

# 3MZ-FE ENGINE MECHANICAL

## SERVICE DATA

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| Battery specific gravity   | at 20°C (68°F)                           | 1.25 to 1.29   |
| New drive belt deflection (Pressing force: 98 N (10 kgf, 22 lbf))  | For fan and generator                    | 9.1 to 10.5 mm (0.358 to 0.413 in.)                  |
|  | For vane pump                            | 7.0 to 9.0 mm (0.276 to 0.354 in.)                   |
| Used drive belt deflection (Pressing force: 98 N (10 kgf, 22 lbf)) | For fan and generator                    | 11.0 to 13.5 mm (0.433 to 0.531 in.)                 |
|  | For vane pump                            | 10.0 to 12.0 mm (0.394 to 0.472 in.)                 |
| New drive belt tension   | For fan and generator                    | 617 to 853 N (63 to 87 kgf, 139 to 192 lbf)          |
|  | For vane pump                            | 686 to 784 N (70 to 80 kgf, 154 to 176 lbf)          |
| Used drive belt tension  | For fan and generator                    | 294 to 490 N (30 to 50 kgf, 66 to 110 lbf)           |
|  | For vane pump                            | 343 to 490 N (33 to 50 kgf, 73 to 110 lbf)           |
| Ignition timing  | Terminals TC and CG of DLC3 connected    | 8 to 12° BTDC  |
|  | Terminals TC and CG of DLC3 disconnected | 7 to 24° BTDC  |
| Idle speed   |  | 650 to 750 r/min                                     |
| Compression  | Compression pressure                     | 1.5 MPa (15.3 kgf/cm <sup>2</sup> , 218 psi) or more |
|  | Minimum pressure                         | 1.0 MPa (10.2 kgf/cm <sup>2</sup> , 145 psi)         |
|  | Difference between each cylinder         | 100 kPa (1.0 kgf/cm <sup>2</sup> , 15 psi) or less   |
| Valve clearance at cold  | Intake                                   | 0.15 to 0.25 mm (0.0059 to 0.0098 in.)               |
|  | Exhaust                                  | 0.25 to 0.35 mm (0.0098 to 0.0138 in.)               |
| Camshaft   |  |  |
| Maximum circle runout  |  | 0.06 mm (0.0024 in.)                                 |
| Specified cam lobe height  | STD intake                               | 43.132 to 43.232 mm (1.6981 to 1.7020 in.)           |
|  | STD exhaust                              | 43.010 to 43.110 mm (1.6933 to 1.6972 in.)           |
|  | Minimum intake                           | 42.98 mm (1.6921 in.)                                |
|  | Minimum exhaust                          | 42.86 mm (1.6874 in.)                                |
| Camshaft Journal diameter  |  | 26.959 to 26.975 mm (1.0614 to 1.0620 in.)           |
| 12 pointed head cylinder head set bolt diameter at tension portion | STD                                      | 8.95 to 9.05 mm (0.3524 to 0.3563 in.)               |
|  | Maximum                                  | 8.75 mm (0.3445 in.)                                 |
| Cylinder head  |  |  |
| Maximum warpage  | Cylinder block side                      | 0.05 mm (0.0020 in.)                                 |
|  | Intake manifold side                     | 0.10 mm (0.0039 in.)                                 |
|  | Exhaust manifold side                    | 0.10 mm (0.0039 in.)                                 |
| Intake valve   |  |  |
| Valve overall length   | STD intake                               | 95.45 mm (3.7579 in.)                                |
|  | STD exhaust                              | 95.40 mm (3.7559 in.)                                |
|  | Minimum intake                           | 94.95 mm (3.7382 in.)                                |
|  | Minimum exhaust                          | 94.90 mm (3.7362 in.)                                |
| Valve stem diameter  | STD intake                               | 5.470 to 5.485 mm (0.2154 to 0.2159 in.)             |
|  | STD exhaust                              | 5.465 to 5.480 mm (0.2152 to 0.2157 in.)             |
| Margin thickness   | STD intake                               | 1.0 mm (0.039 in.)                                   |
|  | STD exhaust                              | 1.0 mm (0.039 in.)                                   |
|  | Minimum intake                           | 0.5 mm (0.020 in.)                                   |
|  | Minimum exhaust                          | 0.5 mm (0.020 in.)                                   |
| Inner Compression Spring   |  |  |
| Free length  |  | 45.50 mm (1.7913 in.)                                |
| Maximum deviation  |  | 2.0 mm (0.079 in.)                                   |

