

GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

| No. | Descriptions | Bolt size | Torque | | |
|-----|--------------------|---|------------|----------------------|-----------|
| | | | kgf · m | lbf · ft | |
| 1 | Engine | Engine mounting bolt(Engine-Bracket) | M12 × 1.75 | 10.0±1.0 | 72.3±7.2 |
| 2 | | Engine mounting bolt(Bracket-Frame, FR) | M16 × 2.0 | 30±3.5 | 253±25.3 |
| 3 | | Engine mounting bolt(Bracket-Frame, RR) | M20 × 2.5 | 55±3.5 | 398±25.3 |
| 4 | | Radiator mounting bolt, nut | M12 × 1.75 | 12.2±1.3 | 88.2±9.4 |
| 5 | | Coupling mounting bolt | M16 × 2.0 | 22.0±1.0 | 159±7.2 |
| 6 | | Main pump housing mounting bolt | M10 × 1.5 | 6.1±0.3 | 44.1±2.2 |
| 7 | Hydraulic system | Main pump mounting bolt | M16 × 2.0 | 22.1±2.4 | 159±17.3 |
| 8 | | Main control valve mounting bolt | M12 × 1.75 | 12.2±1.3 | 88.2±9.4 |
| 9 | | Fuel tank mounting bolt | M20 × 2.5 | 45±5.1 | 325±36.9 |
| 10 | | Hydraulic oil tank mounting bolt | M20 × 2.5 | 45±5.1 | 325±36.9 |
| 11 | | Turning joint mounting bolt, nut | M12 × 1.75 | 12.3±1.3 | 88.2±9.4 |
| 12 | Power train system | Swing motor mounting bolt | M16 × 2.0 | 29.6±3.2 | 214±23.1 |
| 13 | | Swing bearing upper mounting bolt | M18 × 2.0 | 41.3±4.5 | 299±32.5 |
| 14 | | Swing bearing lower mounting bolt | M16 × 2.0 | 29.7±4.5 23±2.5 | 215±32.5 |
| 15 | | Travel motor mounting bolt | M16 × 2.0 | 29.7±4.5 | 166±18.1 |
| 16 | | Sprocket mounting bolt | M16 × 2.0 | 29.7±4.5 29.7±4.5 | 215±32.5 |
| 17 | | Carrier roller mounting bolt, nut | M16 × 2.0 | 29.7±4.5 | 215±32.5 |
| 18 | Under carriage | Track roller mounting bolt | M16 × 2.0 | 31.3±4.7 29.7±4.5 | 215±32.5 |
| 19 | | Track tension cylinder mounting bolt | M16 × 2.0 | 100±15 | 215±32.5 |
| 20 | | Track shoe mounting bolt, nut | M16 × 1.5 | 12.8±3.0 4.05±0.8 | 226±34.0 |
| 21 | | Track guard mounting bolt | M16 × 2.0 | | 215±32.5 |
| 22 | Others | Counter weight mounting bolt | M24 × 3.0 | | 723±109 |
| 23 | | Cab mounting bolt, nut | M12 × 1.75 | | 92.6±21.7 |
| 24 | | Operator's seat mounting bolt | M 8 × 1.25 | | 29.3±5.8 |

2. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT - Coarse thread

| Bolt size | 8T | | 10T | |
|------------|-------------|-------------|-------------|-------------|
| | kgf · m | lbf · ft | kgf · m | lbf · ft |
| M 6 × 1.0 | 0.85 ~ 1.25 | 6.15 ~ 9.04 | 1.14 ~ 1.74 | 8.2 ~ 12.6 |
| M 8 × 1.25 | 2.0 ~ 3.0 | 14.5 ~ 21.7 | 2.73 ~ 4.12 | 19.7 ~ 29.8 |
| M10 × 1.5 | 4.0 ~ 6.0 | 28.9 ~ 43.4 | 5.5 ~ 8.3 | 39.8 ~ 60 |
| M12 × 1.75 | 7.4 ~ 11.2 | 53.5 ~ 79.5 | 9.8 ~ 15.8 | 71 ~ 114 |
| M14 × 2.0 | 12.2 ~ 16.6 | 88.2 ~ 120 | 16.7 ~ 22.5 | 121 ~ 167 |
| M16 × 2.0 | 18.6 ~ 25.2 | 135 ~ 182 | 25.2 ~ 34.2 | 182 ~ 247 |
| M18 × 2.5 | 25.8 ~ 35.0 | 187 ~ 253 | 35.1 ~ 47.5 | 254 ~ 343 |
| M20 × 2.5 | 36.2 ~ 49.0 | 262 ~ 354 | 49.2 ~ 66.6 | 356 ~ 482 |
| M22 × 2.5 | 48.3 ~ 63.3 | 350 ~ 457 | 65.8 ~ 98.0 | 476 ~ 709 |
| M24 × 3.0 | 62.5 ~ 84.5 | 452 ~ 611 | 85.0 ~ 115 | 615 ~ 832 |
| M30 × 3.5 | 124 ~ 168 | 898 ~ 1214 | 169 ~ 229 | 1223 ~ 1655 |
| M36 × 4.0 | 174 ~ 236 | 1261 ~ 1703 | 250 ~ 310 | 1808 ~ 2242 |

