

## Centrifugal Forces and Related Data

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### Units

r= feet, M =mass of engine = 3000 pounds

V=Lower case “Omega” angular velocity in the units of “Radians”

Radians are unit - less ;  $\text{Velocity}^2/r$  (Mass) = pound force

To convert pound force to newtons multiply by 4.448

Radius (r)	Velocity (fps)	Velocity ^2	Velocity^2/r	Velocity^2/r (Mass)
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#### One RPM

58	6.07	36.84	.635	1,905
78	8.16	66.59	.854	2,607
98	10.25	105.06	1.072	3,216
118	12.35	152.52	1.293	3,879
138	14.44	208.51	1.511	4,533

#### Two RPM

Radius (r)	Velocity (fps)	Velocity^2	Velocity^2/r	Velocity^2/r (Mass)
58	12.14	147.99	2.55	7,650
78	16.32	266.34	3.41	10,230
98	20.25	410.06	4.18	12,540
118	24.70	610.09	5.17	15,510
138	28.80	829.44	6.01	18,030
158	33.06	1092.96	6.92	20,685

### Three RPM

Radius (r)	Velocity (fps)	Velocity <sup>2</sup>	Velocity <sup>2</sup> /r	Velocity <sup>2</sup> /r(Mass)
58	18.21	333.60	5.80	17,400
78	24.48	599.27	7.68	23,040
98	30.75	945.56	9.65	28,950
118	37.05	1372.70	11.63	34,890
138	43.32	1902.70	13.78	41,340
158	49.59	2459.17	15.56	46,680

### Four RPM

Radius (r)	Velocity (fps)	Velocity <sup>2</sup>	Velocity <sup>2</sup> /r	Velocity <sup>2</sup> /r(Mass)
58	24.28	589.52	10.16	30,480
78	32.64	1,065.36	13.66	40,980
98	40.96	1,677.72	17.12	51,360
118	49.40	2,440.36	20.68	62,040
138	57.76	3,336.22	24.16	72,480
158	66.12	4,371.85	27.67	83,010

### Five RPM

Radius (r)	Velocity (fps)	Velocity <sup>2</sup>	Velocity <sup>2</sup> /r	Velocity <sup>2</sup> /r(Mass)
58	30.35	921.12	15.88	47,640
78	40.80	1,664.64	21.34	64,020
98	51.25	2,626.56	26.80	80,400
118	61.75	3,813.06	32.31	96,340
138	72.70	5,285.29	38.30	114,900

<b>158</b>	<b>82.65</b>	<b>6,831.02</b>	<b>43.23</b>	<b>129,690</b>
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**Six RPM**

<b>Radius (r)</b>	<b>Velocity (fps)</b>	<b>Velocity<sup>2</sup></b>	<b>Velocity<sup>2</sup>/r</b>	<b>Velocity<sup>2</sup>/r(Mass)</b>
<b>58</b>	<b>6.42</b>	<b>1,326.42</b>	<b>22.86</b>	<b>68,580</b>
<b>78</b>	<b>49.86</b>	<b>2,397.08</b>	<b>30.73</b>	<b>92,190</b>
<b>98</b>	<b>61.50</b>	<b>3,782.25</b>	<b>38.59</b>	<b>115,779</b>
<b>118</b>	<b>74.10</b>	<b>5,490.81</b>	<b>46.53</b>	<b>139,590</b>
<b>138</b>	<b>86.84</b>	<b>7,541.19</b>	<b>54.65</b>	<b>163,950</b>
<b>158</b>	<b>99.18</b>	<b>9,836.67</b>	<b>62.26</b>	<b>186,780</b>

**Seven RPM**

<b>Radius (r)</b>	<b>Velocity (fps)</b>	<b>Velocity<sup>2</sup></b>	<b>Velocity<sup>2</sup>/r</b>	<b>Velocity<sup>2</sup>/r(Mass)</b>
<b>58</b>	<b>42.56</b>	<b>1,811.35</b>	<b>31.23</b>	<b>96,350</b>
<b>78</b>	<b>57.12</b>	<b>3,262.69</b>	<b>41.83</b>	<b>125,490</b>
<b>98</b>	<b>71.75</b>	<b>5,148.06</b>	<b>52.53</b>	<b>156,690</b>
<b>118</b>	<b>86.45</b>	<b>7,473.60</b>	<b>63.33</b>	<b>189,990</b>
<b>138</b>	<b>101.08</b>	<b>10,217.16</b>	<b>70.14</b>	<b>210,120</b>
<b>158</b>	<b>115.71</b>	<b>13,388.80</b>	<b>84.74</b>	<b>254,220</b>

**Eight RPM**

<b>Radius (r)</b>	<b>Velocity (fps)</b>	<b>Velocity<sup>2</sup></b>	<b>Velocity<sup>2</sup>/r</b>	<b>Velocity<sup>2</sup>/r(Mass)</b>
<b>58</b>	<b>48.56</b>	<b>2,358.07</b>	<b>40.66</b>	<b>121,980</b>
<b>78</b>	<b>65.28</b>	<b>4,332.27</b>	<b>55.54</b>	<b>176,620</b>

<b>98</b>	<b>82.00</b>	<b>6,724.00</b>	<b>68.61</b>	<b>205,830</b>
<b>118</b>	<b>98.80</b>	<b>9,761.40</b>	<b>82.72</b>	<b>248,160</b>
<b>138</b>	<b>115.52</b>	<b>13,324.87</b>	<b>96.70</b>	<b>290,100</b>
<b>158</b>	<b>132.24</b>	<b>17,487.42</b>	<b>110.68</b>	<b>332,040</b>

**Nine RPM**

<b>Radius (r)</b>	<b>Velocity (fps)</b>	<b>Velocity</b>	<b>Velocity<sup>2</sup>/r</b>	<b>Velocity<sup>2</sup>/r(Mass)</b>
<b>58</b>	<b>54.63</b>	<b>2,984.44</b>	<b>51.46</b>	<b>154,380</b>
<b>78</b>	<b>73.44</b>	<b>5,943.43</b>	<b>69.15</b>	<b>207,450</b>
<b>98</b>	<b>92.25</b>	<b>8,510.06</b>	<b>86.84</b>	<b>260,520</b>
<b>118</b>	<b>111.15</b>	<b>12,354.32</b>	<b>104.70</b>	<b>314,100</b>
<b>138</b>	<b>129.96</b>	<b>16,889.60</b>	<b>122.39</b>	<b>367,100</b>
<b>158</b>	<b>148.77</b>	<b>22,132.52</b>	<b>140.08</b>	<b>420,240</b>

**Ten RPM**

<b>Radius (r)</b>	<b>Velocity (fps)</b>	<b>Velocity<sup>2</sup></b>	<b>Velocity<sup>2</sup>/r</b>	<b>Velocity<sup>2</sup>/r(Mass)</b>
<b>58</b>	<b>54.63</b>	<b>2,984.44</b>	<b>51.46</b>	<b>154,389</b>
<b>78</b>	<b>73.44</b>	<b>5,393.43</b>	<b>69.15</b>	<b>207,450</b>
<b>98</b>	<b>92.95</b>	<b>8,510.06</b>	<b>86.54</b>	<b>260,520</b>
<b>118</b>	<b>111.15</b>	<b>12,354.32</b>	<b>104.70</b>	<b>314,100</b>
<b>138</b>	<b>129.96</b>	<b>16,889.60</b>	<b>122.39</b>	<b>367,170</b>
<b>158</b>	<b>148.77</b>	<b>22,132.52</b>	<b>140.08</b>	<b>420,240</b>