|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 5.19**  **Measurement of roundness by Dial gauge deflections of 12-mm Diameter Copper (Cu) Round Bar** **Before Straightening** | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | **Mean values of Dial Gauge Deflection Readings before straightening of 12 mm Copper (Cu) 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) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 | 102 | 91 | 81 | 70 | 61 | 52 | 49 | 49 | 49 | 49 | 52 | 59 | 66 | 74 | 82 | 91 | 101 | 110 | 116 | 121 | 124 | 122 | 117 | 112 | 0.27505 |
| 15 | 95 | 88 | 80 | 70 | 64 | 51 | 51 | 49 | 49 | 50 | 53 | 59 | 66 | 72 | 82 | 88 | 96 | 102 | 108 | 110 | 112 | 111 | 110 | 104 | 0.23366 |
| 19 | 92 | 89 | 85 | 83 | 79 | 75 | 71 | 67 | 65 | 64 | 65 | 67 | 70 | 72 | 76 | 79 | 83 | 86 | 89 | 91 | 94 | 94 | 94 | 93 | 0.10598 |
| 24 | 67 | 66 | 67 | 66 | 67 | 69 | 72 | 75 | 77 | 80 | 82 | 85 | 88 | 88 | 88 | 88 | 88 | 86 | 83 | 81 | 79 | 74 | 71 | 69 | 0.08401 |
| 29 | 75 | 75 | 75 | 74 | 73 | 73 | 72 | 71 | 70 | 70 | 69 | 69 | 69 | 68 | 69 | 70 | 70 | 71 | 73 | 73 | 74 | 74 | 73 | 74 | 0.02334 |
| 34 | 102 | 101 | 98 | 95 | 88 | 80 | 72 | 66 | 58 | 50 | 49 | 49 | 49 | 49 | 49 | 52 | 59 | 65 | 72 | 78 | 85 | 91 | 96 | 100 | 0.19895 |
| 39 | 97 | 96 | 97 | 95 | 89 | 85 | 78 | 72 | 65 | 60 | 56 | 55 | 56 | 56 | 58 | 60 | 64 | 69 | 74 | 78 | 83 | 86 | 88 | 92 | 0.15044 |
| 44 | 79 | 78 | 79 | 78 | 77 | 76 | 74 | 72 | 71 | 69 | 68 | 67 | 67 | 66 | 67 | 67 | 69 | 70 | 71 | 73 | 74 | 75 | 75 | 76 | 0.04334 |
| 49 | 62 | 62 | 64 | 66 | 67 | 69 | 70 | 72 | 74 | 75 | 76 | 77 | 77 | 74 | 73 | 72 | 71 | 69 | 67 | 65 | 62 | 61 | 60 | 60 | 0.05682 |
| 56 | 77 | 76 | 76 | 76 | 75 | 73 | 72 | 70 | 67 | 65 | 63 | 61 | 60 | 58 | 59 | 58 | 59 | 62 | 63 | 65 | 67 | 69 | 71 | 74 | 0.0652 |
| 59 | 63 | 63 | 62 | 61 | 59 | 58 | 56 | 55 | 55 | 52 | 51 | 50 | 49 | 49 | 49 | 50 | 52 | 52 | 55 | 56 | 57 | 58 | 60 | 61 | 0.04636 |
| 62 | 50 | 50 | 50 | 51 | 53 | 53 | 55 | 57 | 58 | 60 | 60 | 61 | 61 | 60 | 59 | 59 | 59 | 57 | 56 | 54 | 52 | 50 | 49 | 49 | 0.0429 |
| 67 | 49 | 49 | 49 | 49 | 50 | 53 | 58 | 62 | 66 | 69 | 71 | 71 | 72 | 70 | 68 | 65 | 62 | 58 | 52 | 49 | 49 | 49 | 49 | 49 | 0.08975 |
| 72 | 49 | 49 | 49 | 51 | 55 | 57 | 61 | 64 | 67 | 69 | 70 | 71 | 70 | 68 | 66 | 64 | 60 | 57 | 55 | 51 | 49 | 49 | 49 | 49 | 0.08312 |
| 77 | 53 | 54 | 56 | 59 | 62 | 65 | 67 | 70 | 73 | 74 | 75 | 76 | 75 | 73 | 70 | 68 | 65 | 61 | 57 | 54 | 50 | 50 | 49 | 50 | 0.09309 |
| 82 | 61 | 61 | 62 | 65 | 67 | 69 | 72 | 75 | 77 | 78 | 80 | 82 | 82 | 80 | 79 | 78 | 77 | 74 | 71 | 70 | 65 | 61 | 61 | 61 | 0.07554 |
| 87 | 70 | 69 | 70 | 70 | 71 | 72 | 73 | 74 | 75 | 75 | 79 | 79 | 77 | 76 | 76 | 76 | 75 | 73 | 72 | 71 | 70 | 69 | 68 | 69 | 0.03303 |



**Figure 5.17(a): Box Plot of dial gauge readings dataset of mean values of 12-mm diameter Copper (Cu) round bar before straightening**

**Figure 5.17(b): Error Plot of 12 mm Copper Round Bar Before Straightening**