1GR-FE ENGINE MECHANICAL VALVE CLEARANCE ADJUSTMENT

PROCEDURE

■ 1.DRAIN ENGINE COOLANT

Click hereEngine / Hybrid System>1GR-FE COOLING>COOLANT>REPLACEMENT

2.REMOVE INTAKE AIR SURGE TANK

17129

Click hereEngine / Hybrid System>1GR-FE INTAKE / EXHAUST>INTAKE MANIFOLD>REMOVAL

■ 3.REMOVE IGNITION COIL ASSEMBLY

19500

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>REMOVAL

4.REMOVE SPARK PLUG

19100P

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>REMOVAL

5.REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

11201

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>DISASSEMBLY

6.REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH

11202

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>DISASSEMBLY

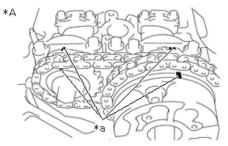
7.SET NO. 1 CYLINDER TO TDC/COMPRESSION

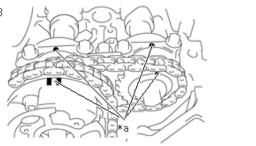
a.

Turn the crankshaft and align its groove with timing mark "0" of the timing chain cover sub-assembly.

b. Check that the timing marks of the camshaft timing gears and sprockets are aligned with the timing marks of the bearing caps as shown in the illustration.

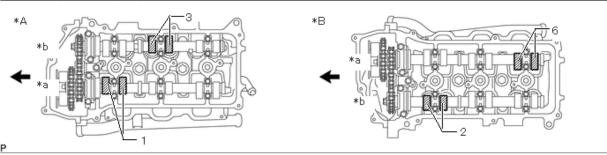
If not, turn the crankshaft 1 complete revolution (360°) and align the timing marks as above.





*A	for Bank 1	*B	for Bank 2
*a	Timing Mark	-	-

a. Using a feeler gauge, measure the valve clearance indicated in the illustration.



*A	for Bank 1	*B	for Bank 2
*a	Intake Side	*b	Exhaust Side
→	Engine Front Side	-	-

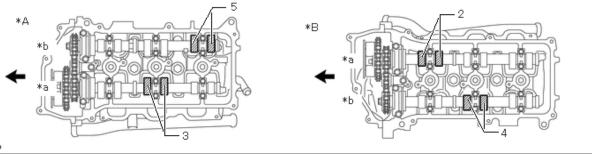
Standard Valve Clearance (Cold):

Item	Specified Condition
Intake Side	0.15 to 0.25 mm (0.00591 to 0.00984 in.)
Exhaust Side	0.29 to 0.39 mm (0.0114 to 0.0154 in.)

Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

b. Turn the crankshaft 2/3 of a revolution (240°).

c. Using a feeler gauge, measure the valve clearance indicated in the illustration.



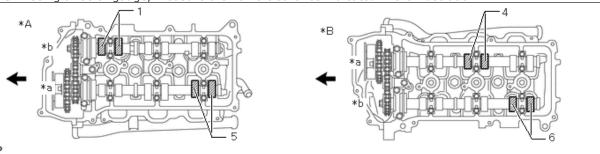
*A	for Bank 1	*B	for Bank 2
*a	Intake Side	*b	Exhaust Side
→	Engine Front Side	-	-

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Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

- **d.** Turn the crankshaft 2/3 of a revolution (240°).
- e. Using a feeler gauge, measure the valve clearance indicated in the illustration.



*A	for Bank 1	*B	for Bank 2
*a	Intake Side	*b	Exhaust Side
→	Engine Front Side	-	-

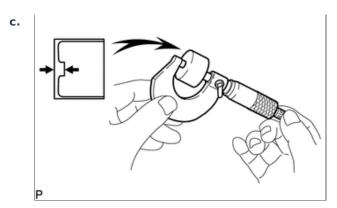
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Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

9.ADJUST VALVE CLEARANCE

- a. Remove the camshafts. Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CAMSHAFT>REMOVAL
- **b.** Remove the 24 valve lifters from the cylinder head LH and RH.



Determine the size of the valve lifter to be installed according to the following formulas and charts.

- i. Using a micrometer, measure the thickness of the removed valve lifter.
- ii. Calculate the thickness of a new valve lifter so that the valve clearance comes within the specified range.

т.

