|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 6.19 Measurement of roundness by Dial gauge deflections of 8-mm Diameter Aluminium (Al) Round Bar** | | | | | | | | | | | | | | | | | | | | | | | |  |
|  | **Mean values of Dial Gauge Deflection Readings after straightening of 8 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)** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 | 173 | 172 | 168 | 166 | 163 | 161 | 158 | 157 | 153 | 150 | 147 | 146 | 147 | 149 | 153 | 157 | 163 | 166 | 171 | 175 | 175 | 175 | 174 | 174 | 0.1018 |
| 15 | 172 | 170 | 168 | 165 | 164 | 160 | 158 | 156 | 152 | 148 | 151 | 153 | 152 | 150 | 153 | 157 | 161 | 166 | 169 | 173 | 173 | 173 | 174 | 174 | 0.0886 |
| 20 | 171 | 170 | 168 | 165 | 166 | 159 | 157 | 155 | 156 | 154 | 157 | 153 | 154 | 153 | 155 | 157 | 160 | 165 | 169 | 170 | 171 | 172 | 173 | 173 | 0.0729 |
| 24 | 169 | 167 | 166 | 167 | 168 | 162 | 160 | 158 | 158 | 156 | 156 | 156 | 159 | 157 | 156 | 157 | 159 | 162 | 166 | 168 | 169 | 170 | 170 | 169 | 0.0535 |
| 28 | 170 | 168 | 167 | 166 | 169 | 165 | 163 | 161 | 163 | 159 | 157 | 157 | 158 | 158 | 158 | 162 | 159 | 162 | 163 | 166 | 167 | 168 | 168 | 168 | 0.0428 |
| 32 | 167 | 166 | 168 | 168 | 171 | 168 | 165 | 163 | 160 | 162 | 160 | 158 | 162 | 159 | 162 | 165 | 158 | 160 | 157 | 159 | 161 | 162 | 163 | 163 | 0.0376 |
| 36 | 169 | 171 | 170 | 171 | 169 | 172 | 171 | 167 | 169 | 165 | 161 | 162 | 164 | 165 | 166 | 168 | 167 | 167 | 166 | 166 | 166 | 167 | 168 | 169 | 0.028 |
| 40 | 170 | 169 | 172 | 172 | 170 | 173 | 170 | 168 | 167 | 166 | 163 | 164 | 163 | 164 | 168 | 167 | 167 | 167 | 167 | 167 | 167 | 169 | 170 | 170 | 0.0275 |
| 44 | 171 | 170 | 171 | 172 | 171 | 171 | 172 | 169 | 166 | 164 | 164 | 163 | 162 | 165 | 167 | 167 | 167 | 168 | 167 | 167 | 168 | 169 | 169 | 169 | 0.0283 |
| 48 | 171 | 171 | 169 | 171 | 170 | 170 | 169 | 168 | 170 | 167 | 166 | 165 | 164 | 165 | 166 | 166 | 168 | 167 | 168 | 168 | 169 | 169 | 170 | 171 | 0.0211 |
| 52 | 167 | 170 | 171 | 171 | 169 | 166 | 168 | 167 | 169 | 168 | 165 | 167 | 165 | 166 | 167 | 168 | 168 | 169 | 170 | 170 | 170 | 171 | 168 | 171 | 0.0189 |
| 56 | 171 | 171 | 170 | 169 | 167 | 167 | 164 | 165 | 167 | 166 | 164 | 163 | 163 | 164 | 166 | 167 | 167 | 168 | 168 | 168 | 168 | 169 | 170 | 171 | 0.0242 |
| 59 | 171 | 172 | 171 | 169 | 169 | 167 | 167 | 165 | 166 | 169 | 163 | 163 | 165 | 164 | 166 | 167 | 168 | 169 | 169 | 169 | 170 | 172 | 171 | 171 | 0.028 |
| 62 | 169 | 169 | 170 | 168 | 166 | 166 | 165 | 167 | 165 | 168 | 164 | 162 | 164 | 163 | 163 | 164 | 164 | 165 | 166 | 167 | 167 | 169 | 169 | 168 | 0.0232 |
| 65 | 168 | 167 | 167 | 169 | 168 | 167 | 164 | 165 | 164 | 167 | 163 | 165 | 163 | 164 | 162 | 163 | 164 | 165 | 165 | 166 | 166 | 167 | 168 | 167 | 0.019 |
| 69 | 168 | 167 | 166 | 168 | 167 | 165 | 165 | 164 | 165 | 168 | 167 | 166 | 164 | 165 | 164 | 162 | 163 | 163 | 164 | 163 | 164 | 166 | 166 | 166 | 0.0175 |
| 73 | 169 | 168 | 169 | 170 | 168 | 166 | 164 | 165 | 164 | 163 | 160 | 161 | 163 | 163 | 158 | 163 | 164 | 164 | 162 | 163 | 163 | 165 | 165 | 166 | 0.0298 |
| 77 | 170 | 169 | 168 | 166 | 169 | 165 | 164 | 162 | 163 | 160 | 159 | 158 | 159 | 160 | 160 | 161 | 162 | 163 | 164 | 166 | 167 | 168 | 168 | 168 | 0.0384 |
