

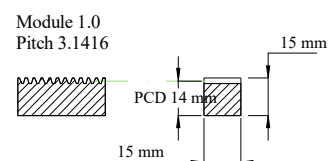
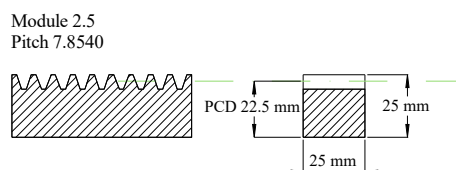
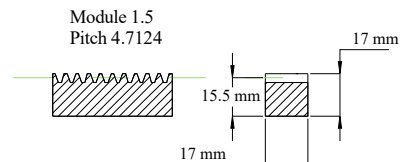
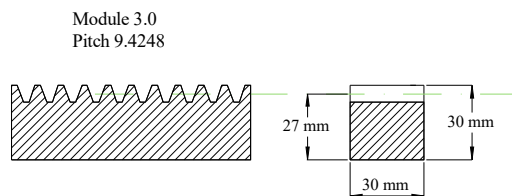
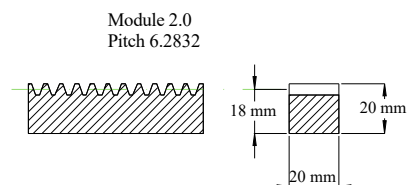
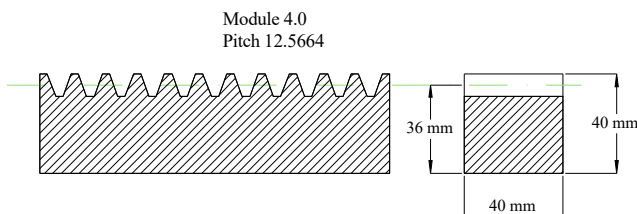
## Spur Gear and Racking – Stock Industrial Range



Standard metric spur gears and rack available from stock in non-hardened form. Rack and pinion is a traditional drive system that provides a compact and rugged linear or geared drive. Standard racks are 2m long and can be butt joined for an unlimited length. A great benefit of rack and pinion is its high rigidity even in very long length applications. It is also easy to install and can operate at high speed.

Rack and pinions in plastic, stainless, hardened circular cross section, and high torque helical are available on indent to suit almost any application.

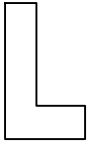
### Racks



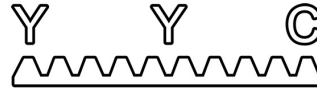
| Module | Cross section | # Teeth | Actual Length<br>mm | Precision<br>JIS9e27 | Mass<br>Kg/m |
|--------|---------------|---------|---------------------|----------------------|--------------|
| 1      | 15x15         | 636     | 1998.05             | 0.056/300mm          | 1.64         |
| 1.5    | 17x17         | 424     | 1998.05             | 0.059/300mm          | 2.06         |
| 2      | 20x20         | 318     | 1998.05             | 0.059/300mm          | 2.81         |
| 2.5    | 25x25         | 255     | 2002.77             | 0.063/300mm          | 4.38         |
| 3      | 30x30         | 212     | 1998.05             | 0.065/300mm          | 6.44         |
| 4      | 40x40         | 159     | 1998.05             | 0.068/300mm          | 11.31        |

Material S45C (SAE 1045) can be welded and hardened.

Racks can be cut to your required length and lengths are specially machined to be butt jointed. Special designs with pre drilled or counter bored holes can also be supplied on request.



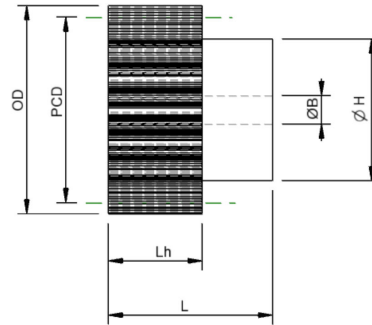
**ATLANTA**



## Spur Gears



- Material C45 – heat or nitride treatable.
- Torque values can be factor up to 2.5 times with hardening.

