## Drill Collar Connection Make-Up Torque

<table>
<thead>
<tr>
<th>Connection</th>
<th>OD in</th>
<th>1</th>
<th>1 1/4</th>
<th>1 1/2</th>
<th>1 3/4</th>
<th>2</th>
<th>2 1/4</th>
<th>2 1/2</th>
<th>2 13/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>API NC23</td>
<td>3</td>
<td>*2,508</td>
<td>*2,508</td>
<td>*2,508</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 1/4</td>
<td>4,000</td>
<td>3,387</td>
<td>2,647</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 3/8 Regular</td>
<td>3</td>
<td>*2,241</td>
<td>*2,241</td>
<td></td>
<td>1,749</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 1/4</td>
<td>3,285</td>
<td>2,574</td>
<td>1,749</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 PAC'</td>
<td>3</td>
<td>*3,797</td>
<td>*3,797</td>
<td></td>
<td>2,926</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 1/8</td>
<td>4,966</td>
<td>4,151</td>
<td>2,926</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 API IF</td>
<td>3 1/2</td>
<td>5,206</td>
<td>4,151</td>
<td>2,926</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>API NC26</td>
<td>3 3/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,697</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 Slim Hole</td>
<td>3 3/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,697</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 Regular</td>
<td>3 3/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,697</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 7/8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 Obl. Streamline</td>
<td>3 7/8</td>
<td>*5,352</td>
<td>*5,352</td>
<td>*5,352</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 Mod. Open</td>
<td>4 1/8</td>
<td>*8,059</td>
<td>*8,059</td>
<td></td>
<td>7,433</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8 API IF</td>
<td>3 7/8</td>
<td>*3,836</td>
<td>*3,836</td>
<td></td>
<td>2,926</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>API NC31</td>
<td>4 1/8</td>
<td>*7,390</td>
<td>*7,390</td>
<td>*7,390</td>
<td>6,853</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 Regular</td>
<td>4 1/8</td>
<td>*6,466</td>
<td>*6,466</td>
<td>*6,466</td>
<td>*6,466</td>
<td>5,685</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 1/4</td>
<td>*7,886</td>
<td>*7,886</td>
<td>*7,886</td>
<td>7,115</td>
<td>5,685</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>10,471</td>
<td>9,514</td>
<td>8,394</td>
<td>7,115</td>
<td>5,685</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 Slim Hole</td>
<td>4 1/4</td>
<td>*8,858</td>
<td>*8,858</td>
<td>8,161</td>
<td>6,853</td>
<td>5,391</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 1/2</td>
<td>10,286</td>
<td>9,307</td>
<td>8,161</td>
<td>6,853</td>
<td>5,391</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>API NC35</td>
<td>4 1/2</td>
<td>*9,038</td>
<td>*9,038</td>
<td>*9,038</td>
<td>*9,038</td>
<td>7,411</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>12,275</td>
<td>10,922</td>
<td>9,202</td>
<td>7,411</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 Extra Hole</td>
<td>4 1/4</td>
<td>*5,161</td>
<td>*5,161</td>
<td>*5,161</td>
<td>*5,161</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 Mod. Open</td>
<td>4 3/4</td>
<td>*12,074</td>
<td>*11,803</td>
<td>10,144</td>
<td>8,311</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>13,283</td>
<td>11,803</td>
<td>10,144</td>
<td>8,311</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 1/2 API IF</td>
<td>4 3/4</td>
<td>*9,986</td>
<td>*9,986</td>
<td>*9,986</td>
<td>*9,986</td>
<td>8,315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>API NC 38</td>
<td>5</td>
<td>*13,949</td>
<td>*13,949</td>
<td>12,907</td>
<td>10,997</td>
<td>8,315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2 Slim Hole</td>
<td>4 3/4</td>
<td>16,207</td>
<td>14,643</td>
<td>12,907</td>
<td>10,997</td>
<td>8,315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td></td>
<td>16,207</td>
<td>14,643</td>
<td>12,907</td>
<td>10,997</td>
<td>8,315</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Type</td>
<td>OD</td>
<td>1 1/2</td>
<td>1 3/4</td>
<td>2</td>
<td>2 1/4</td>
<td>2 1/2</td>
<td>2 13/16</td>
<td>3</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>3 1/2</td>
<td>H-90°</td>
<td>4 3/4</td>
<td>*8,786</td>
<td>*8,786</td>
<td>*8,786</td>
<td>*8,786</td>
<td>*8,786</td>
<td>10,408</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>*12,794</td>
<td>*12,794</td>
<td>*12,794</td>
<td>*12,794</td>
<td>*12,794</td>
<td>10,408</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 1/4</td>
<td>*17,094</td>
<td>16,929</td>
<td>15,137</td>
<td>13,151</td>
<td>10,408</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 1/2</td>
<td>16,522</td>
<td>16,929</td>
<td>15,137</td>
<td>13,151</td>
<td>10,408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Full Hole</td>
<td>5</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>10,408</td>
<td></td>
</tr>
<tr>
<td></td>
<td>API NC40</td>
<td>5 1/4</td>
<td>*15,200</td>
<td>*15,200</td>
<td>*15,200</td>