Thickness of removed valve lifter

Α:

Measured valve clearance

N:

Thickness of new valve lifter

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Intake:
N = T + (A - 0.20 \text{ mm } (0.00787 \text{ in.}))
Exhaust:
N = T + (A - 0.34 \text{ mm } (0.0134 \text{ in.}))
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iii. Select a new valve lifter with a thickness as close as possible to the calculated value.

Lifters are available in 35 sizes in increments of 0.020~mm (0.000787~in.), from 5.060~mm (0.1992~in.) to 5.740~mm (0.2260~in.).

	0.431 - 0.450 (0.0762 - 0.0763) 0.431 - 0.450 (0.0176 - 0.0176) 0.431 - 0.450 (0.0178 - 0.0185 - 0.0185) 0.471 - 0.490 (0.0185 - 0.0185) 0.471 - 0.490 (0.0185 - 0.0185) 0.491 - 0.510 (0.0201 - 0.0209) 0.531 - 0.550 (0.0201 - 0.0224) 0.551 - 0.550 (0.0203 - 0.0240) 0.561 - 0.570 (0.0241 - 0.0244) 0.571 - 0.590 (0.0245 - 0.0234) 0.591 - 0.610 (0.0248 - 0.0256) 0.651 - 0.670 (0.0264 - 0.0272) 0.591 - 0.610 (0.0264 - 0.0272) 0.591 - 0.610 (0.0264 - 0.0272) 0.591 - 0.700 (0.0265 - 0.0264) 0.651 - 0.670 (0.0265 - 0.0264) 0.651 - 0.750 (0.0266 - 0.0266) 0.651 - 0.750 (0.0266 - 0.0266) 0.651 - 0.750 (0.0266 - 0.0261) 0.751 - 0.750 (0.0266 - 0.0311) 0.751 - 0.750 (0.0364 - 0.0311) 0.751 - 0.830 (0.0319 - 0.0331) 0.831 - 0.850 (0.0319 - 0.0335) 0.851 - 0.870 (0.0335 - 0.0343)	0.291 - 0.310 (0.0115 - 0.0122) 0.311 - 0.330 (0.0122 - 0.0130) 0.331 - 0.350 (0.0130 - 0.0138) 0.331 - 0.350 (0.0138 - 0.0146) 0.351 - 0.370 (0.0138 - 0.0154) 0.371 - 0.390 (0.0146 - 0.0154) 0.371 - 0.410 (0.0154 - 0.0161)	*D 0.000 - 0.020 0.021 - 0.020 0.021 - 0.040 0.041 - 0.080 0.051 - 0.080 0.051 - 0.100 0.101 - 0.120 0.121 - 0.140 0.121 - 0.140 0.121 - 0.140 0.121 - 0.200 0.251 - 0.270
	0.450 (0.0702 - 0.0750) -0.450 (0.0707 - 0.0767) -0.450 (0.0708 - 0.0185) -0.450 (0.0708 - 0.0185) -0.550 (0.0201 - 0.0209) -0.550 (0.0201 - 0.02017) -0.550 (0.0201 - 0.02017) -0.550 (0.0201 - 0.02017) -0.550 (0.0204 - 0.02017) -0.650 (0.0204 - 0.0233 - 0.0204) -0.650 (0.0204 - 0.0234) -0.650 (0.0204 - 0.0264) -0.650 (0.0204 - 0.0264) -0.650 (0.0204 - 0.0264) -0.650 (0.0204 - 0.0264) -0.650 (0.0204 - 0.0264) -0.650 (0.0204 - 0.0267) -0.750 (0.0208 - 0.0267) -0.750 (0.0208 - 0.0267) -0.750 (0.0208 - 0.0267) -0.750 (0.0204 - 0.0271) -0.750 (0.0204 - 0.0271) -0.750 (0.0204 - 0.0271) -0.750 (0.0204 - 0.0264) -0.650 (0.0304 - 0.0319) -0.630 (0.0319 - 0.0319) -0.630 (0.0319 - 0.0327) -0.850 (0.0335 - 0.0343) -0.870 (0.0335 - 0.0343)	0.310 (0.0115 - 0.0182) 0.330 (0.0122 - 0.0130) 0.350 (0.0130 - 0.0138) 0.370 (0.0138 - 0.0146) 0.390 (0.0146 - 0.0154) 0.410 (0.0154 - 0.0160)	** 1.0020 (0.0000 - 0.00078 0.0020 (0.0000 - 0.00078 0.0040 (0.000827 - 0.0011 0.000 (0.00038 - 0.0033 0.100 (0.0038 - 0.0033 0.100 (0.0038 - 0.0047 0.100 (0.0038 - 0.0047 0.100 (0.0038 - 0.0047 0.100 (0.0038 - 0.0047 0.100 (0.0038 - 0.0047 0.100 (0.0038 - 0.0047 0.0008 - 0.0047 0.0008 - 0.0047 0.0008 - 0.0047 0.0008 - 0.0047 0.0008 - 0.0047 0.0008 - 0.0047