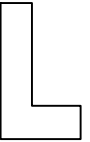
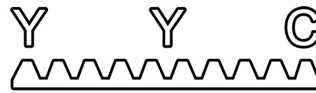


### Mod 1 - 2.5

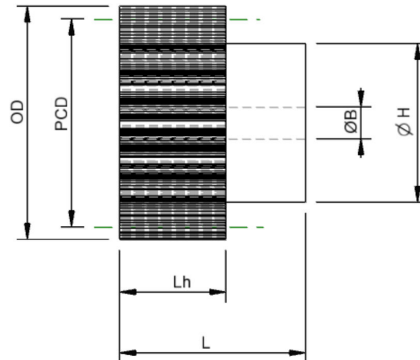
Items in **bold** are regular stock items

| Teeth | Mod 1     |           |           |           |            |            | Mod. 1.5    |             |           |           |            |            | Mod 2     |           |           |           |             |            | Mod.2.5     |             |           |           |             |            |
|-------|-----------|-----------|-----------|-----------|------------|------------|-------------|-------------|-----------|-----------|------------|------------|-----------|-----------|-----------|-----------|-------------|------------|-------------|-------------|-----------|-----------|-------------|------------|
|       | Lh=15     |           |           | L=25      |            |            | Lh=17       |             |           | L=30      |            |            | Lh=20     |           |           | L=35      |             |            | Lh=25       |             |           | L=45      |             |            |
|       | Outside Ø | Pitch Ø   | Hub Ø     | Bore Ø    | Torque     | Mass       | Outside Ø   | Pitch Ø     | Hub Ø     | Bore Ø    | Torque     | Mass       | Outside Ø | Pitch Ø   | Hub Ø     | Bore Ø    | Torque      | Mass       | Outside Ø   | Pitch Ø     | Hub Ø     | Bore Ø    | Torque      | Mass       |
| z     | OD        | PCD       | H         | B         | Nm         | kg         | OD          | PCD         | H         | B         | Nm         | kg         | OD        | PCD       | H         | B         | Nm          | kg         | OD          | PCD         | H         | B         | Nm          | kg         |
| 12    | 14        | 12        | 9         | -         | 0.2        | 0.1        | 21          | 18          | 14        | 8         | 0.8        | 0.1        | 28        | 24        | 18        | 10        | 1.7         | 0.1        | 35          | 30          | 22        | 10        | 2.4         | 0.2        |
| 13    | 15        | 13        | 10        | -         | 0.3        | 0.1        | 22.5        | 19.5        | 15        | 8         | 0.9        | 0.1        | 30        | 26        | 20        | 10        | 1.9         | 0.1        | 37.5        | 32.5        | 25        | 10        | 3.4         | 0.3        |
| 14    | 16        | 14        | 11        | -         | 0.3        | 0.1        | 24          | 21          | 17        | 8         | 1.1        | 0.1        | 32        | 28        | 22        | 10        | 2.2         | 0.2        | 40          | 35          | 28        | 10        | 4.2         | 0.3        |
| 15    | <b>17</b> | <b>15</b> | <b>12</b> | -         | <b>0.4</b> | <b>0.1</b> | <b>25.5</b> | <b>22.5</b> | <b>18</b> | <b>8</b>  | <b>1.2</b> | <b>0.1</b> | <b>34</b> | <b>30</b> | <b>24</b> | <b>10</b> | <b>2.6</b>  | <b>0.2</b> | <b>42.5</b> | <b>37.5</b> | <b>30</b> | <b>10</b> | <b>5</b>    | <b>0.3</b> |
| 16    | 18        | 16        | 13        | -         | 0.5        | 0.1        | 27          | 24          | 19        | 8         | 1.4        | 0.1        | 36        | 32        | 25        | 10        | 3           | 0.2        | 45          | 40          | 32        | 12        | 5.8         | 0.4        |
| 17    | 19        | 17        | 14        | -         | 0.6        | 0.1        | 28.5        | 25.5        | 20        | 8         | 1.7        | 0.1        | 38        | 34        | 25        | 10        | 3.5         | 0.2        | 47.5        | 42.5        | 35        | 12        | 6.7         | 0.4        |
| 18    | 20        | 18        | 15        | 8         | 0.7        | 0.1        | 30          | 27          | 20        | 8         | 1.9        | 0.1        | 40        | 36        | 25        | 10        | 4           | 0.3        | 50          | 45          | 35        | 12        | 7.7         | 0.5        |
| 19    | 21        | 19        | 15        | 8         | 0.8        | 0.1        | 31.5        | 28.5        | 20        | 8         | 2.1        | 0.1        | 42        | 38        | 25        | 10        | 4.4         | 0.3        | 52.5        | 47.5        | 35        | 12        | 8.6         | 0.5        |
