

## MINIMUM ANGLE BETWEEN CONNECTIONS FOR MANHOLES OR CATCH BASINS

| CONNECTIONS DIAMETER |                | MANHOLE OR CATCH BASIN DIAMETER |                   |                   |                   |                   |                   |                   |                    |                    |                    |
|----------------------|----------------|---------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|
| INLET                | OUTLET         | 300 mm<br>(12 in)               | 375 mm<br>(15 in) | 450 mm<br>(18 in) | 525 mm<br>(21 in) | 600 mm<br>(24 in) | 750 mm<br>(30 in) | 900 mm<br>(36 in) | 1050 mm<br>(42 in) | 1200 mm<br>(48 in) | 1500 mm<br>(60 in) |
| 100 mm (4 in)        | 100 mm (4 in)  | 62                              | 49                | 41                | 35                | 30                | 24                | 20                | 17                 | 15                 | 12                 |
| 150 mm (6 in)        | 100 mm (4 in)  | 72                              | 57                | 48                | 41                | 35                | 28                | 24                | 20                 | 17                 | 14                 |
| 150 mm (6 in)        | 150 mm (6 in)  | 83                              | 65                | 54                | 46                | 40                | 32                | 27                | 23                 | 20                 | 16                 |
| 200 mm (8 in)        | 100 mm (4 in)  | 85                              | 66                | 55                | 47                | 40                | 32                | 27                | 23                 | 20                 | 16                 |
| 200 mm (8 in)        | 150 mm (6 in)  | 96                              | 74                | 61                | 52                | 45                | 36                | 30                | 26                 | 22                 | 18                 |
| 200 mm (8 in)        | 200 mm (8 in)  | 108                             | 84                | 69                | 58                | 51                | 40                | 34                | 29                 | 25                 | 20                 |
| 250 mm (10 in)       | 100 mm (4 in)  | 99                              | 76                | 62                | 52                | 45                | 36                | 30                | 26                 | 22                 | 18                 |
| 250 mm (10 in)       | 150 mm (6 in)  | 110                             | 83                | 68                | 58                | 50                | 40                | 33                | 28                 | 25                 | 20                 |
| 250 mm (10 in)       | 200 mm (8 in)  | 122                             | 91                | 75                | 63                | 56                | 44                | 37                | 31                 | 27                 | 22                 |
| 250 mm (10 in)       | 250 mm (10 in) | 136                             | 102               | 83                | 70                | 61                | 48                | 40                | 34                 | 30                 | 24                 |
| 300 mm (12 in)       | 100 mm (4 in)  | 121                             | 87                | 70                | 59                | 53                | 42                | 36                | 30                 | 26                 | 21                 |
| 300 mm (12 in)       | 150 mm (6 in)  | 131                             | 95                | 76                | 64                | 58                | 46                | 39                | 33                 | 29                 | 23                 |
| 300 mm (12 in)       | 200 mm (8 in)  | 144                             | 104               | 84                | 70                | 64                | 50                | 42                | 35                 | 31                 | 25                 |
| 300 mm (12 in)       | 250 mm (10 in) | 158                             | 113               | 91                | 76                | 69                | 54                | 45                | 38                 | 33                 | 27                 |
| 300 mm (12 in)       | 300 mm (12 in) | 180                             | 124               | 99                | 82                | 74                | 58                | 49                | 41                 | 36                 | 29                 |
| 375 mm (15 in)       | 100 mm (4 in)  |                                 | 113               | 85                | 70                | 63                | 49                | 41                | 34                 | 30                 | 24                 |
| 375 mm (15 in)       | 150 mm (6 in)  |                                 | 121               | 91                | 75                | 67                | 53                | 44                | 37                 | 32                 | 26                 |
| 375 mm (15 in)       | 200 mm (8 in)  |                                 | 130               | 99                | 81                | 73                | 57                | 48                | 40                 | 35                 | 28                 |
| 375 mm (15 in)       | 250 mm (10 in) |                                 | 139               | 106               | 87                | 78                | 62                | 51                | 43                 | 37                 | 30                 |
| 375 mm (15 in)       | 300 mm (12 in) |                                 | 151               | 114               | 93                | 83                | 65                | 54                | 45                 | 40                 | 32                 |