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| Installed tension                            | at 33.8 mm (1.331 in.)                       | 186 to 206 N (19.0 to 21.0 kgf, 41.9 to 46.3 lbf) |
| Valve guide bush                             |  |   |
| Bush inside diameter                         |  | 5.510 to 5.530 mm (0.2169 to 0.2177 in.)          |
| Specified bush oil clearance                 | STD intake                                   | 0.025 to 0.060 mm (0.0010 to 0.0024 in.)          |
|  | STD exhaust                                  | 0.030 to 0.065 mm (0.0012 to 0.0026 in.)          |
|  | Maximum intake                               | 0.08 mm (0.0031 in.)                              |
|  | Maximum exhaust                              | 0.10 mm (0.0039 in.)                              |
| Cylinder head valve guide bush bore diameter | STD  | 10.295 to 10.313 mm (0.4053 to 0.4060 in.)        |
|  | O/S 0.05                                     | 10.345 to 10.363 mm (0.4073 to 0.4080 in.)        |
| Bush diameter                                | STD  | 10.333 to 10.344 mm (0.4068 to 0.4072 in.)        |
|  | O/S 0.05                                     | 10.383 to 10.394 mm (0.4088 to 0.4092 in.)        |
| Bush length                                  | Intake                                       | 34.5 mm (1.358 in.)                               |
|  | Exhaust                                      | 40.5 mm (1.594 in.)                               |
| Bush protrusion height                       | Intake                                       | 11.1 to 11.5 mm (0.437 to 0.453 in.)              |
|  | Exhaust                                      | 8.9 to 9.3 mm (0.350 to 0.366 in.)                |
| Valve lifter                                 |  |   |
| Lifter diameter                              |  | 30.966 to 30.976 mm (1.2191 to 1.2195 in.)        |
| Lifter bore diameter                         |  | 31.009 to 31.025 mm (1.2208 to 1.2215 in.)        |
| Specified oil clearance                      | STD  | 0.033 to 0.059 mm (0.0013 to 0.0023 in.)          |
|  | Maximum                                      | 0.07 mm (0.0028 in.)                              |
| Camshaft                                     |  |   |
| Gear backlash                                | STD  | 0.020 to 0.200 mm (0.0008 to 0.0079 in.)          |
|  | Maximum                                      | 0.30 mm (0.0118 in.)                              |
| Journal thrust clearance                     | STD  | 0.040 to 0.090 mm (0.0016 to 0.0035 in.)          |
|  | Maximum                                      | 0.12 mm (0.0047 in.)                              |
| Journal oil clearance                        | STD intake #4, #5                            | 0.025 to 0.057 mm (0.0010 to 0.0022 in.)          |
|  | STD other                                    | 0.025 to 0.062 mm (0.0010 to 0.0024 in.)          |
|  | Maximum                                      | 0.10 mm (0.0039 in.)                              |
| Connecting rod                               |  |   |
| Thrust clearance                             | STD  | 0.15 to 0.30mm (0.0059 to 0.0118 in.)             |
|  | Maximum                                      | 0.35 mm (0.0138 in.)                              |
| Connecting rod oil clearance                 | STD  | 0.038 to 0.066 mm (0.0015 to 0.0026 in.)          |
|  | Maximum                                      | 0.08 mm (0.0031 in.)                              |
| Crankshaft                                   |  |   |
| Crankshaft thrust clearance                  | STD  | 0.04 to 0.24 mm (0.0016 to 0.0094 in.)            |
|  | Maximum                                      | 0.30 mm (0.0118 in.)                              |
| Cylinder block                               |  |   |
| Maximum warpage                              | Maximum                                      | 0.05 mm (0.0020 in.)                              |
| Specified cylinder bore diameter             | STD  | 92.000 to 92.012 mm (3.6220 to 3.6225 in.)        |
|  | Maximum                                      | 92.080 mm (3.6252 in.)                            |
| Piston                                       |  |   |
| Piston diameter                              | At 13.0 mm (0.512 in.)<br>from piston bottom | 91.953 to 91.967 mm (3.6202 to 3.6207 in.)        |
| Oil clearance                                | STD  | 0.033 to 0.059 mm (0.0013 to 0.0023 in.)          |
|  | Maximum                                      | 0.13 mm (0.0051 in.)                              |
| Connecting rod                               |  |   |
| Maximum misalignment per 100 mm (3.94 in.)   |  | 0.05 mm (0.0020 in.) per 100 mm (3.94 in.)        |
| Maximum rod twist per 100 mm (3.94 in.)      |  | 0.15 mm (0.0059 in.) per 100 mm (3.94 in.)        |
| Bush inside diameter                         |  | 22.005 to 22.014 mm (0.8663 to 0.8667 in.)        |
| Piston pin                                   |  |   |
| Piston pin diameter                          |  | 21.997 to 22.006 mm (0.8660 to 0.8664 in.)        |