| 20    | <b>22</b> | <b>20</b> | <b>16</b> | <b>8</b>  | <b>0.9</b> | <b>0.1</b> | <b>33</b>   | <b>30</b>   | <b>25</b> | <b>8</b>  | <b>2.3</b> | <b>0.2</b> | <b>44</b> | <b>40</b> | <b>30</b> | <b>10</b> | <b>4.9</b>  | <b>0.3</b> | <b>55</b>   | <b>50</b>   | <b>40</b> | <b>12</b> | <b>9.5</b>  | <b>0.6</b> |
| 21    | 23        | 21        | 16        | 8         | 1          | 0.1        | 34.5        | 31.5        | 25        | 10        | 2.5        | 0.2        | 46        | 42        | 30        | 12        | 5.5         | 0.3        | 57.5        | 52.5        | 40        | 14        | 10.4        | 0.6        |
| 22    | 24        | 22        | 16        | 8         | 1.1        | 0.1        | 36          | 33          | 25        | 10        | 2.8        | 0.2        | 48        | 44        | 30        | 12        | 6           | 0.4        | 60          | 55          | 45        | 14        | 11.4        | 0.7        |
| 23    | 25        | 23        | 18        | 8         | 1.2        | 0.1        | 37.5        | 34.5        | 25        | 10        | 3          | 0.2        | 50        | 46        | 30        | 12        | 6.6         | 0.4        | 62.5        | 57.5        | 45        | 14        | 12.4        | 0.7        |
| 24    | 26        | 24        | 20        | 10        | 1.3        | 0.1        | 39          | 36          | 25        | 10        | 3.4        | 0.2        | 52        | 48        | 35        | 12        | 7.2         | 0.4        | 65          | 60          | 45        | 14        | 13.5        | 0.8        |
| 25    | <b>27</b> | <b>25</b> | <b>20</b> | <b>10</b> | <b>1.4</b> | <b>0.1</b> | <b>40.5</b> | <b>37.5</b> | <b>25</b> | <b>10</b> | <b>3.6</b> | <b>0.2</b> | <b>54</b> | <b>50</b> | <b>35</b> | <b>12</b> | <b>7.8</b>  | <b>0.5</b> | <b>67.5</b> | <b>62.5</b> | <b>50</b> | <b>14</b> | <b>14.6</b> | <b>0.8</b> |
| 26    | 28        | 26        | 20        | 10        | 1.5        | 0.1        | 42          | 39          | 30        | 12        | 3.9        | 0.2        | 56        | 52        | 40        | 12        | 8.1         | 0.5        | 70          | 65          | 50        | 14        | 15.8        | 0.8        |
| 27    | 29        | 27        | 20        | 10        | 1.6        | 0.1        | 43.5        | 40.5        | 30        | 12        | 4.1        | 0.2        | 58        | 54        | 40        | 12        | 8.7         | 0.5        | 72.5        | 67.5        | 50        | 14        | 17          | 0.9        |
| 28    | 30        | 28        | 20        | 10        | 1.7        | 0.1        | 45          | 42          | 30        | 12        | 4.4        | 0.2        | 60        | 56        | 40        | 12        | 9.3         | 0.6        | 75          | 70          | 50        | 14        | 18.1        | 1          |
| 29    | 31        | 29        | 20        | 10        | 1.8        | 0.1        | 46.5        | 43.5        | 30        | 12        | 4.8        | 0.2        | 62        | 58        | 40        | 14        | 10          | 0.6        | 77.5        | 72.5        | 50        | 14        | 19.4        | 1.1        |
| 30    | <b>32</b> | <b>30</b> | <b>20</b> | <b>10</b> | <b>1.9</b> | <b>0.1</b> | <b>48</b>   | <b>45</b>   | <b>30</b> | <b>12</b> | <b>5</b>   | <b>0.3</b> | <b>64</b> | <b>60</b> | <b>40</b> | <b>14</b> | <b>10.6</b> | <b>0.7</b> | <b>80</b>   | <b>75</b>   | <b>55</b> | <b>14</b> | <b>20.7</b> | <b>1.2</b> |
| 31    | 33        | 31        | 25        | 10        | 2          | 0.1        | 49.5        | 46.5        | 35        | 12        | 5.4        | 0.3        | 66        | 62        | 45        | 14        | 11.3        | 0.7        | 82.5        | 77.5        | 55        | 16        | 22          | 1.2        |
| 32    | 34        | 32        | 25        | 10        | 2.1        | 0.1        | 51          | 48          | 35        | 12        | 5.7        | 0.3        | 68        | 64        | 45        | 14        | 12          | 0.7        | 85          | 80          | 55        | 16        | 23.4        | 1.3        |
| 33    | 35        | 33        | 25        | 10        | 2.3        | 0.1        | 52.5        | 49.5        | 35        | 12        | 6          | 0.3        | 70        | 66        | 45        | 14        | 12.7        | 0.7        | 87.5        | 82.5        | 55        | 16        | 24.8        | 1.4        |