| 80 | 169 | 171 | 168 | 168 | 167 | 167 | 163 | 161 | 162 | 164 | 158 | 157 | 162 | 159 | 160 | 163 | 162 | 163 | 164 | 164 | 167 | 169 | 169 | 168 | 0.0398 |
| 83 | 169 | 169 | 168 | 165 | 164 | 166 | 166 | 163 | 160 | 163 | 157 | 163 | 157 | 161 | 159 | 161 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 0.0349 |
| 87 | 170 | 169 | 169 | 167 | 165 | 165 | 163 | 163 | 163 | 160 | 158 | 160 | 161 | 160 | 157 | 158 | 159 | 161 | 162 | 163 | 164 | 166 | 167 | 167 | 0.0373 |
| 90 | 170 | 169 | 169 | 168 | 165 | 164 | 165 | 161 | 159 | 158 | 159 | 161 | 162 | 157 | 158 | 158 | 162 | 161 | 162 | 164 | 165 | 165 | 167 | 168 | 0.0399 |
| 93 | 169 | 168 | 167 | 169 | 165 | 165 | 164 | 164 | 163 | 162 | 160 | 159 | 157 | 159 | 157 | 157 | 157 | 157 | 159 | 159 | 160 | 162 | 163 | 164 | 0.0402 |
| 96 | 168 | 167 | 168 | 166 | 164 | 164 | 167 | 163 | 162 | 160 | 161 | 159 | 158 | 160 | 159 | 158 | 163 | 157 | 158 | 159 | 160 | 161 | 163 | 164 | 0.0339 |
| 100 | 169 | 166 | 167 | 167 | 167 | 166 | 165 | 165 | 164 | 163 | 162 | 160 | 159 | 157 | 157 | 158 | 158 | 159 | 161 | 161 | 162 | 164 | 165 | 167 | 0.0368 |
| 104 | 170 | 168 | 169 | 167 | 167 | 166 | 165 | 164 | 163 | 162 | 161 | 159 | 158 | 160 | 157 | 159 | 157 | 158 | 160 | 161 | 162 | 164 | 166 | 167 | 0.0391 |
| 108 | 168 | 168 | 168 | 168 | 167 | 166 | 165 | 164 | 163 | 163 | 161 | 160 | 157 | 162 | 162 | 157 | 158 | 158 | 160 | 161 | 162 | 164 | 166 | 167 | 0.0374 |
| 112 | 169 | 169 | 169 | 168 | 168 | 166 | 165 | 164 | 163 | 163 | 160 | 158 | 157 | 158 | 160 | 157 | 157 | 158 | 160 | 161 | 163 | 165 | 167 | 168 | 0.0438 |
| 116 | 169 | 169 | 169 | 169 | 168 | 166 | 166 | 165 | 163 | 162 | 161 | 162 | 161 | 161 | 159 | 159 | 160 | 158 | 159 | 162 | 162 | 165 | 166 | 168 | 0.0368 |
| 120 | 169 | 169 | 170 | 169 | 168 | 167 | 166 | 164 | 163 | 162 | 160 | 158 | 160 | 158 | 156 | 157 | 157 | 159 | 160 | 162 | 164 | 165 | 168 | 169 | 0.0461 |
| 124 | 170 | 170 | 170 | 170 | 169 | 168 | 166 | 166 | 163 | 161 | 160 | 161 | 162 | 163 | 157 | 157 | 158 | 158 | 161 | 163 | 164 | 166 | 168 | 170 | 0.0458 |
| 128 | 170 | 170 | 170 | 171 | 170 | 169 | 168 | 166 | 164 | 162 | 161 | 160 | 164 | 161 | 157 | 157 | 157 | 158 | 159 | 161 | 162 | 166 | 167 | 169 | 0.0485 |
| 132 | 169 | 168 | 168 | 169 | 170 | 167 | 165 | 164 | 162 | 160 | 159 | 157 | 162 | 159 | 162 | 160 | 163 | 159 | 159 | 161 | 162 | 165 | 166 | 167 | 0.0386 |
| 136 | 168 | 169 | 170 | 169 | 168 | 168 | 168 | 164 | 162 | 161 | 159 | 161 | 159 | 158 | 159 | 159 | 158 | 157 | 159 | 160 | 163 | 165 | 167 | 169 | 0.0432 |
| 140 | 168 | 169 | 170 | 170 | 169 | 167 | 167 | 165 | 164 | 162 | 160 | 160 | 157 | 157 | 156 | 157 | 157 | 158 | 162 | 164 | 164 | 166 | 168 | 169 | 0.0475 |
| 143 | 169 | 169 | 169 | 168 | 167 | 167 | 165 | 164 | 164 | 162 | 161 | 159 | 159 | 158 | 158 | 159 | 161 | 162 | 163 | 164 | 166 | 168 | 169 | 169 | 0.0395 |



**Figure 6.24(a): Box Plot of dial gauge readings dataset of mean values of 6-mm diameter Aluminium (Al) round bar before straightening**

**Figure 6.24(b): Error Plot of dial gauge readings on 8 mm Aluminium Round Bar after straightening**