<td>14,969</td>
<td>12,125</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mod. Open</td>
<td>5 1/2</td>
<td>*19,985</td>
<td>18,886</td>
<td>17,028</td>
<td>14,969</td>
<td>12,125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>'Obl. Streamline</td>
<td>5 3/4</td>
<td>20,539</td>
<td>18,886</td>
<td>17,028</td>
<td>14,969</td>
<td>12,125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>H-90°</td>
<td>5 1/4</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>*10,910</td>
<td>10,408</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 1/2</td>
<td>*17,094</td>
<td>*17,094</td>
<td>*17,094</td>
<td>*17,094</td>
<td>*17,094</td>
<td>16,536</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 3/4</td>
<td>21,741</td>
<td>21,741</td>
<td>19,543</td>
<td>16,536</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>5</td>
<td>25,408</td>
<td>23,671</td>
<td>21,714</td>
<td>19,543</td>
<td>16,536</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 1/4</td>
<td>25,408</td>
<td>23,671</td>
<td>21,714</td>
<td>19,543</td>
<td>16,536</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>'API Full Hole</td>
<td>5 1/4</td>
<td>*15,576</td>
<td>*15,576</td>
<td>*15,576</td>
<td>*15,576</td>
<td>*15,576</td>
<td>20,311</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 1/2</td>
<td>18,119</td>
<td>18,119</td>
<td>16,119</td>
<td>17,900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>23,605</td>
<td>23,605</td>
<td>22,028</td>
<td>19,921</td>
<td>17,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>API NC44</td>
<td>5 3/4</td>
<td>*20,895</td>
<td>*20,895</td>
<td>*20,895</td>
<td>*20,895</td>
<td>*20,895</td>
<td>18,161</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>*26,453</td>
<td>25,510</td>
<td>23,493</td>
<td>21,257</td>
<td>18,161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 1/4</td>
<td></td>
<td>6</td>
<td>27,300</td>
<td>25,510</td>
<td>23,493</td>
<td>21,257</td>
<td>18,161</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 1/2</td>
<td>27,300</td>
<td>25,510</td>
<td>23,493</td>
<td>21,257</td>
<td>18,161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>5 3/4</td>
<td>*18,119</td>
<td>*18,119</td>
<td>*18,119</td>
<td>*18,119</td>
<td>*18,119</td>
<td>17,900</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>*23,605</td>
<td>*23,605</td>
<td>*22,028</td>
<td>19,921</td>
<td>17,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>'Extra Hole</td>
<td>5 3/4</td>
<td>*17,738</td>
<td>*17,738</td>
<td>*17,738</td>
<td>*17,738</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>API NC46</td>
<td>5 1/2</td>
<td>*23,422</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>API IF</td>
<td>6 1/4</td>
<td>28,021</td>
<td>25,676</td>
<td>22,426</td>
<td>20,311</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>Semi IF</td>
<td>6 1/2</td>
<td>28,021</td>
<td>25,676</td>
<td>22,426</td>
<td>20,311</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>'Obl. Streamline</td>
<td>6 3/4</td>
<td>28,021</td>
<td>25,676</td>
<td>22,426</td>
<td>20,311</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>H-90°</td>
<td>5 3/4</td>
<td>*18,019</td>
<td>*18,019</td>
<td>*18,019</td>
<td>*18,019</td>
<td>*18,019</td>
<td>18,161</td>
<td></td>
</tr>
<tr>
<td></td>
<td>API Regular</td>
<td>6</td>
<td>*23,681</td>
<td>*23,681</td>
<td>*23,681</td>
<td>*23,681</td>
<td>*23,681</td>
<td>21,257</td>
<td></td>
</tr>
<tr>
<td>6 1/4</td>
<td></td>
<td>6</td>
<td>28,732</td>
<td>26,397</td>
<td>23,159</td>
<td>21,051</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 1/2</td>
<td>28,732</td>
<td>26,397</td>
<td>23,159</td>
<td>21,051</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6</td>
<td>35,292</td>
<td>32,825</td>
<td>29,400</td>
<td>27,167</td>
<td>23,988</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>6 1/2</td>
<td>35,292</td>
<td>32,825</td>
<td>29,400</td>
<td>27,167</td>
<td>23,988</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Type</td>
<td>OD in</td>
<td>2</td>
<td>2 1/4</td>
<td>2 1/2</td>
<td>2 13/16</td>
<td>3</td>
<td>3 1/4</td>
<td>3 1/2</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>-------</td>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>-----</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>4 1/2</td>
<td>API IF</td>
<td>6 1/4</td>
<td>*23,004</td>
<td>*23,004</td>
<td>*23,004</td>
<td>*23,004</td>
<td>*23,004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>API</td>
<td>NC50</td>
<td>6 1/2</td>
<td>*29,679</td>
<td>*29,679</td>
<td>*29,679</td>
<td>*29,679</td>
<td>*29,679</td>
<td>26,675</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Extra Hole</td>
<td>6 3/4</td>
<td>*36,742</td>
<td>35,824</td>
<td>32,277</td>
<td>29,966</td>
<td>26,675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mod. Open</td>
<td>7 1/4</td>
<td>38,397</td>
<td>35,824</td>
<td>32,277</td>
<td>29,966</td>
<td>26,675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>Dbl. Streamline</td>
<td>7 1/2</td>
<td>38,397</td>
<td>35,824</td>
<td>32,277</td>