| 34    | 36        | 34        | 25        | 10        | 2.4        | 0.1        | 54          | 51          | 35        | 12        | 6.2        | 0.3        | 72        | 68        | 45        | 14        | 13.4        | 0.7        | 90          | 85          | 55        | 16        | 26.3        | 1.5        |
| 35    | <b>37</b> | <b>35</b> | <b>25</b> | <b>10</b> | <b>2.6</b> | <b>0.2</b> | <b>55.5</b> | <b>52.5</b> | <b>35</b> | <b>12</b> | <b>6.6</b> | <b>0.4</b> | <b>74</b> | <b>70</b> | <b>45</b> | <b>14</b> | <b>14.1</b> | <b>0.9</b> | <b>92.5</b> | <b>87.5</b> | <b>60</b> | <b>16</b> | <b>27.8</b> | <b>1.6</b> |
| 36    | 38        | 36        | 25        | 10        | 2.7        | 0.2        | 57          | 54          | 35        | 12        | 6.9        | 0.4        | 76        | 72        | 45        | 14        | 14.9        | 0.9        | 95          | 90          | 60        | 16        | 29.3        | 1.6        |
| 37    | 39        | 37        | 25        | 10        | 2.8        | 0.2        | 58.5        | 55.5        | 40        | 12        | 7.3        | 0.4        | 78        | 74        | 50        | 14        | 15.6        | 0.9        | 97.5        | 92.5        | 60        | 16        | 31          | 1.7        |
| 38    | 40        | 38        | 25        | 10        | 3          | 0.2        | 60          | 57          | 40        | 12        | 7.6        | 0.5        | 80        | 76        | 50        | 14        | 16.5        | 1          | 100         | 95          | 60        | 16        | 32.5        | 1.8        |
| 39    | 41        | 39        | 25        | 10        | 3.1        | 0.2        | 61.5        | 58.5        | 40        | 12        | 8          | 0.5        | 82        | 78        | 50        | 14        | 17.3        | 1          | 102.5       | 97.5        | 60        | 16        | 34.1        | 1.9        |
| 40    | <b>42</b> | <b>40</b> | <b>25</b> | <b>10</b> | <b>3.3</b> | <b>0.2</b> | <b>63</b>   | <b>60</b>   | <b>40</b> | <b>12</b> | <b>8.4</b> | <b>0.6</b> | <b>84</b> | <b>80</b> | <b>50</b> | <b>14</b> | <b>18.1</b> | <b>1.1</b> | <b>105</b>  | <b>100</b>  | <b>70</b> | <b>16</b> | <b>35.9</b> | <b>2</b>   |
| 41    | 43        | 41        | 30        | 10        | 2.4        | 0.3        | 64.5        | 61.5        | 40        | 12        | 8.8        | 0.6        | 86        | 82        | 55        | 16        | 19          | 1.1        | 107.5       | 103         | 70        | 16        | 37.901      | 2.1        |
| 42    | 44        | 42        | 30        | 10        | 3.6        | 0.3        | 66          | 63          | 50        | 12        | 9.2        | 0.6        | 88        | 84        | 55        | 16        | 19.8        | 1.1        | 110         | 105         | 70        | 16        | 39.4        | 2.2        |
| 43    | 45        | 43        | 30        | 10        | 3.8        | 0.3        | 67.5        | 64.5        | 50        | 12        | 9.6        | 0.6        | 90        | 86        | 55        | 16        | 20.7        | 1.1        | 112.5       | 108         | 70        | 16        | 41.714      | 2.4        |
| 44    | 46        | 44        | 30        | 10        | 3.9        | 0.3        | 69          | 66          | 50        | 12        | 10         | 0.6        | 92        | 88        | 60        | 16        | 21.6        | 1.1        | 115         | 110         | 70        | 16        | 43.7        | 2.5        |
| 45    | 47        | 45        | 30        | 12        | 4.1        | 0.3        | 70.5        | 67.5        | 50        | 12        | 10.5       | 0.7        | 94        | 90        | 60        | 16        | 22.6        | 1.4        | 117.5       | 113         | 70        | 16        | 45          | 2.6        |
| 46    | 48        | 46        | 30        | 12        | 4.3        | 0.3        | 72          | 69          | 50        | 14        | 10.9       | 0.7        | 96        | 92        | 60        | 16        | 23.5        | 1.4        | 120         | 115         | 70        | 16        | 47.8        | 2.7        |
