Plan View Radii is drawn out full scale on the floor.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along this drawn Plan View Radius arc. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed stringer is then mocked up at full elevation and plumbed using plumb bobs to match the inside of the stringer to the drawn Plan View Radius.

Each stringer is then checked to verify compliance to provided tolerances according to the following criteria:

Four dimensions / features of geometry are checked at each of the three Point locations:

1 - Height – Calculated based on specified rise over run (i.e., 7" rise over 12" run). Tolerance would be the variance in height as measured from the calculated height as required at each point.

2 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

3 – Plumb to Radius Line – Projected Plan View Radius measured using plumb bobs down from stringer to drawn Plan View Radius on the floor. Tolerance would be variation of plumb bob point to the drawn line.

4 – Level to Vertical Face – Theoretically 90 Degrees from Level to Vertical Face of stringer. Measurements are taken with a bubble level protractor in degrees. Tolerance would be the variation from 90 degrees.

Additionally – Stringers are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Tolerances for Hot Spiral bending

Plan view radius greater than 20' 0"

True Arc Length	Plumb to Radius Line	Torpedo Level vertical face	Pitch in Degrees	Height at midpoint	Height at top
Under 10 ft**	see note 1	Within 1½° overall	+/- ½°	+/- ½"	+/- ¼"
10 ft - 17 ft	see note 1	Within 2° overall	+/- ¾°	+/- ¾"	+/- 3/8"
17+ ft - 24 ft	see note 1	Within 2½° overall	+/- 1°	+/- 1"	+/- 3/4"
over 24 ft	see note 1	Within 3° overall	+/- 1½°	+/- 1½"	+/- 1"

*To properly QC, all stringers are stood up at full scale pitch.

**When arc is under 10ft, you are to use a ratio of the allowed tolerance. (ie 6ft = 60%, 5ft = 50%, 4ft = 40% etc). You are to round the required arc with extra to the nearest foot and use that percentage. (ie 33" would be 3ft, 51" would be 4ft).

Notes:

1. Plumb to radius line tolerance is not applicable. Instead, Albina will use our standard shop chord and rise tolerances.
2. The level to vertical face is a cumulative tolerance. You cannot be more than half the allowed tolerance out at any one point.

Example: If your tolerance is 1.5° for the vertical face, you can be .75° out at the bottom, 0° out at the midpoint and .75° out at the top. This would be 1.5° out total. You would not be allowed to be more than .75° out at any given point since that would be more than half of your tolerance in one spot.

Procedure for QC of Spiral Stringers Hot Bent (Greater than 20 ft. plan view radius)

Spiral stringers are checked by the following method: Reference marked up drawing for locations and associated terms / definitions.

Points 1 (lower starting end) Point 2 (middle) and Point 3 (upper finishing end) are marked according to calculated locations along the arc of the stringer itself. Point locations are calculated based on degree of turn in plan or arc length in plan.

Each completed stringer is then mocked up at full elevation and pitch.

Each stringer is then checked to verify compliance to provided tolerances according to the following criteria:

Four dimensions / features of geometry are checked at each of the three Point locations:

1 - Height – Calculated based on specified rise over run (i.e., 7” rise over 12” run). Tolerance would be the variance in height as measured from the calculated height as required at each point.

2 – Degree of Pitch – As specified on drawing or as calculated from rise over run. Tolerance would be the variance in degrees from the specified requirement.

