|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 5.6 Measurement of roundness by Dial gauge deflections of 10-mm Diameter Mild Steel (MS) Round Bar** | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | **Mean values of Dial Gauge Deflection Readings before straightening of 10 mm Mild Steel round bar x 0.01 mm** | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | Angles in Degrees | | | | | | | | | | | | | | | | | | | | | | | |  |
| Length in cm | 0o | 15o | 30o | 45o | 60o | 75o | 90o | 105o | 120o | 135o | 150o | 165o | 180o | 195o | 210o | 225o | 240o | 255o | 270o | 285o | 300o | 315o | 330o | 345o | STD  DEV (mm) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14.5 | 99 | 96 | 97 | 94 | 93 | 92 | 95 | 95 | 94 | 94 | 94 | 94 | 94 | 91 | 89 | 89 | 89 | 91 | 90 | 90 | 90 | 92 | 93 | 95 | 0.0253982 |
| 17 | 102 | 102 | 100 | 100 | 100 | 99 | 102 | 100 | 100 | 97 | 97 | 95 | 98 | 94 | 95 | 95 | 94 | 95 | 94 | 95 | 95 | 93 | 95 | 95 | 0.0283701 |
| 20 | 102 | 99 | 98 | 97 | 98 | 96 | 97 | 94 | 95 | 97 | 97 | 96 | 97 | 96 | 97 | 95 | 96 | 95 | 97 | 96 | 97 | 95 | 96 | 96 | 0.0158141 |
| 23.5 | 98 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 95 | 94 | 94 | 93 | 93 | 93 | 92 | 93 | 93 | 94 | 94 | 94 | 95 | 95 | 0.0152029 |
| 26 | 92 | 92 | 92 | 90 | 90 | 91 | 91 | 90 | 90 | 90 | 90 | 90 | 89 | 89 | 89 | 88 | 88 | 87 | 87 | 88 | 88 | 88 | 89 | 89 | 0.0154122 |
| 29 | 87 | 87 | 88 | 88 | 88 | 88 | 88 | 88 | 89 | 88 | 88 | 87 | 88 | 86 | 86 | 85 | 84 | 84 | 84 | 83 | 84 | 84 | 85 | 85 | 0.0177151 |
| 31.5 | 98 | 95 | 94 | 95 | 94 | 92 | 94 | 95 | 95 | 95 | 95 | 94 | 96 | 94 | 93 | 91 | 92 | 91 | 90 | 89 | 89 | 89 | 90 | 91 | 0.025553 |
| 34 | 96 | 93 | 94 | 93 | 94 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 96 | 93 | 93 | 93 | 93 | 92 | 91 | 90 | 91 | 90 | 90 | 91 | 0.0185525 |
| 37 | 92 | 90 | 90 | 90 | 91 | 92 | 93 | 93 | 93 | 93 | 92 | 108 | 92 | 91 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 90 | 0.0393474 |
| 40 | 91 | 89 | 89 | 89 | 89 | 89 | 90 | 89 | 90 | 90 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 90 | 89 | 89 | 89 | 89 | 90 | 0.0053236 |
| 43 | 92 | 92 | 92 | 91 | 92 | 92 | 91 | 93 | 93 | 93 | 92 | 91 | 91 | 89 | 88 | 89 | 90 | 89 | 89 | 88 | 87 | 89 | 89 | 89 | 0.0177617 |
| 46 | 95 | 91 | 93 | 93 | 93 | 94 | 94 | 93 | 93 | 94 | 92 | 91 | 94 | 93 | 88 | 89 | 88 | 89 | 88 | 87 | 88 | 89 | 90 | 90 | 0.0247392 |
| 49 | 94 | 90 | 91 | 91 | 93 | 92 | 94 | 94 | 93 | 93 | 93 | 90 | 94 | 91 | 90 | 90 | 89 | 89 | 89 | 89 | 89 | 90 | 90 | 90 | 0.0186489 |
| 52 | 96 | 95 | 97 | 95 | 96 | 97 | 98 | 98 | 98 | 96 | 95 | 94 | 95 | 95 | 94 | 94 | 93 | 93 | 93 | 92 | 90 | 90 | 91 | 90 | 0.0251318 |
| 55 | 92 | 92 | 94 | 94 | 93 | 92 | 95 | 92 | 91 | 92 | 92 | 91 | 94 | 92 | 92 | 91 | 93 | 91 | 89 | 88 | 88 | 88 | 88 | 90 | 0.019766 |
| 58 | 98 | 97 | 99 | 98 | 97 | 97 | 96 | 96 | 97 | 97 | 100 | 97 | 98 | 100 | 99 | 100 | 99 | 97 | 95 | 93 | 97 | 98 | 98 | 98 | 0.0159292 |
| 61 | 98 | 98 | 97 | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 99 | 100 | 99 | 98 | 96 | 96 | 98 | 95 | 97 | 96 | 96 | 95 | 95 | 96 | 0.0146747 |
| 64 | 93 | 91 | 92 | 91 | 92 | 93 | 92 | 109 | 91 | 90 | 89 | 89 | 90 | 88 | 88 | 88 | 89 | 88 | 88 | 90 | 89 | 89 | 90 | 90 | 0.0415668 |