| 47    | 49        | 47        | 30        | 12        | 4.5        | 0.3        | 73.5        | 70.5        | 50        | 14        | 11.4       | 0.7        | 98        | 94        | 70        | 16        | 24.5        | 1.4        | 122.5       | 118         | 80        | 20        | 49.893      | 2.8        |
| 48    | 50        | 48        | 30        | 12        | 4.6        | 0.3        | 75          | 72          | 50        | 14        | 11.8       | 0.8        | 100       | 96        | 70        | 16        | 25.5        | 1.6        | 125         | 120         | 80        | 20        | 50.8        | 2.9        |
| 49    | 51        | 49        | 30        | 12        | 4.8        | 0.3        | 76.5        | 73.5        | 50        | 14        | 12.3       | 0.8        | 102       | 98        | 70        | 16        | 26.6        | 1.6        | 127.5       | 123         | 80        | 20        | 54.258      | 3          |
| 50    | 52        | 50        | 30        | 12        | 5          | 0.3        | 78          | 75          | 50        | 14        | 12.8       | 0.8        | 104       | 100       | 70        | 16        | 27.6        | 1.8        | 130         | 125         | 80        | 20        | 55          | 3.1        |
| 51    | 53        | 51        | 40        | 12        | 5.1        | 0.3        | 79.5        | 76.5        | 60        | 14        | 13.401     | 0.8        | 106       | 102       | 70        | 16        | 28.959      | 1.8        | 132.5       | 128         | 80        | 20        | 58.808      | 3.2        |
| 52    | 54        | 52        | 40        | 12        | 5.2        | 0.3        | 81          | 78          | 60        | 14        | 13.9       | 0.8        | 108       | 104       | 70        | 16        | 30.1        | 1.8        | 135         | 130         | 90        | 20        | 61.2        | 3.4        |
| 53    | 55        | 53        | 40        | 12        | 5.4        | 0.3        | 82.5        | 79.5        | 60        | 14        | 14.419     | 0.8        | 110       | 106       | 70        | 16        | 31.182      | 1.8        | 137.5       | 133         | 90        | 20        | 63.542      | 3.6        |
| 54    | 56        | 54        | 40        | 12        | 5.6        | 0.3        | 84          | 81          | 60        | 14        | 14.8       | 0.8        | 112       | 108       | 70        | 16        | 31.9        | 1.8        | 140         | 135         | 90        | 20        | 63.5        | 3.8        |
| 55    | 57        | 55        | 40        | 12        | 5.8        | 0.3        | 85.5        | 82.5        | 60        | 14        | 15.473     | 0.8        | 114       | 110       | 70        | 16        | 33.483      | 1.8        | 142.5       | 138         | 90        | 20        | 68.461      | 4          |
| 56    | 58        | 56        | 40        | 12        | 6          | 0.3        | 87          | 84          | 60        | 16        | 15.8       | 0.8        | 116       | 112       | 70        | 16        | 34.2        | 2.2        | 145         | 140         | 100       | 20        | 68          | 4.1        |
| 57    | 59        | 57        | 40        | 12        | 6.1        | 0.4        | 88.5        | 85.5        | 60        | 16        | 16.4       | 1.1        | 118       | 114       | 70        | 16        | 35.4        | 2.3        | 147.5       | 143         | 100       | 20        | 73.564      | 4.2        |
| 58    | 60        | 58        | 40        | 12        | 6.3        | 0.4        | 90          | 87          | 60        | 16        | 17.1       | 1.1        | 120       | 116       | 70        | 16        | 37.1        | 2.5        | 150         | 145         | 100       | 20        | 76.2        | 4.2        |
| 59    | 61        | 59        | 40        | 12        | 6.5        | 0.4        | 91.5        | 88.5        | 60        | 16        | 17.687     | 1.1        | 122       | 118       | 70        | 16        | 38.321      |            | 152.5       | 148         | 100       | 20        | 78.851      | 4.3        |
| 60    | 62        | 60        | 40        | 12        | 6.7        | 0.4        | 93          | 90          | 60        | 16        | 18         | 1.2        | 124       | 120       | 70        | 16        | 39          |            | 155         | 150         | 100       | 20        | 77          | 4.4        |