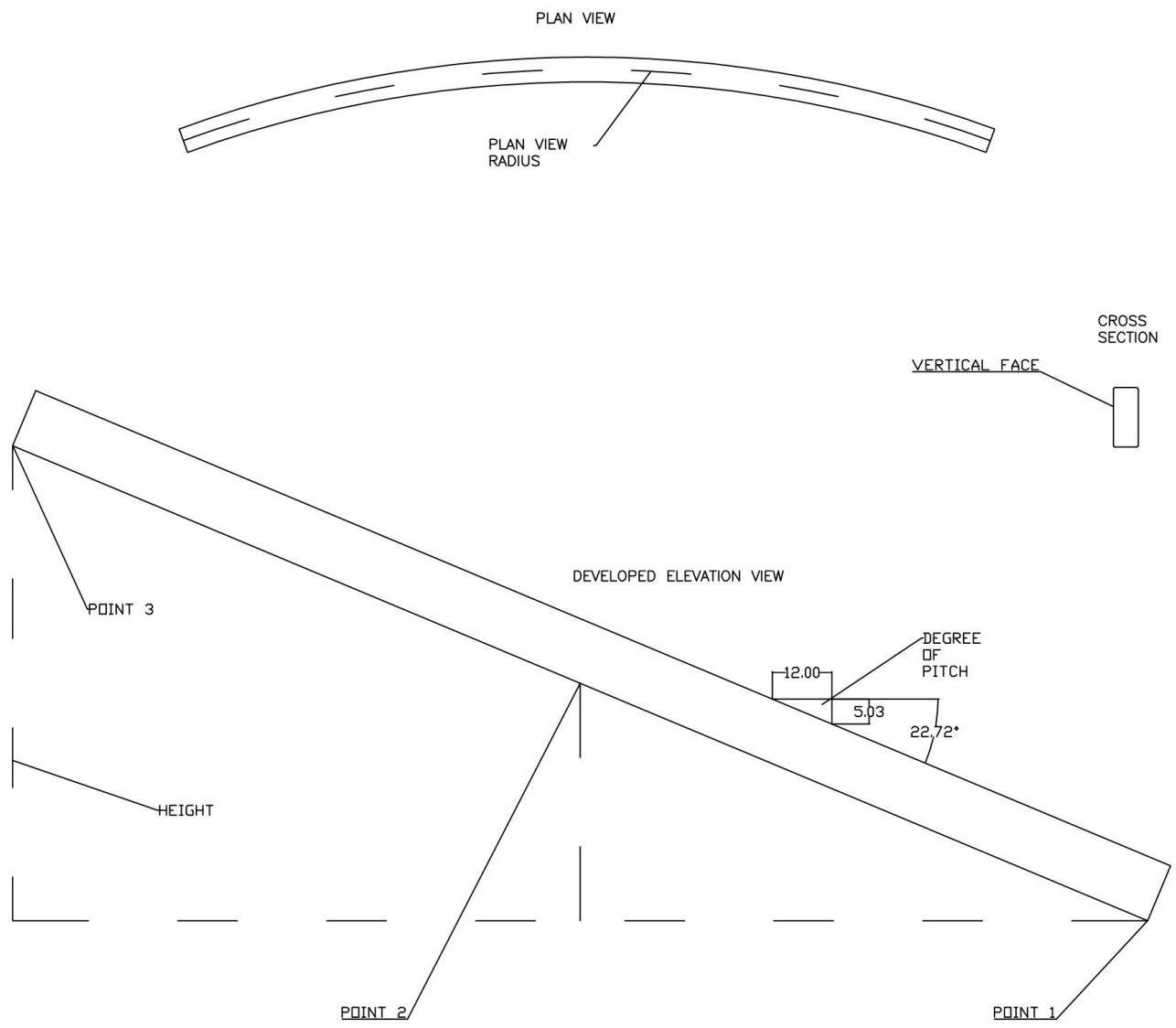
3 – Calculated actual bending radius is measured by chord and rise along length of stringer.

4 – Level to Vertical Face – Theoretically 90 Degrees from Level to Vertical Face of stringer. Measurements are taken with a bubble level protractor in degrees. Tolerance would be the variation from 90 degrees.

Additionally – Stringers are checked for consistency in radius throughout the arc, based on the actual calculated radius using a chord and rise measurement.

All pertinent dimensional specifications, information and actual checked dimensions are documented on the Spiral QC Report.

Sample Drawing for reference dimensions



SPIRAL QC REPORT

Customer _____ SO# _____ PO# _____
 Material _____ Operator _____ Inspector _____

Direction of Rotation: CW / CCW _____ DWG#/Part# _____

	Planview Radius	Actual Radius	
CLR _____			Degree of Turn _____
Inside _____			Arc Required _____
			Arc Supplied _____

Pitch in Degrees _____

	Required	
	Height	Chord
Height @ Top		
Height @ Middle		

	CHORD	RISE
1		
2		
3		
4		

Math/Layout Confirmed: _____

CHECKED AT

	Pc #1	Pc #2	Pc #3	Pc #4
Top				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				
Middle				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				
Bottom				
Height				
Level to Vertical Face				
Degree of Pitch				
Plumb to Radius Line				

CHORD / RISE

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Albina Chord Tolerances

Chord length in Feet	COSP		COSP WF
	(+) Tol	(-) Tol	(+/-) Tol
60	1.50	0.63	0.75
55	1.37	0.63	0.68
50	1.25	0.63	0.63
45	1.12	0.63	0.56
40	1.00	0.50	0.50
35	0.87	0.50	0.43
30	0.75	0.25	0.37
25	0.62	0.25	0.31
20	0.50	0.25	0.25
12	0.25	0.12	0.15
9 and under	0.06	0.06	0.06

Cambering Tolerances

As per AISC Code of Standard Practice 2016 Section 6.4.4, for member less than 50ft long, the camber tolerance is - 0", +1/2". An additional +1/8" per each additional 10ft of length (or fraction thereof) is allowed for lengths more than 50ft. An exception is also included; members received from the rolling mill with 75% of the specific camber require no further cambering. Furthermore, it is specified that camber be inspection in the shop in an unstressed condition