| 67 | 164 | 161 | 161 | 161 | 157 | 157 | 157 | 155 | 158 | 155 | 155 | 156 | 156 | 156 | 157 | 153 | 155 | 155 | 156 | 154 | 151 | 154 | 154 | 154 | 0.0301126 |
| 70 | 158 | 155 | 156 | 155 | 154 | 154 | 155 | 155 | 154 | 153 | 152 | 152 | 152 | 152 | 154 | 157 | 153 | 154 | 153 | 154 | 155 | 154 | 154 | 155 | 0.0148382 |
| 73 | 104 | 100 | 100 | 99 | 99 | 102 | 100 | 99 | 100 | 100 | 102 | 96 | 100 | 99 | 99 | 101 | 98 | 99 | 99 | 99 | 101 | 101 | 98 | 100 | 0.0151658 |
| 76 | 105 | 92 | 92 | 92 | 92 | 91 | 91 | 91 | 91 | 91 | 93 | 91 | 93 | 93 | 93 | 93 | 93 | 93 | 91 | 92 | 90 | 90 | 90 | 91 | 0.0284741 |
| 79 | 99 | 99 | 93 | 94 | 92 | 91 | 90 | 94 | 93 | 98 | 92 | 91 | 94 | 95 | 95 | 96 | 97 | 97 | 99 | 94 | 93 | 92 | 94 | 92 | 0.0271762 |
| 82 | 98 | 96 | 96 | 96 | 95 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 95 | 95 | 96 | 96 | 96 | 96 | 95 | 95 | 96 | 96 | 96 | 96 | 0.0063171 |
| 85 | 97 | 98 | 97 | 97 | 98 | 98 | 99 | 99 | 95 | 94 | 97 | 94 | 92 | 92 | 93 | 95 | 94 | 95 | 96 | 93 | 97 | 96 | 95 | 94 | 0.0219486 |
| 88 | 93 | 95 | 97 | 97 | 97 | 97 | 99 | 95 | 98 | 98 | 97 | 98 | 99 | 98 | 97 | 97 | 98 | 97 | 95 | 93 | 95 | 96 | 95 | 97 | 0.0159041 |
| 91 | 94 | 93 | 95 | 93 | 93 | 93 | 95 | 94 | 94 | 94 | 92 | 92 | 98 | 94 | 91 | 92 | 92 | 91 | 90 | 91 | 91 | 91 | 91 | 89 | 0.019437 |
| 94 | 97 | 96 | 98 | 98 | 99 | 95 | 100 | 98 | 96 | 96 | 91 | 93 | 94 | 94 | 94 | 94 | 92 | 92 | 95 | 95 | 94 | 95 | 95 | 97 | 0.0219155 |
| 97 | 151 | 150 | 150 | 150 | 151 | 151 | 150 | 150 | 147 | 147 | 147 | 148 | 148 | 146 | 146 | 146 | 146 | 146 | 146 | 147 | 147 | 147 | 147 | 149 | 0.0178126 |
| 100 | 153 | 150 | 151 | 150 | 152 | 157 | 159 | 160 | 156 | 156 | 154 | 155 | 154 | 155 | 155 | 155 | 155 | 155 | 155 | 156 | 157 | 157 | 161 | 163 | 0.032674 |
| 102 | 90 | 87 | 87 | 86 | 83 | 83 | 85 | 85 | 83 | 81 | 82 | 82 | 83 | 82 | 84 | 82 | 85 | 86 | 84 | 85 | 90 | 90 | 91 | 88 | 0.0288303 |
| 104 | 85 | 83 | 82 | 83 | 83 | 79 | 81 | 79 | 80 | 78 | 77 | 77 | 80 | 78 | 77 | 77 | 77 | 78 | 76 | 78 | 79 | 81 | 79 | 80 | 0.0232452 |
| 107 | 94 | 92 | 93 | 93 | 92 | 92 | 91 | 90 | 90 | 89 | 89 | 89 | 88 | 88 | 88 | 88 | 87 | 87 | 88 | 89 | 89 | 90 | 90 | 91 | 0.0209637 |
| 111 | 101 | 98 | 97 | 93 | 94 | 93 | 91 | 91 | 86 | 87 | 87 | 87 | 90 | 89 | 93 | 89 | 93 | 90 | 86 | 82 | 89 | 92 | 93 | 93 | 0.0428827 |
| 114 | 99 | 99 | 99 | 101 | 102 | 100 | 103 | 100 | 98 | 97 | 97 | 99 | 103 | 99 | 99 | 96 | 97 | 97 | 97 | 100 | 98 | 97 | 97 | 100 | 0.0182502 |
| 118 | 102 | 100 | 100 | 100 | 99 | 97 | 98 | 97 | 95 | 89 | 89 | 90 | 90 | 90 | 88 | 85 | 86 | 87 | 88 | 90 | 91 | 92 | 95 | 96 | 0.0508057 |
| 122 | 89 | 85 | 86 | 87 | 88 | 86 | 87 | 86 | 85 | 83 | 83 | 77 | 84 | 85 | 83 | 84 | 84 | 82 | 85 | 85 | 80 | 79 | 85 | 84 | 0.0278409 |
| 127 | 88 | 85 | 85 | 87 | 89 | 87 | 84 | 81 | 80 | 78 | 79 | 80 | 82 | 83 | 82 | 80 | 82 | 81 | 85 | 84 | 84 | 81 | 84 | 84 | 0.0277348 |
| 131 | 95 | 95 | 93 | 93 | 94 | 91 | 90 | 87 | 87 | 88 | 89 | 90 | 92 | 90 | 91 | 91 | 89 | 90 | 89 | 91 | 92 | 93 | 92 | 90 | 0.0215768 |
| 138 | 94 | 99 | 99 | 97 | 98 | 96 | 98 | 97 | 97 | 98 | 98 | 98 | 98 | 99 | 98 | 97 | 97 | 98 | 98 | 96 | 97 | 95 | 97 | 97 | 0.0109086 |



Figure 5.4(a): Box Plot of dial gauge readings dataset of mean values of 10-mm diameter Mild Steel (MS) round bar before straightening

Figure 5.4(b): Error Plot of 10 mm Mild Steel Round Bar Before Straightening