Larger sizes available on request



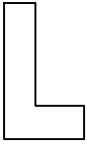
## Mod 3 – 6



Items in **bold** are regular stock items

| Teeth<br>z | Mod 3        |            |           |           |              |            | Mod 4        |            |           |           |              |            | Mod 5        |            |          |           |              |            | Mod 6        |            |          |           |              |            |
|------------|--------------|------------|-----------|-----------|--------------|------------|--------------|------------|-----------|-----------|--------------|------------|--------------|------------|----------|-----------|--------------|------------|--------------|------------|----------|-----------|--------------|------------|
|            | Lh=30        |            |           | L=50      |              |            | Lh=40        |            |           | L=60      |              |            | Lh=50        |            |          | L=75      |              |            | Lh=60        |            |          | L=80      |              |            |
|            | Outside<br>Ø | Pitch<br>Ø | Hub<br>Ø  | Bore<br>Ø | Torque<br>Nm | Mass<br>kg | Outside<br>Ø | Pitch<br>Ø | Hub<br>Ø  | Bore<br>Ø | Torque<br>Nm | Mass<br>kg | Outside<br>Ø | Pitch<br>Ø | Hub<br>Ø | Bore<br>Ø | Torque<br>Nm | Mass<br>kg | Outside<br>Ø | Pitch<br>Ø | Hub<br>Ø | Bore<br>Ø | Torque<br>Nm | Mass<br>kg |
| 12         | 42           | 36         | 27        | 12        | 5.4          | 0.3        | 56           | 48         | 35        | 14        | 12.3         | 0.6        | 70           | 60         | 45       | 20        | 24.3         | 1.1        | 84           | 72         | 54       | 20        | 52.3         |            |
| 13         | 45           | 39         | 30        | 12        | 6.3          | 0.4        | 60           | 52         | 40        | 14        | 15.2         | 0.7        | 75           | 65         | 50       | 20        | 30.7         | 1.2        | 90           | 78         | 60       | 20        | 50.3         |            |
| 14         | 48           | 42         | 33        | 12        | 7.6          | 0.4        | 64           | 56         | 45        | 14        | 18.2         | 0.8        | 80           | 70         | 55       | 20        | 36.7         | 1.4        |              |            |          |           |              |            |
| 15         | <b>51</b>    | <b>45</b>  | <b>35</b> | <b>12</b> | <b>9.1</b>   | <b>0.5</b> | <b>68</b>    | <b>60</b>  | <b>45</b> | <b>14</b> | <b>21.2</b>  | <b>0.9</b> | 85           | 75         | 60       | 20        | 42.4         | 1.6        | 102          | 90         | 70       | 20        | 62.8         | 2.6        |
| 16         | 54           | 48         | 38        | 14        | 10.6         | 0.5        | 72           | 64         | 50        | 16        | 24.2         | 1          | 90           | 80         | 65       | 20        | 48.1         | 1.7        | 108          | 96         | 75       | 20        | 71.7         |            |
| 17         | 57           | 51         | 42        | 14        | 12.3         | 0.6        | 76           | 68         | 50        | 16        | 27.4         | 1.1        | 95           | 85         | 70       | 20        | 53.1         | 1.9        |              |            |          |           |              |            |
| 18         | 60           | 54         | 45        | 14        | 13.9         | 0.7        | 80           | 72         | 50        | 16        | 30.7         | 1.2        | 100          | 90         | 70       | 20        | 61.8         | 2.2        | 120          | 108        | 80       | 20        | 90.7         |            |
| 19         | 63           | 57         | 45        | 14        | 15           | 0.7        | 84           | 76         | 60        | 16        | 34.2         | 1.3        | 105          | 95         | 70       | 20        | 68.7         | 2.4        |              |            |          |           |              | 3.9        |
| 20         | <b>66</b>    | <b>60</b>  | <b>45</b> | <b>14</b> | <b>16.5</b>  | <b>0.8</b> | <b>88</b>    | <b>80</b>  | <b>70</b> | <b>16</b> | <b>37.8</b>  | <b>1.4</b> | 110          | 100        | 80       | 20        | 75.8         | 2.6        | 132          | 120        | 90       | 20        | 111.2        | 4.3        |
| 21         | 69           | 63         | 50        | 16        | 18.2         | 0.9        | 92           | 84         | 70        | 16        | 41.6         | 1.6        | 115          | 105        | 80       | 20        | 83.2         | 2.9        | 126          | 114        | 80       | 20        |              | 4.7        |
| 22         | 72           | 66         | 50        | 16        | 20           | 1          | 96           | 88         | 70        | 16        | 45.5         | 1.7        | 120          | 110        | 80       | 20        | 90.9         | 3.1        | 144          | 132        | 100      | 20        |              | 5.1        |
| 23         | 75           | 69         | 50        | 16        | 21.7         | 1          | 100          | 92         | 75        | 20        | 49.5         | 1.8        | 125          | 115        | 90       | 20        | 98.8         | 3.4        |              |            |          |           |              |            |
| 24         | 78           | 72         | 50        | 16        | 23.6         | 1.1        | 104          | 96         | 75        | 20        | 53.7         | 2          | 130          | 120        | 90       | 20        | 107          | 3.6        | 156          | 144        | 110      | 25        | 156.8        |            |
| 25         | <b>81</b>    | <b>75</b>  | <b>60</b> | <b>16</b> | <b>25.5</b>  | <b>1.2</b> | <b>108</b>   | <b>100</b> | <b>75</b> | <b>20</b> | <b>58.1</b>  | <b>2.2</b> | 135          | 125        | 90       | 20        | 115.6        | 3.9        | 162          | 150        | 110      | 25        | 169.2        | 6.5        |
| 26         | 84           | 78         | 60        | 16        | 28.5         | 1.3        | 112          | 104        | 75        | 20        | 62.5         | 2.3        | 140          | 130        | 100      | 20        | 124.2        | 4.2        |              |            |          |           |              |            |
| 27         | 87           | 81         | 60        | 16        | 30.7         | 1.4        | 116          | 108        | 75        | 20        | 67.3         | 2.5        | 145          | 135        | 100      | 20        | 133.2        | 4.4        |              |            |          |           |              |            |
| 28         | 90           | 84         | 60        | 16        | 33           | 1.5        | 120          | 112        | 75        | 20        | 72.1         | 2.6        | 150          | 140        | 100      | 25        | 142.5        | 4.8        | 180          | 168        | -        | 25        | 209          |            |
| 29         | 93           | 87         | 60        | 16        | 35.3         | 1.6        | 124          | 116        | 75        | 20        | 77           | 2.8        | 155          | 145        | 110      | 25        | 152.1        | 5.2        |              |            |          |           |              |            |
| 30         | <b>96</b>    | <b>90</b>  | <b>60</b> | <b>16</b> | <b>37.6</b>  | <b>1.7</b> | <b>128</b>   | <b>120</b> | <b>75</b> | <b>20</b> | <b>82.1</b>  | <b>3</b>   | 160          | 150        | 110      | 25        | 162          | 5.5        | 192          | 180        | -        | 25        | 247.4        | 9.1        |
