|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 5.13**  **Measurement of roundness by Dial gauge deflections of 8-mm Diameter Aluminium (Al) Round Bar** **Before Straightening** | | | | | | | | | | | | | | | | | | | | | | | | |  | |
|  | **Mean values of Dial Gauge Deflection Readings before straightening of 8 mm Aluminium 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 | 0.1017828 | |
| 15 | 172 | 170 | 168 | 165 | 164 | 160 | 158 | 156 | 152 | 148 | 145 | 145 | 146 | 149 | 153 | 157 | 161 | 166 | 169 | 173 | 173 | 173 | 174 | 174 | 0.1018878 | |
| 20 | 171 | 170 | 168 | 165 | 161 | 159 | 157 | 155 | 150 | 147 | 147 | 146 | 147 | 150 | 155 | 157 | 160 | 165 | 169 | 170 | 171 | 172 | 173 | 173 | 0.094518 | |
| 24 | 168 | 167 | 164 | 161 | 159 | 156 | 154 | 152 | 148 | 146 | 145 | 145 | 147 | 150 | 153 | 157 | 159 | 162 | 166 | 168 | 169 | 170 | 170 | 169 | 0.0886861 | |
| 28 | 168 | 165 | 163 | 161 | 158 | 154 | 153 | 149 | 147 | 145 | 145 | 145 | 147 | 150 | 154 | 155 | 159 | 162 | 163 | 166 | 167 | 168 | 168 | 168 | 0.0842612 | |
| 32 | 161 | 161 | 159 | 157 | 155 | 153 | 150 | 149 | 147 | 146 | 147 | 146 | 147 | 149 | 149 | 151 | 153 | 155 | 157 | 159 | 161 | 162 | 163 | 163 | 0.0604452 | |
| 36 | 172 | 174 | 175 | 175 | 174 | 174 | 175 | 174 | 174 | 173 | 172 | 170 | 170 | 168 | 169 | 168 | 167 | 167 | 166 | 166 | 166 | 167 | 168 | 169 | 0.0336838 | |
| 40 | 173 | 173 | 175 | 174 | 173 | 173 | 173 | 172 | 171 | 170 | 169 | 167 | 168 | 168 | 168 | 167 | 167 | 167 | 167 | 167 | 167 | 169 | 170 | 170 | 0.0274522 | |
| 44 | 171 | 172 | 172 | 172 | 170 | 171 | 171 | 169 | 168 | 168 | 168 | 167 | 166 | 166 | 167 | 167 | 167 | 168 | 167 | 167 | 168 | 169 | 169 | 169 | 0.0192512 | |
| 48 | 171 | 172 | 172 | 171 | 170 | 170 | 169 | 168 | 167 | 167 | 166 | 165 | 165 | 165 | 166 | 166 | 168 | 167 | 168 | 168 | 169 | 169 | 170 | 171 | 0.0223728 | |
| 52 | 171 | 172 | 172 | 171 | 169 | 169 | 168 | 167 | 166 | 165 | 165 | 164 | 165 | 166 | 167 | 168 | 168 | 169 | 170 | 170 | 170 | 171 | 172 | 171 | 0.0247999 | |
| 56 | 171 | 171 | 170 | 169 | 167 | 167 | 166 | 165 | 164 | 164 | 164 | 163 | 163 | 164 | 166 | 167 | 167 | 168 | 168 | 168 | 168 | 169 | 170 | 171 | 0.0253874 | |
| 59 | 171 | 172 | 171 | 169 | 169 | 167 | 167 | 165 | 164 | 164 | 163 | 163 | 163 | 164 | 166 | 167 | 168 | 169 | 169 | 169 | 170 | 172 | 171 | 171 | 0.0309387 | |
| 62 | 168 | 169 | 168 | 168 | 166 | 166 | 165 | 163 | 163 | 163 | 162 | 162 | 162 | 163 | 163 | 164 | 164 | 165 | 166 | 167 | 167 | 169 | 169 | 168 | 0.0251193 | |
| 65 | 168 | 167 | 167 | 166 | 164 | 164 | 164 | 161 | 160 | 160 | 160 | 160 | 160 | 161 | 162 | 163 | 164 | 165 | 165 | 166 | 166 | 167 | 168 | 167 | 0.0279719 | |
| 69 | 167 | 167 | 166 | 164 | 163 | 162 | 162 | 160 | 158 | 159 | 158 | 157 | 158 | 159 | 160 | 160 | 161 | 163 | 164 | 163 | 164 | 166 | 166 | 166 | 0.0315647 | |
| 73 | 166 | 166 | 165 | 164 | 162 | 161 | 161 | 159 | 158 | 157 | 156 | 156 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 163 | 165 | 165 | 166 | 0.0341883 | |
