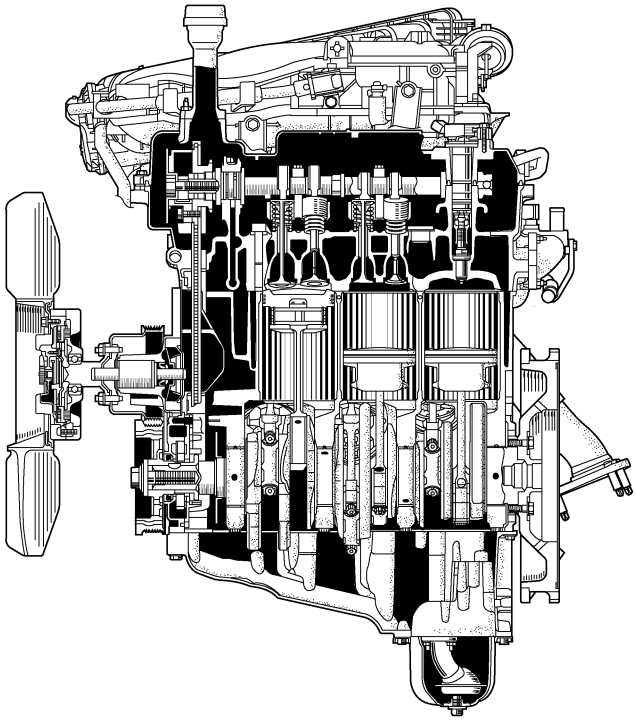
# ENGINE

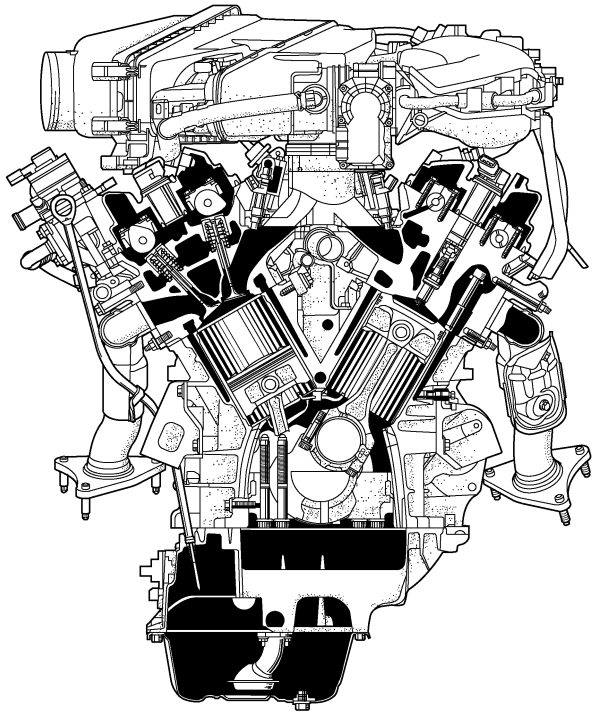
## 1GR-FE ENGINE

### ■ DESCRIPTION

The 1GR-FE engine is a 4.0-liter, 24-valve DOHC V6. This engine uses the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), ACIS (Acoustic Control Induction System), ETCS-i (Electronic Throttle Control System-intelligent), and AI (Air Injection) system. These control functions achieve improved engine performance, fuel economy, and clean emissions.



04E0EG72Z



04E0EG73Z

## ▶ Engine Specification ◀

| **Engine Type** | | | **1GR-FE** |
|---|---|---|---|
| No. of Cyls. & Arrangement | | | 6-Cylinder, V Type |
| Valve Mechanism | | | 24-Valve DOHC, Chain Drive (with VVT-i) |
| Combustion Chamber | | | Pentroof Type |
| Flow of Intake and Exhaust Gasses | | | Cross-Flow |
| Fuel System | | | SFI |
| Ignition System | | | DIS |
| Displacement $cm^3$ (cu. in.) | | | 3956 (241.4) |
| Bore × Stroke mm (in.) | | | 94.0 × 95.0 (3.70 × 3.74) |
| Compression Ratio | | | 10.0 : 1 |
| Max. Output (SAE-NET)*1 | | | 176 kW @ 5200 rpm<br>(236 HP @ 5200 rpm) |
| Max. Torque (SAE-NET)*1 | | | 361 N·m @ 4000 rpm<br>(266 ft·lbf @ 4000 rpm) |
| Oil Capacity | Dry | | 6.0 liters (6.3 US qts, 5.3 Imp. qts) |
| | With Oil Filter | | 5.2 liters (5.5 US qts, 4.6 Imp. qts) |
| | Without Oil Filter | | 4.9 liters (5.2 US qts, 4.3 Imp. qts) |
| Oil Grade | | | ILSAC |
| Engine Coolant | Type | | TOYOTA Genuine Super Long Life Coolant or the following*2 |
| | Capacity | | 9.6 liters (10.1 US qts, 8.4 Imp. qts) |
| Spark Plug | Type | DENSO | K20HR-U11 (Nickel) |
| | | NGK | LFR6C11 (Nickel) |
| | Plug Gap mm (in.) | | 1.0 - 1.1 (0.0394 - 0.0433) |
| Firing Order | | | 1 - 2 - 3 - 4 - 5 - 6 |
| Fuel Octane Rating (RON+MON)/2 | | | 87 or higher |
| Emission Regulation | Tailpipe | California | LEVII,□$FTP |
| | | Except California | Tier2-Bin5, SFTP |
| | Evaporative | | LEVII, ORVR |
| Engine Service Mass*3 (Reference) kg (lb) | | | 170 (374.8) |

*1: Maximum output and torque rating are determined using the revised SAE J1349 procedure.

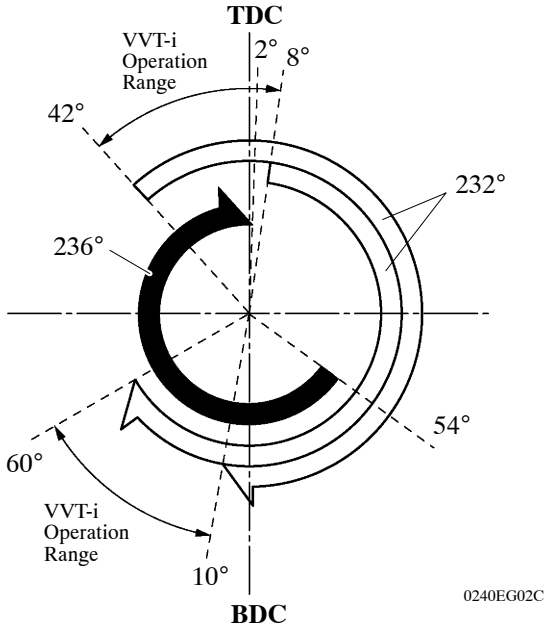
*2: Similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology. (Coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids.)

*3: The figure shown is the weight of the part without coolant and oil.

## ▶ Valve Timing ◀

: **Intake Valve Opening Angle**

: **Exhaust Valve Opening Angle**




| | | |
|---|---|---|
| Intake | Open | 8° ATDC to 42° BTDC |
| | Close | 60° to 10° ABDC |
| Exhaust | Open | 54° BBDC |
| | Close | 2° ATDC |

## ▶ Performance Curve ◀