| 375 mm (15 in)       | 375 mm (15 in) |                                 | 180               | 128               | 104               | 92                | 72                | 60                | 50                 | 43                 | 35                 |
| 450 mm (18 in)       | 100 mm (4 in)  |                                 |                   | 110               | 83                | 73                | 56                | 46                | 39                 | 34                 | 27                 |
| 450 mm (18 in)       | 150 mm (6 in)  |                                 |                   | 117               | 88                | 78                | 60                | 50                | 42                 | 36                 | 29                 |
| 450 mm (18 in)       | 200 mm (8 in)  |                                 |                   | 124               | 95                | 83                | 64                | 53                | 44                 | 39                 | 30                 |
| 450 mm (18 in)       | 250 mm (10 in) |                                 |                   | 131               | 100               | 88                | 68                | 56                | 47                 | 41                 | 33                 |
| 450 mm (18 in)       | 300 mm (12 in) |                                 |                   | 139               | 107               | 93                | 72                | 60                | 50                 | 44                 | 35                 |
| 450 mm (18 in)       | 375 mm (15 in) |                                 |                   | 154               | 118               | 100               | 79                | 65                | 54                 | 47                 | 38                 |
| 450 mm (18 in)       | 450 mm (18 in) |                                 |                   | 180               | 133               | 110               | 86                | 70                | 59                 | 51                 | 41                 |
| 525 mm (21 in)       | 100 mm (4 in)  |                                 |                   |                   | 107               | 86                | 64                | 52                | 44                 | 38                 | 30                 |
| 525 mm (21 in)       | 150 mm (6 in)  |                                 |                   |                   | 113               | 91                | 68                | 56                | 46                 | 40                 | 32                 |
| 525 mm (21 in)       | 200 mm (8 in)  |                                 |                   |                   | 119               | 96                | 72                | 59                | 49                 | 43                 | 34                 |
| 525 mm (21 in)       | 250 mm (10 in) |                                 |                   |                   | 125               | 101               | 76                | 62                | 52                 | 45                 | 36                 |
| 525 mm (21 in)       | 300 mm (12 in) |                                 |                   |                   | 131               | 106               | 80                | 66                | 55                 | 48                 | 38                 |
| 525 mm (21 in)       | 375 mm (15 in) |                                 |                   |                   | 142               | 115               | 86                | 71                | 59                 | 51                 | 41                 |
| 525 mm (21 in)       | 450 mm (18 in) |                                 |                   |                   | 155               | 126               | 93                | 76                | 63                 | 55                 | 44                 |
| 525 mm (21 in)       | 525 mm (21 in) |                                 |                   |                   | 180               | 139               | 101               | 82                | 68                 | 59                 | 47                 |
| 600 mm (24 in)       | 100 mm (4 in)  |                                 |                   |                   |                   | 105               | 72                | 58                | 48                 | 41                 | 33                 |
| 600 mm (24 in)       | 150 mm (6 in)  |                                 |                   |                   |                   | 110               | 74                | 61                | 51                 | 44                 | 35                 |
| 600 mm (24 in)       | 200 mm (8 in)  |                                 |                   |                   |                   | 116               | 80                | 56                | 54                 | 46                 | 37                 |
| 600 mm (24 in)       | 250 mm (10 in) |                                 |                   |                   |                   | 121               | 84                | 68                | 56                 | 49                 | 39                 |
| 600 mm (24 in)       | 300 mm (12 in) |                                 |                   |                   |                   | 126               | 88                | 71                | 59                 | 51                 | 41                 |
| 600 mm (24 in)       | 375 mm (15 in) |                                 |                   |                   |                   | 135               | 94                | 77                | 63                 | 55                 | 44                 |