| 77 | 170 | 169 | 168 | 166 | 166 | 165 | 164 | 161 | 160 | 160 | 159 | 158 | 159 | 160 | 160 | 161 | 162 | 163 | 164 | 166 | 167 | 168 | 168 | 168 | 0.0379925 | |
| 80 | 169 | 170 | 168 | 168 | 165 | 164 | 163 | 161 | 160 | 158 | 158 | 157 | 157 | 159 | 160 | 161 | 162 | 163 | 164 | 164 | 167 | 169 | 169 | 168 | 0.0428296 | |
| 83 | 169 | 169 | 168 | 165 | 164 | 163 | 162 | 160 | 159 | 158 | 157 | 155 | 157 | 157 | 159 | 161 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 0.0411469 | |
| 87 | 168 | 169 | 169 | 167 | 165 | 164 | 163 | 159 | 159 | 157 | 156 | 155 | 156 | 156 | 157 | 158 | 159 | 161 | 162 | 163 | 164 | 166 | 167 | 167 | 0.0463427 | |
| 90 | 170 | 169 | 169 | 168 | 165 | 164 | 163 | 161 | 159 | 158 | 155 | 156 | 156 | 157 | 158 | 158 | 159 | 161 | 162 | 164 | 165 | 165 | 167 | 168 | 0.0472462 | |
| 93 | 166 | 164 | 164 | 165 | 165 | 165 | 164 | 164 | 163 | 162 | 160 | 159 | 157 | 157 | 157 | 157 | 157 | 157 | 159 | 159 | 160 | 162 | 163 | 164 | 0.0323862 | |
| 96 | 165 | 165 | 165 | 165 | 164 | 164 | 167 | 163 | 162 | 160 | 161 | 159 | 158 | 156 | 156 | 156 | 157 | 157 | 158 | 159 | 160 | 161 | 163 | 164 | 0.0328369 | |
| 100 | 165 | 165 | 165 | 167 | 167 | 166 | 165 | 165 | 164 | 163 | 162 | 160 | 159 | 157 | 157 | 158 | 158 | 159 | 161 | 161 | 162 | 164 | 165 | 167 | 0.0334166 | |
| 104 | 168 | 168 | 169 | 167 | 167 | 166 | 165 | 164 | 163 | 162 | 161 | 159 | 158 | 156 | 157 | 157 | 157 | 158 | 160 | 161 | 162 | 164 | 166 | 167 | 0.0407782 | |
| 108 | 168 | 168 | 168 | 168 | 167 | 166 | 165 | 164 | 163 | 163 | 161 | 160 | 157 | 156 | 156 | 157 | 158 | 158 | 160 | 161 | 162 | 164 | 166 | 167 | 0.0422703 | |
| 112 | 169 | 169 | 169 | 168 | 168 | 166 | 165 | 164 | 163 | 163 | 160 | 158 | 157 | 155 | 155 | 157 | 157 | 158 | 160 | 161 | 163 | 165 | 167 | 168 | 0.0480263 | |
| 116 | 169 | 169 | 169 | 169 | 168 | 166 | 166 | 165 | 163 | 162 | 161 | 158 | 156 | 156 | 156 | 156 | 157 | 158 | 159 | 162 | 162 | 165 | 166 | 168 | 0.0483716 | |
| 120 | 169 | 169 | 170 | 169 | 168 | 167 | 166 | 164 | 163 | 162 | 160 | 158 | 157 | 156 | 156 | 157 | 157 | 159 | 160 | 162 | 164 | 165 | 168 | 169 | 0.04903 | |
| 124 | 170 | 170 | 170 | 170 | 169 | 168 | 166 | 166 | 163 | 161 | 160 | 157 | 157 | 156 | 157 | 157 | 158 | 158 | 161 | 163 | 164 | 166 | 168 | 170 | 0.052205 | |
| 128 | 170 | 170 | 170 | 171 | 170 | 169 | 168 | 166 | 164 | 162 | 161 | 160 | 158 | 156 | 157 | 157 | 157 | 158 | 159 | 161 | 162 | 166 | 167 | 169 | 0.0524089 | |
| 132 | 169 | 168 | 168 | 169 | 170 | 167 | 165 | 164 | 162 | 160 | 159 | 157 | 155 | 155 | 154 | 155 | 156 | 156 | 159 | 161 | 162 | 165 | 166 | 167 | 0.0534053 | |
| 136 | 168 | 169 | 170 | 169 | 168 | 168 | 168 | 164 | 162 | 161 | 159 | 157 | 155 | 154 | 155 | 154 | 156 | 157 | 159 | 160 | 163 | 165 | 167 | 169 | 0.0554425 | |
| 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 | 0.0475253 | |
| 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 | 0.0395147 | |



**Figure 5.11(a): Box Plot of dial gauge readings dataset of mean values of 8-mm diameter Aluminium (Al) round bar before straightening**

Figure 5.11(b): Error Plot of 8 mm Aluminium Round Bar Before Straightening