| 31         | 99           | 93         | 60        | 16        | 40.1         | 1.8        | 132          | 124        | 80        | 20        | 88.294       | 3.2        |              |            |          |           |              |            |              |            |          |           |              |            |
| 32         | 102          | 96         | 70        | 16        | 42.6         | 1.9        | 136          | 128        | 80        | 20        | 93.1         | 3.4        | 170          | 160        | -        | 25        | 186.6        | 6.2        | 204          | 192        | -        | 25        | 285.0        |            |
| 33         | 105          | 99         | 70        | 16        | 45.2         | 2          | 140          | 132        | 80        | 20        | 99.954       | 3.6        |              |            |          |           |              |            |              |            |          |           |              |            |
| 34         | 108          | 102        | 70        | 16        | 47.8         | 2.2        | 144          | 136        | 80        | 20        | 106.1        | 3.8        |              |            |          |           |              |            |              |            |          |           |              |            |
| 35         | <b>111</b>   | <b>105</b> | <b>70</b> | <b>16</b> | <b>50.6</b>  | <b>2.3</b> | 148          | 140        | 80        | 20        | 111.7        | 4.3        | 185          | 175        | -        | 25        | 222.4        | 7.4        | 222          | 210        | -        | 25        |              |            |
| 36         | 114          | 108        | 70        | 20        | 53.4         | 2.4        | 152          | 144        | 80        | 25        | 118.2        | 4.4        |              |            |          |           | 7.8          |            |              |            |          |           | 360.3        | 12.8       |
| 37         | 117          | 111        | 70        | 20        | 56.3         | 2.6        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 38         | 120          | 114        | 80        | 20        | 59.3         | 2.7        | 160          | 152        | -         | 25        | 132.2        | 4.7        | 200          | 190        | -        | 25        | 260.9        | 8.6        | 240          | 228        | -        | 25        | 396.8        |            |
| 39         | 123          | 117        | 80        | 20        | 62.3         | 2.8        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 40         | <b>126</b>   | <b>120</b> | <b>80</b> | <b>20</b> | <b>65.4</b>  | <b>2.9</b> | 168          | 160        | -         | 25        | 146.2        | 5.2        | 210          | 200        | -        | 25        | 300.2        | 9.5        | 252          | 240        | -        | 25        | 446.7        |            |
| 41         | 129          | 123        | 80        | 20        | 68.527       | 3.1        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 42         | 132          | 126        | 80        | 20        | 71.7         | 3.2        |              |            |           |           | 161.2        |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 43         | 135          | 129        | 80        | 20        | 75.368       | 3.4        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 44         | 138          | 132        | 90        | 20        | 78.9         | 3.5        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 45         | 141          | 135        | 90        | 20        | 81.9         | 3.8        | 188          | 180        | -         | 25        | 185.2        | 6.5        | 235          | 225        | -        | 25        | 381          | 11.9       |              |            |          |           | 567.4        |            |
| 46         | 144          | 138        | 90        | 20        | 86.2         | 3.9        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 47         | 147          | 141        | 100       | 20        | 90.024       | 4.1        |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 48         | 150          | 144        | 100       | 20        | 93           | 4.2        | 200          | 192        | -         | 25        | 210.7        | 7.4        | 250          | 240        | -        | 25        | 434          | 13.5       |              |            |          |           | 644.2        |            |
| 49         |              |            |           |           |              |            |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 50         | 156          | 150        | -         | 20        | 100.4        | 4.5        | 208          | 200        | -         | 25        | 228.8        | 8          | 260          | 250        | -        | 30        | 456.8        | 14.6       |              |            |          |           | 701.5        |            |
| 51         |              |            |           |           |              |            |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 52         | 162          | 156        | -         | 20        | 110.2        | 5.0        | 216          | 208        | -         | 25        | 246.4        | 8.6        | 270          | 260        | -        | 20        | 503.5        | 15.7       |              |            |          |           |              |            |
| 53         |              |            |           |           |              |            |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 54         |              |            |           |           | 116.5        |            |              |            |           |           | 264.8        |            |              |            |          |           | 551.6        |            |              |            |          |           |              |            |
| 55         | 171          | 165        | -         | 20        | 123.24       | 5.3        | 228          | 220        | -         | 25        | 275.38       | 9.5        | 285          | 275        | -        | 30        | 563.52       | 16.8       |              |            |          |           |              |            |
| 56         |              |            |           |           | 125          | 5.6        |              |            |           |           | 287.2        | 10         |              |            |          |           | 18.1         |            |              |            |          |           |              |            |
| 57         | 177          | 171        | -         | 20        | 132.35       | 5.7        | 236          | 228        | -         | 25        | 295.6        | 11         | 295          | 285        | -        | 30        | 605.45       | 18.6       |              |            |          |           |              |            |
| 58         |              |            |           |           |              |            |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 59         |              |            |           |           |              |            |              |            |           |           |              |            |              |            |          |           |              |            |              |            |          |           |              |            |
| 60         | 186          | 180        | -         | 20        | 143          | 6.4        | 248          | 240        | -         | 25        | 327.2        | 11.4       | 310          | 300        | -        | 30        | 678.4        | 20.7       |              |            |          |           |              |            |