<td>29,966</td>
<td>26,675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Semi IF</td>
<td>7 1/2</td>
<td>38,397</td>
<td>35,824</td>
<td>32,277</td>
<td>29,966</td>
<td>26,675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>H-90a</td>
<td>6 3/4</td>
<td>*34,508</td>
<td>*34,508</td>
<td>*34,508</td>
<td>34,142</td>
<td>30,781</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>*41,993</td>
<td>40,117</td>
<td>36,501</td>
<td>34,142</td>
<td>30,781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API Regular</td>
<td>6 3/4</td>
<td>*31,941</td>
<td>*31,941</td>
<td>*31,941</td>
<td>*31,941</td>
<td>30,495</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>*49,661</td>
<td>*49,661</td>
<td>47,756</td>
<td>45,190</td>
<td>41,533</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API NC56</td>
<td>7 1/4</td>
<td>42,481</td>
<td>39,866</td>
<td>36,235</td>
<td>33,686</td>
<td>30,495</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 1/2</td>
<td>42,481</td>
<td>39,866</td>
<td>36,235</td>
<td>33,686</td>
<td>30,495</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API Full Hole</td>
<td>8</td>
<td>*32,762</td>
<td>32,762</td>
<td>*32,762</td>
<td>*32,762</td>
<td>*32,762</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 1/4</td>
<td>*40,996</td>
<td>*40,996</td>
<td>*40,996</td>
<td>*40,996</td>
<td>*40,996</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 1/2</td>
<td>*49,661</td>
<td>*49,661</td>
<td>47,756</td>
<td>45,190</td>
<td>41,533</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API Regular</td>
<td>7 1/4</td>
<td>46,399</td>
<td>46,399</td>
<td>46,399</td>
<td>46,399</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 3/4</td>
<td>52,115</td>
<td>48,221</td>
<td>45,680</td>
<td>42,058</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API NC61</td>
<td>8</td>
<td>*55,131</td>
<td>*55,131</td>
<td>*55,131</td>
<td>*55,131</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/4</td>
<td>60,321</td>
<td>56,273</td>
<td>53,629</td>
<td>49,855</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 5/8</td>
<td>H-90a</td>
<td>7 1/2</td>
<td>*46,509</td>
<td>*46,509</td>
<td>*46,509</td>
<td>*46,509</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 3/4</td>
<td>*55,708</td>
<td>*55,708</td>
<td>53,629</td>
<td>49,855</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>8 1/4</td>
<td>65,438</td>
<td>65,438</td>
<td>65,438</td>
<td>61,624</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/2</td>
<td>72,670</td>
<td>68,398</td>
<td>65,607</td>
<td>61,624</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3/4</td>
<td>72,670</td>
<td>68,398</td>
<td>65,607</td>
<td>61,624</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>9</td>
<td>72,670</td>
<td>68,398</td>
<td>65,607</td>
<td>61,624</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>API IF</td>
<td>8</td>
<td>*56,641</td>
<td>*56,641</td>
<td>*56,641</td>
<td>*56,641</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/4</td>
<td>*65,131</td>
<td>*67,131</td>
<td>*67,131</td>
<td>*67,131</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/2</td>
<td>74,626</td>
<td>70,277</td>
<td>67,436</td>
<td>63,831</td>
<td>59,027</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3/4</td>
<td>74,626</td>
<td>70,277</td>
<td>67,436</td>
<td>63,831</td>
<td>59,027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 1/4</td>
<td></td>
<td></td>
<td>74,626</td>
<td>70,277</td>
<td>67,436</td>
<td>63,831</td>
<td>59,027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Type</td>
<td>OD</td>
<td>2 1/2</td>
<td>2 13/16</td>
<td>3</td>
<td>3 1/4</td>
<td>3 1/2</td>
<td>3 3/4</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>-----</td>
<td>-------</td>
<td>---------</td>
<td>---</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>6 5/8</td>
<td>API Full Hole</td>
<td>8 1/2</td>
<td>*67,789</td>
<td>*67,789</td>
<td>*67,789</td>
<td>*67,789</td>
<td>*67,789</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3/4</td>
<td>*79,544</td>
<td>*79,544</td>
<td>*79,544</td>
<td>76,706</td>
<td>72,102</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>88,562</td>
<td>83,992</td>
<td>80,991</td>
<td>76,706</td>
<td>72,102</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 1/2</td>
<td>88,562</td>
<td>83,992</td>
<td>80,991</td>
<td>76,706</td>
<td>72,102</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td>API NC70</td>
<td>9</td>
<td>*75,781</td>
<td>*75,781</td>
<td>*75,781</td>
<td>*75,781</td>
<td>*75,781</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 1/2</td>
<td>*102,354</td>
<td>*102,354</td>
<td>*102,354</td>
<td>101,107</td>
<td>96,214</td>
<td>90,984</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>113,710</td>
<td>108,841</td>
<td>105,657</td>
<td>101,107</td>
<td>96,214</td>
<td>90,984</td>
<td></td>
</tr>
<tr>
<td></td>
<td>API NC77</td>
<td>10</td>
<td>*124,051</td>
<td>*124,051</td>
<td>*124,051</td>
<td>*124,051</td>
<td>*124,051</td>
<td>67,184</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/4</td>