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| Oil clearance                                | STD                            | 0.005 to 0.011 mm (0.0002 to 0.0004 in.)   |
|  | Maximum                        | 0.05 mm (0.0020 in.)                       |
| Piston ring                                  |                                |  |
| Piston ring groove clearance                 | No.1                           | 0.03 to 0.08 mm (0.0012 to 0.0031 in.)     |
|  | No.2                           | 0.02 to 0.06 mm (0.0008 to 0.0024 in.)     |
|  | Oil (Side rail)                | 0.03 to 0.11 mm (0.0012 to 0.0043 in.)     |
| End gap                                      | STD No.1                       | 0.30 to 0.40 mm (0.0118 to 0.0157 in.)     |
|  | Maximum No.1                   | 0.95 mm (0.0374 in.)                       |
|  | STD No.2                       | 0.50 to 0.60 mm (0.0197 to 0.0236 in.)     |
|  | Maximum NO.2                   | 1.05 mm (0.0413 in.)                       |
|  | STD oil (Side rail)            | 0.15 to 0.40 mm (0.0059 to 0.0157 in.)     |
|  | Maximum oil (Side rail)        | 1.00 mm (0.0394 in.)                       |
| Connecting rod bolt                          |                                |  |
| Specified diameter                           | STD                            | 7.2 to 7.3 mm (0.283 to 0.287 in.)         |
|  | Minimum                        | 7.0 mm (0.276 in.)                         |
| Crankshaft bearing cap set bolt              |                                |  |
| Specified diameter                           | STD                            | 7.5 to 7.6 mm (0.295 to 0.299 in.)         |
|  | Minimum                        | 7.2 mm (0.283 in.)                         |
| Crankshaft                                   |                                |  |
| Maximum circle runout                        |                                | 0.06 mm (0.0024 in.)                       |
| Main journal taper and out-of-round          |                                | 60.988 to 61.000 mm (2.4011 to 2.4016 in.) |
| Maximum crank journal taper and out-of-round |                                | 0.02 mm (0.0008 in.)                       |
| Crank pin diameter                           |                                | 52.992 to 53.000 mm (2.0863 to 2.0866 in.) |
| Maximum crank pin taper and out-of-round     |                                | 0.02 mm (0.0008 in.)                       |
| Crankshaft oil clearance                     | STD No.1 and No.2 journals     | 0.014 to 0.034 mm (0.0006 to 0.0013 in.)   |
|  | STD No.3 and No.4 journals     | 0.026 to 0.046 mm (0.0010 to 0.0018 in.)   |
|  | Maximum No.1 and No.2 journals | 0.05 mm (0.0020 in.)                       |
|  | Maximum No.3 and No.4 journals | 0.06 mm (0.0024 in.)                       |