Larger sizes available on request



## Sizing a rack and pinion drive

Sizing a rack and pinion drive is based on the maximum torque the pinion can provide. This can be calculated as follows.

$$T_p = \frac{F_U \cdot d}{2000} \cdot K_A \cdot S_B \quad \text{Pinion torque}$$

For vertical applications:  $F_U = m \cdot g + m \cdot a$

For horizontal applications:  $F_U = m \cdot g \cdot \mu + m \cdot a$

Acceleration:  $a = \frac{v}{t}$

Where:

|       |   |                                   |                  |
|-------|---|-----------------------------------|------------------|
| $T_p$ | = | Torque on the pinion              | N.m              |
| $d$   | = | Pinion diameter                   | mm               |
| $F_u$ | = | Drive force                       | N                |
| $g$   | = | Gravitational acceleration (9.81) | m/s <sup>2</sup> |
| $a$   | = | Acceleration                      | m/s <sup>2</sup> |
| $m$   | = | Mass                              | kg               |
| $v$   | = | Velocity                          | m/s              |
| $K_A$ | = | Load factor                       |                  |
| $S_B$ | = | Safety factor                     |                  |

Load factor,  $K_A$

| Drive<br>(Machine movement) | Type of machine load |               |              |
|-----------------------------|----------------------|---------------|--------------|
|                             | Uniform              | Medium Shocks | Heavy Shocks |
| Uniform                     | 1.00                 | 1.25          | 1.75         |
| Light Shocks                | 1.25                 | 1.50          | 2.00         |
| Medium Shocks               | 1.50                 | 1.75          | 2.25         |

Safety factor,  $S_B$  should be from engineering judgement but typically 1.1 for light duty non critical to 3 for mission critical high-risk applications.