<td>*140,491</td>
<td>*140,491</td>
<td>*140,491</td>
<td>140,488</td>
<td>135,119</td>
<td>129,375</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/2</td>
<td>*156,476</td>
<td>*148,966</td>
<td>145,476</td>
<td>145,476</td>
<td>135,119</td>
<td>129,375</td>
<td></td>
</tr>
<tr>
<td>7 H-90°</td>
<td></td>
<td>8</td>
<td>*53,454</td>
<td>*53,454</td>
<td>*53,454</td>
<td>*53,454</td>
<td>*53,454</td>
<td>*53,454</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/4</td>
<td>*63,738</td>
<td>*63,738</td>
<td>*63,738</td>
<td>*63,738</td>
<td>60,971</td>
<td>56,382</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 1/2</td>
<td>*74,478</td>
<td>72,066</td>
<td>69,265</td>
<td>65,267</td>
<td>60,971</td>
<td>56,382</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>API Regular</td>
<td>8 1/2</td>
<td>*60,402</td>
<td>*60,402</td>
<td>*60,402</td>
<td>*60,402</td>
<td>*60,402</td>
<td>*60,402</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3/4</td>
<td>*72,169</td>
<td>*72,169</td>
<td>*72,169</td>
<td>*72,169</td>
<td>*72,169</td>
<td>*72,169</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>*84,442</td>
<td>*84,442</td>
<td>*84,442</td>
<td>84,221</td>
<td>79,536</td>
<td>74,529</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 1/2</td>
<td>96,301</td>
<td>91,633</td>
<td>88,580</td>
<td>84,221</td>
<td>79,536</td>
<td>74,529</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>H-90°</td>
<td>9</td>
<td>*73,017</td>
<td>*73,017</td>
<td>*73,017</td>
<td>*73,017</td>
<td>*73,017</td>
<td>*73,017</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 1/2</td>
<td>*99,506</td>
<td>*99,506</td>
<td>*99,506</td>
<td>*99,506</td>
<td>*99,506</td>
<td>96,285</td>
<td></td>
</tr>
<tr>
<td>8 5/8</td>
<td>API Regular</td>
<td>10</td>
<td>*109,345</td>
<td>*109,345</td>
<td>*109,345</td>
<td>*109,345</td>
<td>*109,345</td>
<td>*109,345</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/4</td>
<td>*125,263</td>
<td>*125,263</td>
<td>*125,263</td>
<td>*125,263</td>
<td>*125,263</td>
<td>*125,034</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/2</td>
<td>*141,767</td>
<td>*141,767</td>
<td>141,134</td>
<td>136,146</td>
<td>130,777</td>
<td>125,034</td>
<td></td>
</tr>
<tr>
<td>8 5/8</td>
<td>H-90°</td>
<td>10 1/4</td>
<td>*113,482</td>
<td>*113,482</td>
<td>*113,482</td>
<td>*113,482</td>
<td>*113,482</td>
<td>*113,482</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/2</td>
<td>*130,063</td>
<td>*130,063</td>
<td>*130,063</td>
<td>*130,063</td>
<td>*130,063</td>
<td>*130,063</td>
<td></td>
</tr>
<tr>
<td>7 H-90°</td>
<td></td>
<td>8 3/4</td>
<td>*68,571</td>
<td>*68,571</td>
<td>*68,571</td>
<td>67,257</td>
<td>62,845</td>
<td>58,131</td>
<td></td>
</tr>
<tr>
<td>(with low torque face)</td>
<td>9</td>
<td>74,235</td>
<td>71,361</td>
<td>67,257</td>
<td>62,845</td>
<td>58,131</td>
<td>58,131</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>API Regular</td>
<td>9 1/4</td>
<td>*73,089</td>
<td>*73,089</td>
<td>*73,089</td>
<td>73,089</td>
<td>73,089</td>
<td>73,089</td>
<td></td>
</tr>
<tr>
<td>(with low torque face)</td>
<td>9 1/2</td>
<td>*86,463</td>
<td>*86,463</td>
<td>*86,463</td>
<td>82,457</td>
<td>77,289</td>
<td>77,289</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>91,789</td>
<td>87,292</td>
<td>82,457</td>
<td>77,289</td>
<td>77,289</td>
<td>77,289</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>H-90°</td>
<td>9 3/4</td>
<td>*91,667</td>
<td>*91,667</td>
<td>*91,667</td>
<td>*91,667</td>
<td>*91,667</td>
<td>*91,667</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 1/4</td>
<td>117,112</td>
<td>113,851</td>
<td>109,188</td>
<td>104,171</td>
<td>98,804</td>
<td>98,804</td>
<td></td>
</tr>
<tr>
<td>10 1/2</td>
<td>H-90°</td>
<td>10 1/2</td>
<td>117,112</td>
<td>113,851</td>
<td>109,188</td>
<td>104,171</td>
<td>98,804</td>
<td>98,804</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Type</td>
<td>OD</td>
<td>2 1/2</td>
<td>2 13/16</td>
<td>3</td>
<td>3 1/4</td>
<td>3 1/2</td>
<td>3 3/4</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------------</td>
<td>-------</td>
<td>--------</td>
<td>----------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>8 5/8</td>
<td>API Regular</td>
<td>10 3/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(with low torque face)</td>
<td>11</td>
<td>*112,883</td>
<td>*112,883</td>
<td>*112,883</td>
<td>*112,883</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 1/4</td>
<td>147,616</td>
<td>142,430</td>
<td>136,846</td>
<td>130,871</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 5/8</td>
<td>H-90</td>
<td>10 3/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(with low torque face)</td>
<td>11</td>
<td>*92,960</td>
<td>*92,960</td>
<td>*92,960</td>
<td>*92,960</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 1/4</td>
<td>*110,781</td>
<td>*110,781</td>
<td>*110,781</td>
<td>*110,781</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Recommended Make-Up Torque1 For Rotary Shouldered Drill Collar Connections