	(0.0176 - 0.0177) (0.0176 - 0.0177) (0.0176 - 0.0185) (0.0185 - 0.0183) (0.0183 - 0.0201) (0.0205 - 0.0217) (0.0205 - 0.0217) (0.0225 - 0.0232) (0.0231 - 0.0240) (0.0241 - 0.0248) (0.0248 - 0.0286) (0.0246 - 0.0287) (0.0256 - 0.0284) (0.0256 - 0.0284) (0.0256 - 0.0284) (0.0256 - 0.0285) (0.0256 - 0.0285) (0.0257 - 0.0285) (0.0258 - 0.0285) (0.0258 - 0.0285) (0.0258 - 0.0303) (0.0258 - 0.0303) (0.0258 - 0.0303) (0.0319 - 0.0319) (0.0319 - 0.0327) (0.0319 - 0.0327)	(0.0115 - 0.0122) (0.0122 - 0.0130) (0.0130 - 0.0138) (0.0138 - 0.0146) (0.0138 - 0.0154) (0.0154 - 0.0161) (0.0154 - 0.0161)	(0.0000 - 0.000787) (0.0000 - 0.000787) (0.000827 - 0.0015) (0.00161 - 0.00236) (0.00240 - 0.00315) (0.00398 - 0.00432) (0.00398 - 0.00587) (0.00398 - 0.00587) (0.00595 - 0.00587) (0.00598 - 0.00587) (0.00598 - 0.0166)
	-0.0177 -0.0185 -0.0201 -0.0201 -0.0201 -0.0232 -0.0240 -0.0240 -0.0284 -0.0284 -0.0288 -0.0288 -0.0287 -0.0287 -0.0393 -0.0319 -0.0335 -0.0335 -0.0335	-0.0122 -0.0130 -0.0138 -0.0146 -0.0154	*C *C
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	72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 3 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 36 3		
	72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 3 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 3		
	72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 4	0 38 36 34 32 30 28	26 24 12 12 10 08 5.180 (0.2039)
	72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 4 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 4		
	72 70 68 66 64 62 60 58 56 54 52 50 48 46 4	4 42 40 38 36 34 32	30 28 16 16 14 12 10 08 5.220 (0.2055)
	74 72 70 68 66 64 62 60 58 56 54 52 50 48 4 72 70 68 66 64 62 60 58 56 54 52 50 48 4		
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	74 72 70 68 66 64 62 6 72 70 68 66 64 62 6		
	74 72 70 68 66 64 6	2 60 58 56 54 52 50	48 46 34 32 30 28 26 24 22 20 5.390 (0.2122)
		2 60 58 56 54 52 50 4 62 60 58 56 54 52	
	72 70 68 66 6	4 62 60 58 56 54 52	50 48 36 36 34 32 30 28 26 24 5.420 (0.2134)
		6 64 62 60 58 56 54 6 64 62 60 58 56 54	
	74 72 70 6	8 66 64 62 60 58 56	54 52 40 38 36 34 32 30 28 26 5.450 (0.2146)
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		2 70 68 66 64 62 60 2 70 68 66 64 62 60	
	7	4 72 70 68 66 64 62 72 70 68 66 64 62	
		74 72 70 68 66 64	
		72 70 68 66 64 74 72 70 68 66	
		72 70 68 66	64 62 50 50 48 46 44 42 40 38 5.560 (0.2189)
		74 72 70 68 72 70 68	
		74 72 70	68 66 54 52 50 48 46 44 42 40 5.590 (0.2201)
			68 66 54 54 52 50 48 46 44 42 5.600 (0.2205) 70 68 56 56 54 52 50 48 46 44 5.620 (0.2213)
			72 70 58 58 56 54 52 50 48 46 5.640 (0.2220)
			72 60 60 58 56 54 52 50 48 5.660 (0.2228) 62 62 60 58 56 54 52 50 5.680 (0.2236)
			64 64 62 60 58 56 54 52 5.700 (0.2244)
			66 66 64 62 60 58 56 54 5.720 (0.2252) 68 68 66 64 62 60 58 56 5.740 (0.2260)
*a	Valve Lifter Selection Chart (Intake)	*b	Measured Clearance mm (in.)
*c	Installed Lifter Thickness mm (in)		

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EXAMPLE: A 5.250~mm (0.2067 in.) lifter is installed and the measured clearance is 0.400 mm (0.0157 in.). Replace the 5.250~mm (0.2067 in.) lifter with a No. 46 lifter.