2) BOLT AND NUT - Fine thread

| Bolt size | 8T | | 10T | |
|------------|--------------|-------------|-------------|-------------|
| | kgf · m | lbf · ft | kgf · m | lbf · ft |
| M 8 × 1.0 | 2.17 ~ 3.37 | 15.7 ~ 24.3 | 3.04 ~ 4.44 | 22.0 ~ 32.0 |
| M10 × 1.25 | 4.46 ~ 6.66 | 32.3 ~ 48.2 | 5.93 ~ 8.93 | 42.9 ~ 64.6 |
| M12 × 1.25 | 7.78 ~ 11.58 | 76.3 ~ 83.7 | 10.6 ~ 16.0 | 76.6 ~ 115 |
| M14 × 1.5 | 13.3 ~ 18.1 | 96.2 ~ 130 | 17.9 ~ 24.1 | 130 ~ 174 |
| M16 × 1.5 | 19.9 ~ 26.9 | 144 ~ 194 | 26.6 ~ 36.0 | 193 ~ 260 |
| M18 × 1.5 | 28.6 ~ 43.6 | 207 ~ 315 | 38.4 ~ 52.0 | 278 ~ 376 |
| M20 × 1.5 | 40.0 ~ 54.0 | 289 ~ 390 | 53.4 ~ 72.2 | 386 ~ 522 |
| M22 × 1.5 | 52.7 ~ 71.3 | 381 ~ 515 | 70.7 ~ 95.7 | 512 ~ 692 |
| M24 × 2.0 | 67.9 ~ 91.9 | 491 ~ 664 | 90.9 ~ 123 | 658 ~ 890 |
| M30 × 2.0 | 137 ~ 185 | 990 ~ 1338 | 182 ~ 248 | 1314 ~ 1795 |
| M36 × 3.0 | 192 ~ 260 | 1389 ~ 1879 | 262 ~ 354 | 1893 ~ 2561 |

3) PIPE AND HOSE(FLARE TYPE)

| Thread size(PF) | Width across flat(mm) | kgf · m | lbf · ft |
|-----------------|-----------------------|---------|----------|
| 1/4" | 19 | 4 | 28.9 |
| 3/8" | 22 | 5 | 36.2 |
| 1/2" | 27 | 9.5 | 68.7 |
| 3/4" | 36 | 18 | 130.2 |
| 1" | 41 | 21 | 151.9 |
| 1-1/4" | 50 | 35 | 253.2 |

4) PIPE AND HOSE(ORFS TYPE)

| Thread size(UNF) | Width across flat(mm) | kgf · m | lbf · ft |
|------------------|-----------------------|---------|----------|
| 9/16-18 | 19 | 4 | 28.9 |
| 11/16-16 | 22 | 5 | 36.2 |
| 13/16-16 | 27 | 9.5 | 68.7 |
| 1-3/16-12 | 36 | 18 | 130.2 |
| 1-7/16-12 | 41 | 21 | 151.9 |
| 1-11/16-12 | 50 | 35 | 253.2 |

5) FITTING

| Thread size | Width across flat(mm) | kgf · m | lbf · ft |
|-------------|-----------------------|---------|----------|
| 1/4" | 19 | 4 | 28.9 |
| 3/8" | 22 | 5 | 36.2 |
| 1/2" | 27 | 9.5 | 68.7 |
| 3/4" | 36 | 18 | 130.2 |
| 1" | 41 | 21 | 151.9 |
| 1-1/4" | 50 | 35 | 253.2 |