| 600 mm (24 in)       | 450 mm (18 in) |                                 |                   |                   |                   | 145               | 101               | 82                | 68                 | 59                 | 47                 |
| 600 mm (24 in)       | 525 mm (21 in) |                                 |                   |                   |                   | 158               | 109               | 88                | 73                 | 63                 | 50                 |
| 600 mm (24 in)       | 600 mm (24 in) |                                 |                   |                   |                   | 90                | 90                | 90                | 77                 | 66                 | 53                 |
| 750 mm (30 in)       | 100 mm (4 in)  |                                 |                   |                   |                   |                   | 102               | 73                | 59                 | 50                 | 40                 |
| 750 mm (30 in)       | 150 mm (6 in)  |                                 |                   |                   |                   |                   | 106               | 76                | 61                 | 52                 | 41                 |
| 750 mm (30 in)       | 200 mm (8 in)  |                                 |                   |                   |                   |                   | 110               | 80                | 64                 | 55                 | 44                 |
| 750 mm (30 in)       | 250 mm (10 in) |                                 |                   |                   |                   |                   | 114               | 83                | 67                 | 57                 | 45                 |
| 750 mm (30 in)       | 300 mm (12 in) |                                 |                   |                   |                   |                   | 118               | 86                | 70                 | 60                 | 47                 |
| 750 mm (30 in)       | 375 mm (15 in) |                                 |                   |                   |                   |                   | 125               | 92                | 74                 | 64                 | 50                 |
| 750 mm (30 in)       | 450 mm (18 in) |                                 |                   |                   |                   |                   | 132               | 97                | 79                 | 67                 | 53                 |
| 750 mm (30 in)       | 525 mm (21 in) |                                 |                   |                   |                   |                   | 140               | 103               | 83                 | 71                 | 56                 |
| 750 mm (30 in)       | 600 mm (24 in) |                                 |                   |                   |                   |                   | 148               | 109               | 88                 | 75                 | 59                 |
| 750 mm (30 in)       | 750 mm (30 in) |                                 |                   |                   |                   |                   | 90                | 90                | 90                 | 84                 | 66                 |
| 900 mm (36 in)       | 100 mm (4 in)  |                                 |                   |                   |                   |                   |                   | 100               | 71                 | 59                 | 46                 |
| 900 mm (36 in)       | 150 mm (6 in)  |                                 |                   |                   |                   |                   |                   | 104               | 74                 | 62                 | 48                 |
| 900 mm (36 in)       | 200 mm (8 in)  |                                 |                   |                   |                   |                   |                   | 107               | 77                 | 64                 | 50                 |
| 900 mm (36 in)       | 250 mm (10 in) |                                 |                   |                   |                   |                   |                   | 110               | 79                 | 67                 | 52                 |
| 900 mm (36 in)       | 300 mm (12 in) |                                 |                   |                   |                   |                   |                   | 114               | 82                 | 69                 | 54                 |
| 900 mm (36 in)       | 375 mm (15 in) |                                 |                   |                   |                   |                   |                   | 119               | 86                 | 73                 | 57                 |
| 900 mm (36 in)       | 450 mm (18 in) |                                 |                   |                   |                   |                   |                   | 125               | 91                 | 77                 | 60                 |
| 900 mm (36 in)       | 525 mm (21 in) |                                 |                   |                   |                   |                   |                   | 131               | 96                 | 81                 | 63                 |
| 900 mm (36 in)       | 600 mm (24 in) |                                 |                   |                   |                   |                   |                   | 136               | 100                | 84                 | 66                 |
| 900 mm (36 in)       | 750 mm (30 in) |                                 |                   |                   |                   |                   |                   | 151               | 111                | 93                 | 72                 |