New Lifter Thickness:

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
06	5.060 mm (0.1992 in.)	30	5.300 mm (0.2087 in.)	54	5.540 mm (0.2181 in.)
08	5.080 mm (0.2000 in.)	32	5.320 mm (0.2094 in.)	56	5.560 mm (0.2189 in.)
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2055 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252 in.)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260 in.)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

C
To Column Colum
T2 T0 68 66 46 62 60 58 56 55 50 48 446 44 24 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 12 10 10 10 10 10 10
72 70 68 66 64 62 60 58 65 45 52 50 48 446 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 72 77 68 66 66 46 22 60 58 65 54 52 50 48 446 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 72 77 68 66 66 46 22 60 58 65 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 14 72 77 68 66 66 46 22 60 58 65 55 55 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 14 72 77 68 66 66 46 22 60 58 65 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 18 72 77 68 66 66 46 22 60 58 65 55 55 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 24 22 10 10 10 08 72 77 70 68 66 66 46 26 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 14 22 10 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 36 34 32 30 28 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 22 40 38 36 34 32 30 28 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26
72 70 68 66 64 62 60 58 65 45 52 50 48 446 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 72 77 68 66 66 46 22 60 58 65 54 52 50 48 446 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 72 77 68 66 66 46 22 60 58 65 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 14 72 77 68 66 66 46 22 60 58 65 55 55 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 14 72 77 68 66 66 46 22 60 58 65 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 16 18 72 77 68 66 66 46 22 60 58 65 55 55 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 42 40 38 36 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 24 22 20 18 72 77 68 66 66 46 22 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 24 22 10 10 10 08 72 77 70 68 66 66 46 26 60 58 65 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 14 22 10 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 38 34 32 30 28 26 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 50 48 46 44 22 40 38 36 34 32 30 28 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 22 40 38 36 34 32 30 28 26 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26 60 58 56 54 52 50 48 46 44 42 40 38 36 54 32 20 18 16 16 14 12 10 08 6 72 77 70 68 66 66 46 26
72 70 68 66 64 62 60 58 65 45 52 50 48 464 44 24 03 83 63 43 23 02 82 62 42 22 01 18 16 14 12 72 77 08 86 66 64 62 60 58 65 45 52 50 48 464 44 24 03 83 86 34 32 30 28 26 24 22 20 18 16 14 12 72 77 08 86 66 64 62 60 58 56 54 52 50 48 464 44 24 03 83 86 34 32 30 28 26 26 24 22 20 18 16 14 12 72 77 08 86 66 64 62 60 58 56 54 52 50 48 464 44 24 03 83 86 34 32 30 28 26 26 24 22 20 18 16 14 12 72 77 08 86 66 64 62 60 58 56 54 52 50 54 84 464 44 24 03 83 86 34 32 30 28 26 24 22 20 18 16 18 18 72 77 08 86 66 64 62 60 58 56 54 52 50 548 464 44 24 03 83 83 34 32 30 28 26 24 22 20 18 16 18 18 72 77 08 86 66 64 62 60 58 56 54 52 50 548 464 44 24 03 83 83 43 23 02 82 62 24 22 20 72 72 72 72 72 72 72 72 72 72 72 72 72 7
72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 03 83 63 43 23 02 82 62 42 22 01 18 16 14 12 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 03 83 86 34 32 30 28 26 24 22 20 18 16 14 12 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 03 83 86 34 32 30 28 26 24 22 20 18 16 14 12 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 03 83 86 34 32 30 28 26 24 22 20 18 16 14 12 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 03 83 86 34 32 30 28 26 24 22 20 18 72 70 68 66 64 62 60 58 66 54 52 50 50 58 64 46 44 24 03 83 86 34 32 30 28 26 24 22 20 18 72 70 68 66 64 62 60 58 66 54 52 50 50 58 64 46 44 24 03 83 83 43 23 02 82 62 24 22 20 72 70 68 66 64 62 60 58 66 54 52 50 50 58 64 54 52 50 48 46 44 24 03 83 63 43 23 02 82 62 24 22 10 72 70 68 66 64 62 60 58 66 54 52 50 50 58 64 64 44 24 03 83 83 43 23 02 82 62 24 22 10 72 70 68 66 64 62 60 58 66 54 52 50 50 58 64 64 44 24 03 83 83 43 23 02 82 62 64 22 10 72 70 68 66 64 62 60 58 66 54 52 50 50 48 46 44 24 20 83 83 43 23 02 82 62 64 22 10 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 83 83 63 43 23 02 82 62 64 12 12 12 10 08 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 83 83 63 43 23 02 82 62 61 12 12 10 08 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 83 83 63 43 23 02 82 62 61 14 14 12 10 08 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 83 83 63 43 23 02 82 61 16 14 12 10 08 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 83 83 63 43 20 02 82 61 16 16 14 12 10 08 72 70 68 66 64 62 60 58 66 54 52 50 48 46 44 24 20 33 83 63 43 20 02 81 16 16 14 12 10 08 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 33 83 63 43 20 02 81 16 16 14 12 10 08 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 33 83 63 43 20 02 81 16 16 14 12 10 08 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 33 83 63 43 20 02 81 16 16 14 12 10 08 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 33 83 63 43 20 02 81 16 16 14 12 10 08 72 70 68 66 64 62 66 65 58 56 58 55 50 58 50 50 50 50 50 50 50 50 50 50 50 50 50
