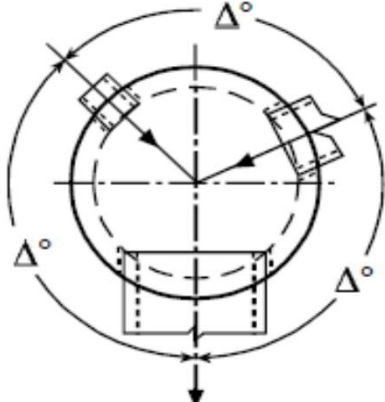


Allowable Angles in Round Manholes for PVC Pipe using ASTM C923 Connectors

MH Dia	Allowable Angle								
	Pipe ID (inches)	6	8	10	12	15	18	21	24
48	Opening	12	12	16	16	20	22	24	28
	6	12	39						
	8	12	39	39					
	10	16	49	49	54				
	12	16	49	49	54	54			
	15	20	54	54	59	59	64		
	18	22	57	57	62	62	67	69	
	21	24	59	59	64	64	69	72	75
	24	28	70	70	75	75	80	83	85

MH Dia	Allowable Angle									
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30
60	Opening	12	12	16	16	20	22	24	28	34
	6	12	31							
	8	12	31	31						
	10	16	39	39	43					
	12	16	39	39	43	43				
	15	20	43	43	47	47	51			
	18	22	45	45	49	49	53	55		
	21	24	47	47	51	51	55	57	59	
	24	28	55	55	59	59	63	65	67	71
	30	34	62	62	66	66	70	72	74	78



Equations:

- $A_o = \text{asin} (O_{po} / ID_m)$
- $A_i = \text{asin} (O_{pi} / ID_m)$
- $A_c = \text{Clear Cir} / ID_m / \pi \times 360$
- $\text{MinAng} = A_o + A_i + A_c$

Notes:

Allowable angles shown based upon Ductile Iron Pipe in ASTM C923 Flexible Pipe Connectors with 4" minimum clear for 48" - 72" manholes and 8" clear for 84" - 126" manholes with matching centerlines. Vertical separation may allow smaller angles. Local jurisdictions may require larger angles between pipe openings or larger manholes than shown.

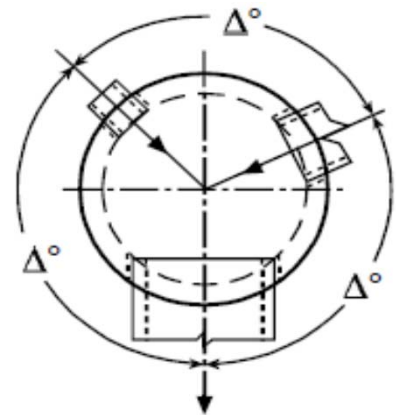
Allowable Angles in Round Manholes for PVC Pipe using ASTM C923 Connectors

MH Dia	Allowable Angle										
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36
72	Opening	12	12	16	16	20	22	24	28	34	42
	6	12	26								
	8	12	26	26							
	10	16	32	32	36						
	12	16	32	32	36	36					
	15	20	36	36	39	39	42				
	18	22	37	37	41	41	44	46			
	21	24	39	39	42	42	46	47	49		
	24	28	46	46	49	49	52	54	56	59	
	30	34	51	51	54	54	58	59	61	64	70
	36	42	59	59	62	62	65	67	68	72	77

MH Dia	Allowable Angle												
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36	42	
84	Opening	12	12	16	16	20	22	24	28	34	42	48	
	6	12	28										
	8	12	28	28									
	10	16	31	31	33								
	12	16	31	31	33	33							
	15	20	33	33	36	36	39						
	18	22	35	35	38	38	40	42					
	21	24	36	36	39	39	42	43	45				
	24	28	39	39	42	42	45	46	47	50			
	30	34	44	44	46	46	49	50	52	55	59		
	36	42	50	50	52	52	55	57	58	61	65	71	
	42	48	54	54	57	57	60	61	63	66	70	76	81

Equations:

$A_o = \text{asin} (O_{po} / ID_m)$
 $A_i = \text{asin} (O_{pi} / ID_m)$
 $A_c = \text{Clear Cir} / ID_m / \pi \times 360$
 $\text{MinAng} = A_o + A_i + A_c$



Notes:

Allowable angles shown based upon Ductile Iron Pipe in ASTM C923 Flexible Pipe Connectors with 4" minimum clear for 48" - 72" manholes and 8" clear for 84" - 126" manholes with matching centerlines. Vertical separation may allow smaller angles. Local jurisdictions may require larger angles between pipe openings or larger manholes than shown.