Notes:

1 Torque figures preceded by an asterisk (*) indicate that the weaker member for the corresponding outside diameter (OD) and bore is the BOX. For all other torque values the weaker member is the PIN.

2 In each connection size and type group, torque values apply to all connection types in the group, when used with the same drill collar outside diameter and bore, i.e. 2 3/8 API IF, API NC26, and 2 7/8 Slim Hole connections used with 3 1/2 x 1 1/4 drill collars all have the same minimum make-up torque of 4,600 ft.lbf., and The BOX is the weaker member.

3 Stress-relief features are disregarded for make-up torque.

Footnotes:

1 Basis of calculations for recommended make-up torque assumed the use of a thread compound containing 40-60% by weight of finely powered metallic zinc or 60% by weight of finely powered metallic lead, with not more than 0.3% total active sulfur applied thoroughly to all threads and shoulders and using the modified screw jack formula in API RP7G (16th edition) Appendix A, paragraph A.8, and a unit stress of 62,500 psi in the box or pin, whichever is weaker.

2 Normal torque range is tabulated value plus 10%.

3 Make-up torque for 2 7/8 PAC connection is based on 87,500 psi stress and other factors listed in footnote 1.

4 Make-up torque for H-90 connection is based on 56,200 psi stress and other factors listed in footnote 1.