|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 5.15**  **Measurement of roundness by Dial gauge deflections of 12-mm Diameter Aluminium (Al) Round Bar** **Before Straightening** | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | **Mean values of Dial Gauge Deflection Readings before straightening of 12 mm Aluminium (Al) 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) |
| 11 | 56 | 53 | 52 | 52 | 52 | 54 | 56 | 58 | 60 | 61 | 62 | 66 | 69 | 70 | 71 | 71 | 70 | 68 | 66 | 66 | 66 | 64 | 62 | 60 | 0.06543 |
| 16 | 55 | 52 | 51 | 51 | 51 | 53 | 55 | 57 | 58 | 59 | 61 | 64 | 67 | 68 | 69 | 69 | 68 | 66 | 65 | 64 | 65 | 63 | 61 | 58 | 0.06213 |
| 20 | 53 | 51 | 50 | 50 | 51 | 52 | 54 | 55 | 57 | 57 | 59 | 62 | 65 | 66 | 67 | 67 | 66 | 64 | 63 | 63 | 63 | 61 | 59 | 56 | 0.05823 |
| 25 | 54 | 52 | 51 | 52 | 54 | 53 | 56 | 57 | 58.5 | 58 | 60 | 63 | 66 | 66 | 67 | 67 | 66 | 64 | 63 | 64 | 63 | 62 | 59 | 57 | 0.05266 |
| 30 | 54 | 53 | 53 | 54 | 56 | 57 | 58 | 59 | 60 | 60 | 62 | 64 | 67 | 67 | 68 | 67 | 66 | 64 | 63 | 64 | 64 | 62 | 60 | 58 | 0.04733 |
| 35 | 53 | 53 | 53 | 53 | 55 | 56 | 57 | 58 | 59 | 59 | 61 | 63 | 65 | 66 | 66 | 65 | 64 | 62 | 61 | 62 | 63 | 61 | 59 | 57 | 0.04302 |
| 40 | 51 | 53 | 53 | 53 | 55 | 56 | 57 | 57 | 58 | 58 | 59 | 62 | 63 | 64 | 63 | 64 | 62 | 61 | 60 | 61 | 61 | 59 | 59 | 56 | 0.03753 |
| 45 | 54 | 55 | 54 | 55 | 57 | 58 | 60 | 60 | 61 | 61 | 62 | 65 | 66 | 66 | 67 | 66 | 64 | 63 | 63 | 64 | 64 | 62 | 62 | 59 | 0.03985 |
| 50 | 58 | 58 | 58 | 58 | 59 | 60 | 62 | 63 | 64 | 64 | 65 | 67 | 69 | 68 | 69 | 67 | 66 | 65 | 66 | 66 | 66 | 65 | 64 | 62 | 0.03595 |
| 55 | 59 | 59 | 59 | 60 | 61 | 62 | 63 | 65 | 64 | 65 | 66 | 67 | 70 | 69 | 70 | 68 | 68 | 67 | 67 | 68 | 67 | 66 | 65 | 63 | 0.03476 |
| 60 | 61 | 60 | 60 | 61 | 62 | 63 | 64 | 66 | 65 | 66 | 67 | 70 | 71 | 71 | 72 | 72 | 69 | 69 | 68 | 69 | 68 | 66 | 65 | 63 | 0.03804 |
| 65 | 60 | 59 | 58 | 59 | 60 | 62 | 62 | 62 | 63 | 63 | 64 | 67 | 67 | 68 | 68 | 67 | 66 | 65 | 65 | 66 | 65 | 64 | 63 | 61 | 0.02993 |
| 70 | 58 | 57 | 57 | 58 | 59 | 60 | 60 | 60 | 60 | 60 | 61 | 63 | 64 | 64 | 64 | 63 | 62 | 61 | 62 | 63 | 62 | 61 | 60 | 58 | 0.02136 |
| 75 | 58 | 58 | 58 | 58 | 58 | 60 | 60 | 61 | 61 | 61 | 61 | 63 | 64 | 64 | 64 | 63 | 63 | 61 | 62 | 63 | 63 | 62 | 61 | 59 | 0.02083 |
| 80 | 58 | 58 | 58 | 58 | 60 | 61 | 61 | 61 | 61 | 62 | 62 | 64 | 64 | 64 | 64 | 64 | 63 | 62 | 62 | 64 | 63 | 63 | 62 | 60 | 0.02039 |
| 85 | 58 | 58 | 58 | 58 | 59 | 60 | 61 | 60 | 61 | 62 | 62 | 63 | 65 | 65 | 65 | 64 | 63 | 63 | 63 | 64 | 63 | 64 | 63 | 60 | 0.02382 |
| 90 | 58 | 57 | 58 | 58 | 59 | 60 | 61 | 61 | 61 | 61 | 63 | 64 | 66 | 66 | 66 | 65 | 64 | 64 | 64 | 64 | 64 | 64 | 63 | 60 | 0.02813 |
| 95 | 57 | 56 | 57 | 58 | 58.5 | 60 | 60.8 | 61 | 60.3 | 61 | 63 | 63 | 65 | 65 | 65 | 64 | 63 | 62 | 62 | 63 | 62 | 62 | 61 | 59 | 0.02588 |
| 100 | 55 | 55 | 56 | 57 | 58 | 60 | 61 | 61 | 60 | 61 | 62 | 64 | 65 | 64 | 64 | 63 | 61 | 60 | 61 | 61 | 60 | 60 | 60 | 58 | 0.02763 |
| 105 | 58 | 57 | 57 | 58 | 59 | 61 | 62 | 61 | 60 | 61 | 60 | 61 | 62 | 62 | 61 | 61 | 59 | 58 | 59 | 59 | 61 | 59 | 60 | 58 | 0.01567 |
| 109 | 60 | 59 | 58 | 59 | 60 | 62 | 63 | 61 | 59 | 58 | 58 | 59 | 60 | 59 | 58 | 58 | 57 | 56 | 56 | 56 | 58 | 58 | 59 | 58 | 0.01605 |



**Figure 5.13(a): Box Plot of dial gauge readings dataset of mean values of 12-mm diameter Aluminium (Al) round bar before straightening**

**Figure 5.13(b): Error Plot of 12 mm Aluminium Round Bar Before Straightening**