

## SPECIFICATIONS 1GR-FE ENGINE MECHANICAL TORQUE SPECIFICATIONS

## Camshaft

Part Tightened		N*m	kgf*cm	ft.*lbf	in.*lbf
Camshaft bearing cap (for Bank 2) x Cylinder head LH	for bolt A	9.0	92		80
	for bolt B	24	245	18	
Camshaft timing gear sub-assembly x No. 3 camshaft sub-assembly		100	1020	74	
No. 3 chain tensioner assembly x Cylinder head LH		21	214	15	
Camshaft timing sprocket x No. 4 camshaft assembly		100	1020	74	
Camshaft bearing cap (for Bank 1) x Cylinder head sub-assembly	for bolt A	9.0	92		80
	for bolt B	24	245	18	
Camshaft timing gear sub-assembly x camshaft		100	1020	74	
No. 2 chain tensioner assembly x Cylinder head sub-assembly		21	214	15	
Camshaft timing sprocket x No. 2 camshaft		100	1020	74	
Timing chain cover plate x Timing chain cover sub-assembly		9.1	93		81

## Cylinder head gasket

Part Tightened			N*m	kgf*cm	ft.*lbf
Cylinder head LH x Cylinder block sub-assembly	Quantity: 8	1st	36	367	27
		2nd	180°		
	Quantity: 2		30	306	22
Cylinder head sub-assembly x Cylinder block sub-assembly	1st		36	367	27
	2nd		180°		

## Engine assembly

Part Tightened		N*m	kgf*cm	ft.*lbf	in.*lbf
Engine hanger x Cylinder head sub-assembly or Cylinder head LH		33	337	24	
Front engine mounting insulator x Body		72	734	53	
Front engine mounting insulator x Engine mounting bracket		87	887	64	
Flywheel sub-assembly x Crankshaft	1st	30	306	22	
	2nd	90°			
Engine mounting bracket heat insulator x Engine mounting bracket		19	194	14	
Vane pump assembly x Cylinder block sub-assembly		21	214	15	
No. 7 engine wire x Timing chain cover sub-assembly		8.4	86		74
Ground cable x rear mater by-pass joint		8.4	86		74
No. 2 engine wire x Battery cable		7.6	77		67
No. 2 engine wire x Fuse block		8.4	86		74
Air cleaner assembly x Body		18	184	13	
Hood assembly sub-assembly x Hood bracket		18	184	13	

## Engine unit

Part Tightened		N*m	kgf*cm	ft.*lbf	in.*lbf
Stud bolt x oil pan sub-assembly		4.0	41		35
Taper screw plug x Cylinder block sub-assembly		25	255	18	
Camshaft bearing cap (for Bank 2) x Cylinder head LH	for Bolt A	9.0	92		80
	for Bolt B	24	245	18	
Camshaft bearing cap	for Bolt A	9.0	92		80

	Part Tightened	N*m	kgf*cm	ft.*lbf	in.*lbf
(for Bank 1) x Cylinder head sub- assembly	for Bolt B	24	245	18	
No. 3 chain tensioner assembly x Cylinder head LH		21	214	15	
Camshaft timing gear sub-assembly x No. 3 camshaft sub-assembly		100	1020	74	
Camshaft timing sprocket x No. 4 camshaft assembly		100	1020	74	
No. 2 chain tensioner assembly x Cylinder head sub-assembly		21	214	15	
Camshaft timing gear sub-assembly x camshaft		100	1020	74	
Camshaft timing sprocket x No. 2 camshaft		100	1020	74	
No. 1 chain vibration damper x Cylinder block sub-assembly		19	194	14	
No. 1 chain tensioner assembly x Cylinder block sub-assembly		10	102	7	
No. 2 idle gear shaft x Cylinder block sub-assembly		60	612	44	
Engine water pump assembly x Timing chain cover sub-assembly		11	112	8	
Engine water pump assembly x Timing chain cover sub- assembly	for Nut	23	235	17	
	for Bolt	21	214	15	
Engine rear oil seal retainer x Cylinder block sub- assembly	for Nut	9.0	92		80
	for Bolt	10	102	7	
Oil pan sub- assembly x Cylinder block sub- assembly	for Bolt A, B and nut	21	214	15	
	for Bolt C	10	102	7	
Oil strainer sub-assembly x Oil pan sub-assembly		9.0	92		80
No. 2 oil pan sub- assembly x Oil pan sub- assembly	for Bolt	9.0	92		80
	for Nut	10	102	7	
Oil pan drain plug x No. 2 oil pan sub-assembly		40	408	30	
Crankshaft pulley x Crankshaft		250	2549	184	
Cylinder head cover sub- assembly LH x Cylinder head LH	for Bolt A	10	102	7	
	for Bolt B and nut	9.0	92		80
Cylinder head cover sub- assembly x Cylinder head sub- assembly	for Bolt A	10	102	7	
	for Bolt B and nut	9.0	92		80
Oil filler cap housing x Cylinder head cover sub-assembly LH		9.0	92		80
Water inlet housing x Timing chain cover sub-assembly		9.0	92		80
Oil filter bracket sub-assembly x Timing chain cover sub-assembly		19	194	14	
Union x cylinder head subassembly and cylinder head LH		62	632	46	
Cylinder block water drain cock sub-assembly x Cylinder block sub-assembly		25	255	18	

Part Tightened	N*m	kgf*cm	ft.*lbf	in.*lbf
No. 1 idler pulley sub-assembly x Timing chain cover sub-assembly	54	551	40	
No. 2 idler pulley sub-assembly x Timing chain cover sub-assembly	54	551	40	
Front No. 1 engine mounting bracket LH x Cylinder block sub-assembly	43	438	32	
Front No. 1 engine mounting bracket RH x Cylinder block sub-assembly	43	438	32	
V-ribbed belt tensioner assembly x Cylinder block sub-assembly	36	367	27	
Water hose sub-assembly x Cylinder head sub-assembly	5.0	51		44

### Cylinder head

Part Tightened	N*m	kgf*cm	ft.*lbf	in.*lbf
Union x Cylinder head	15	153	11	
No. 1 straight screw plug x Cylinder head	80	816	59	
No. 2 straight screw plug x Cylinder head	85	867	63	
Stud bolt x Cylinder head	Upper side	4.0	41	35
	Rear side	9.5	97	84
	Exhaust manifold side	4.0	41	35

### Cylinder block

Part Tightened	N*m	kgf*cm	ft.*lbf	in.*lbf
Stud bolt x Cylinder block sub- assembly	Front side, Lower side	11	112	8
	Rear side, Upper side	4.0	41	35
No. 1 oil nozzle sub-assembly x Cylinder block sub-assembly		9.0	92	80
Crankshaft bearing cap x Cylinder block sub- assembly	Quantity: 16	1st	61	622
		2nd	90°	
	Quantity: 8		25.7	262
Connecting rod cap x Connecting Rod sub- assembly	1st	24.5	250	19
	2nd	90°		