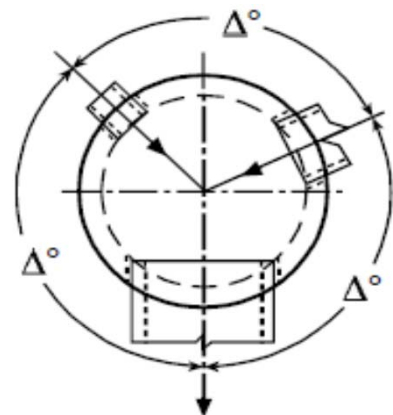
Allowable Angles in Round Manholes for PVC Pipe using ASTM C923 Connectors

MH Dia	Allowable Angle												
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36	42	48
96	Opening	12	12	16	16	20	22	24	28	34	42	48	54
	6	12	24										
	8	12	24	24									
	10	16	27	27	29								
	12	16	27	27	29	29							
	15	20	29	29	32	32	34						
	18	22	30	30	33	33	35	37					
	21	24	32	32	34	34	37	38	39				
	24	28	34	34	37	37	39	40	41	44			
	30	34	38	38	40	40	43	44	45	48	52		
	36	42	43	43	46	46	48	49	50	53	57	62	
	42	48	47	47	50	50	52	53	55	57	61	66	70
	48	54	51	51	54	54	56	58	59	61	65	70	74

MH Dia	Allowable Angle												
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36	42	48
108	Opening	12	12	16	16	20	22	24	28	34	42	48	54
	6	12	22										
	8	12	22	22									
	10	16	24	24	26								
	12	16	24	24	26	26							
	15	20	26	26	28	28	30						
	18	22	27	27	29	29	31	32					
	21	24	28	28	30	30	32	34	35				
	24	28	30	30	33	33	35	36	37	39			
	30	34	34	34	36	36	38	39	40	42	46		
	36	42	38	38	40	40	43	44	45	47	50	55	
	42	48	42	42	44	44	46	47	48	50	54	58	62
	48	54	45	45	48	48	50	51	52	54	57	62	65

Equations:

$A_o = \text{asin} (O_{po} / ID_m)$
 $A_i = \text{asin} (O_{pi} / ID_m)$
 $A_c = \text{Clear Cir} / ID_m / \text{PI} \times 360$
 $\text{MinAng} = A_o + A_i + A_c$



Notes:

Allowable angles shown based upon Ductile Iron Pipe in ASTM C923 Flexible Pipe Connectors with 4" minimum clear for 48" - 72" manholes and 8" clear for 84" - 126" manholes with matching centerlines. Vertical separation may allow smaller angles. Local jurisdictions may require larger angles between pipe openings or larger manholes than shown.

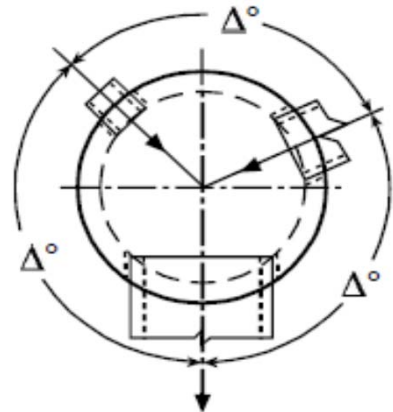
Allowable Angles in Round Manholes for PVC Pipe using ASTM C923 Connectors

MH Dia	Allowable Angle												
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36	42	48
120	Opening	12	12	16	16	20	22	24	28	34	42	48	54
	6	12	20										
	8	12	20	20									
	10	16	22	22	23								
	12	16	22	22	23	23							
	15	20	23	23	25	25	27						
	18	22	24	24	26	26	28	29					
	21	24	25	25	27	27	29	30	31				
	24	28	27	27	29	29	31	32	33	35			
	30	34	30	30	32	32	34	35	36	38	41		
	36	42	34	34	36	36	38	39	40	42	45	49	
	42	48	37	37	39	39	41	42	43	45	48	52	55
	48	54	41	41	43	43	44	45	46	48	51	55	58

MH Dia	Allowable Angle												
	Pipe ID (inches)	6	8	10	12	15	18	21	24	30	36	42	48
126	Opening	12	12	16	16	20	22	24	28	34	42	48	54
	6	12	19										
	8	12	19	19									
	10	16	21	21	22								
	12	16	21	21	22	22							
	15	20	22	22	24	24	26						
	18	22	23	23	25	25	27	28					
	21	24	24	24	26	26	28	29	30				
	24	28	26	26	28	28	30	31	32	33			
	30	34	29	29	31	31	33	33	34	36	39		
	36	42	33	33	35	35	36	37	38	40	43	47	
	42	48	36	36	37	37	39	40	41	43	46	50	53
	48	54	39	39	40	40	42	43	44	46	49	53	56

Equations:

$A_o = \text{asin} (O_{po} / ID_m)$
 $A_i = \text{asin} (O_{pi} / ID_m)$
 $A_c = \text{Clear Cir} / ID_m / \text{PI} \times 360$
 $\text{MinAng} = A_o + A_i + A_c$



Notes:

Allowable angles shown based upon Ductile Iron Pipe in ASTM C923 Flexible Pipe Connectors with 4" minimum clear for 48" - 72" manholes and 8" clear for 84" - 126" manholes with matching centerlines. Vertical separation may allow smaller angles. Local jurisdictions may require larger angles between pipe openings or larger manholes than shown.