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72 70 68 66 64 62 60 58 65 45 25 04 8 64 442 40 33 95 63 42 20 28 26 1 41 44 12 10 08 6 5 5 20 00 (2.047) 74 72 70 68 66 64 62 60 58 56 45 25 04 84 64 44 24 03 38 03 43 23 02 8 16 16 14 12 10 08 6 5 5 20 00 (2.047) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 18 16 14 12 10 08 6 5 5 20 00 (2.047) 75 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 18 16 14 12 10 08 6 5 5 20 00 (2.047) 76 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 18 16 14 12 10 08 6 5 5 20 00 (2.047) 77 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 20 18 16 14 12 10 08 6 5 5 5 20 00 (2.047) 78 70 68 66 64 62 60 58 56 54 52 50 08 46 64 42 24 03 83 63 43 22 20 18 16 14 12 10 08 6 5 5 5 5 5 5 5 5 00 (2.047) 78 70 68 66 64 62 60 58 56 54 52 50 08 46 64 42 24 03 83 63 43 22 20 18 16 14 12 10 08 6 5 5 5 5 5 5 5 5 5 00 (2.047) 78 70 68 66 64 62 60 58 56 54 52 50 08 46 64 42 24 03 83 63 43 22 20 18 16 14 12 10 08 6 5 5 5 5 5 5 5 00 (2.047) 78 70 68 66 64 62 60 58 56 54 52 50 08 46 44 22 40 38 36 34 32 20 20 18 16 14 12 10 08 6 5 5 5 5 5 7 00 60 60 40 60 60 60 60 60 60 60 60 60 60 60 60 60
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74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 20 18 16 14 12 10 08 68 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 20 20 18 16 14 12 10 08 58 54 52 50 40 50 40 54 44 42 40 38 36 34 32 20 20 18 16 14 12 10 08 58 54 52 50 40 50 40 54 42 40 38 36 34 32 20 20 18 16 14 12 10 08 58 54 52 50 40 54 44 42 40 38 36 34 32 20 20 18 16 14 12 10 08 58 54 52 50 40 40 44 42 40 38 36 34 32 20 20 18 16 14 12 10 08 59 59 50 50 50 50 50 50
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74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 40 28 28 24 22 20 18 16 14 12 10 08 06 53.30 (0.2098) 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2100) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2100) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 53.30 (0.2112) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 54.00 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2130) 75 70 68 66 64 62 60 58 56 54 52 50 48 36 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 54.00 (0.2150) 75 70 68 66 64 62 60 58 56 54 52 50 48 36 54 52 50 48 36 34 32
74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 30 30 28 26 24 22 20 18 16 14 12 10 08 06 5 5.350 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 22 30 30 28 26 24 22 20 18 16 14 12 10 08 05 5.360 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 23 30 30 28 26 24 22 20 18 16 14 12 10 08 5 5.360 (0.2110) 75 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.370 (0.2114) 76 70 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.370 (0.2114) 77 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.390 (0.2118) 78 70 70 68 66 64 62 60 58 56 54 52 50 48 46 54 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.390 (0.2118) 79 70 68 66 64 62 60 58 56 54 52 50 48 46 54 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.390 (0.2118) 70 80 66 64 62 60 68 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.390 (0.2118) 71 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5 5.500 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5 5.500 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 15 14 12 5.5500 (0.2165) 74 72 70 68 66 64 62 60 58 56 54 52 50 58 56 54 22 40 38 36 34 32
72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 30 30 28 26 24 22 20 18 16 14 12 10 08 5 5.360 (0.2110) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 6 5.370 (0.2114) 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.370 (0.2114) 72 70 68 66 64 62 60 58 56 54 52 50 48 46 46 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2118) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2118) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.400 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.400 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2134) 75 70 68 66 64 62 60 58 56 54 52 50 38 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2134) 76 70 70 68 66 64 62 60 58 56 54 52 50 38 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2134) 77 70 68 66 64 62 60 58 56 54 52 50 38 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2134) 78 70 70 68 66 64 62 60 58 56 54 52 40 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.400 (0.2154) 79 70 68 66 64 62 60 58 56 54 52 40 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.400 (0.2155) 70 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.400 (0.2155) 70 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.5400 (0.2155) 70 70 68 66 64 62 60 58 66 64 22 60 58 66 44 24 24 03 38 36 34 32 30 28 26 24 22 20 18 16 15 5.500 (0.2165) 70 70 68 66 64 62 60 58 66 64 22 60 58 66 44 24 24 03 38 36 34 32 30 28 26 24 22 20 18 16 5 5.500 (