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## MINIMUM ANGLE BETWEEN CONNECTIONS FOR MANHOLES OR CATCH BASINS

| CONNECTIONS DIAMETER |                 | MANHOLE OR CATCH BASIN DIAMETER |                   |                   |                   |                   |                   |                   |                    |                    |                    |
|----------------------|-----------------|---------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|
| INLET                | OUTLET          | 300 mm<br>(12 in)               | 375 mm<br>(15 in) | 450 mm<br>(18 in) | 525 mm<br>(21 in) | 600 mm<br>(24 in) | 750 mm<br>(30 in) | 900 mm<br>(36 in) | 1050 mm<br>(42 in) | 1200 mm<br>(48 in) | 1500 mm<br>(60 in) |
| 900 mm (36 in)       | 900 mm (36 in)  |                                 |                   |                   |                   |                   |                   | 90                | 90                 | 90                 | 79                 |
| 1050 mm (42 in)      | 100 mm (4 in)   |                                 |                   |                   |                   |                   |                   |                   | 99                 | 73                 | 54                 |
| 1050 mm (42 in)      | 150 mm (6 in)   |                                 |                   |                   |                   |                   |                   |                   | 102                | 75                 | 56                 |
| 1050 mm (42 in)      | 200 mm (8 in)   |                                 |                   |                   |                   |                   |                   |                   | 105                | 78                 | 58                 |
| 1050 mm (42 in)      | 250 mm (10 in)  |                                 |                   |                   |                   |                   |                   |                   | 107                | 80                 | 60                 |
| 1050 mm (42 in)      | 300 mm (12 in)  |                                 |                   |                   |                   |                   |                   |                   | 110                | 83                 | 62                 |
| 1050 mm (42 in)      | 375 mm (15 in)  |                                 |                   |                   |                   |                   |                   |                   | 114                | 86                 | 65                 |
| 1050 mm (42 in)      | 450 mm (18 in)  |                                 |                   |                   |                   |                   |                   |                   | 119                | 90                 | 68                 |
| 1050 mm (42 in)      | 525 mm (21 in)  |                                 |                   |                   |                   |                   |                   |                   | 124                | 94                 | 71                 |
| 1050 mm (42 in)      | 600 mm (24 in)  |                                 |                   |                   |                   |                   |                   |                   | 128                | 98                 | 74                 |
| 1050 mm (42 in)      | 750 mm (30 in)  |                                 |                   |                   |                   |                   |                   |                   | 139                | 106                | 81                 |
| 1050 mm (42 in)      | 900 mm (36 in)  |                                 |                   |                   |                   |                   |                   |                   | 151                | 116                | 87                 |
| 1050 mm (42 in)      | 1050 mm (42 in) |                                 |                   |                   |                   |                   |                   |                   | 180                | 129                | 95                 |
| 1200 mm (48 in)      | 100 mm (4 in)   |                                 |                   |                   |                   |                   |                   |                   |                    | 98                 | 63                 |
| 1200 mm (48 in)      | 150 mm (6 in)   |                                 |                   |                   |                   |                   |                   |                   |                    | 100                | 65                 |
| 1200 mm (48 in)      | 200 mm (8 in)   |                                 |                   |                   |                   |                   |                   |                   |                    | 103                | 67                 |
| 1200 mm (48 in)      | 250 mm (10 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 105                | 69                 |
| 1200 mm (48 in)      | 300 mm (12 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 108                | 71                 |
| 1200 mm (48 in)      | 375 mm (15 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 111                | 74                 |
| 1200 mm (48 in)      | 450 mm (18 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 115                | 77                 |
| 1200 mm (48 in)      | 525 mm (21 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 119                | 80                 |
| 1200 mm (48 in)      | 600 mm (24 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 123                | 83                 |
| 1200 mm (48 in)      | 750 mm (30 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 131                | 89                 |
| 1200 mm (48 in)      | 900 mm (36 in)  |                                 |                   |                   |                   |                   |                   |                   |                    | 141                | 96                 |
| 1200 mm (48 in)      | 1050 mm (42 in) |                                 |                   |                   |                   |                   |                   |                   |                    | 154                | 104                |
| 1200 mm (48 in)      | 1200 mm (48 in) |                                 |                   |                   |                   |                   |                   |                   |                    | 180                | 113                |
| 1500 mm (60 in)      | 100 mm (4 in)   |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 96                 |
| 1500 mm (60 in)      | 150 mm (6 in)   |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 98                 |
| 1500 mm (60 in)      | 200 mm (8 in)   |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 100                |
| 1500 mm (60 in)      | 250 mm (10 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 102                |
| 1500 mm (60 in)      | 300 mm (12 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 104                |
| 1500 mm (60 in)      | 375 mm (15 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 107                |
| 1500 mm (60 in)      | 450 mm (18 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 110                |
| 1500 mm (60 in)      | 525 mm (21 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 113                |
| 1500 mm (60 in)      | 600 mm (24 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 116                |
| 1500 mm (60 in)      | 750 mm (30 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 123                |
| 1500 mm (60 in)      | 900 mm (36 in)  |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 129                |
| 1500 mm (60 in)      | 1050 mm (42 in) |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 137                |
| 1500 mm (60 in)      | 1200 mm (48 in) |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 146                |
| 1500 mm (60 in)      | 1500 mm (60 in) |                                 |                   |                   |                   |                   |                   |                   |                    |                    | 180                |

Note 1: The configurations indicated in this document assume that the pipes are at the same level. If the pipes are at different levels, please contact your Technical Service Engineer.

Note 2: To get the minimum angles between the connections for manholes and catch basins with a diameter greater than 1500 mm (60 in), please contact your sales representative or Technical Service Engineer.

CONNECTION ANGLES :