74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 32 32 32 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2114) 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 32 32 32 32 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2118) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2118) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.380 (0.2122) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.390 (0.2122) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.390 (0.2122) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 38 38 38 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 75 70 70 70 70 70 70 70 70 70 70 70 70 70
74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.490 (0.2122) 72 70 68 66 64 62 60 58 56 54 52 50 48 46 34 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.490 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.400 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 38 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 38 38 38 38 38 38 38 38 38 38 38 38 38
72 70 68 66 46 62 60 58 56 54 52 50 48 46 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2126) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.400 (0.2130) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2134) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2134) 74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2134) 75 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2134) 76 70 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2134) 77 70 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2142) 78 70 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2142) 79 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5 5.400 (0.2150) 70 70 68 66 64 62 60 58 56 54 52 50 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5 5.400 (0.2150) 70 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.5400 (0.2150) 70 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.5400 (0.2150) 70 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.5400 (0.2155) 70 70 68 66 64 62 60 58 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 70 70 68 66 64 62 60 58 66 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 70 70 68 66 64 62 60 58 66 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 50.500 (0.2165)
74 72 70 68 66 64 62 60 58 56 54 52 50 48 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 5.410 (0.2130) 72 70 68 66 64 62 60 58 56 54 52 50 48 36 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.420 (0.2134) 74 72 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.420 (0.2138) 72 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.430 (0.2138) 74 72 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.430 (0.2138) 75 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2142) 75 70 68 66 64 62 60 58 56 54 52 50 40 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2142) 75 70 68 66 64 62 60 58 56 54 52 50 40 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2145) 75 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.450 (0.2145) 76 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 76 70 68 66 64 62 60 58 56 44 24 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 76 8 66 64 62 60 58 56 44 24 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 76 8 66 64 62 60 58 66 46 28 60 58 64 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 77 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 77 70 68 66 64 62 60 58 64 62 60 58 64 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 77 70 68 66 64 62 60 58 64 62 60 58 64 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 78 70 68 66 64 62 60 58 64 62 60 58 64 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 78 70 68 66 64 62 60 58 64 62 60 58 64 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 78 70 68 66 64 62 60 68 62 60 68 64 62 60 58 64 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2155) 79 70 68 66 64 62 60 68 64 62 60 58 64 42 40 40 40 40 40 40 40 40 40 40 40 40 40
74 72 70 68 66 64 62 60 58 56 54 52 50 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 5.430 (0.2138) 72 70 68 66 64 62 60 58 56 54 52 50 38 38 38 34 32 30 28 26 24 22 20 18 16 14 12 10 5.430 (0.2142) 74 72 70 68 66 64 62 60 58 56 54 52 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.440 (0.2142) 72 70 68 66 64 62 60 58 56 54 52 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 40 38 36 34 32 30 28 26 24 22 20 18 16 14 52 5.450 (0.2145) 72 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.450 (0.2150) 74 72 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.450 (0.2150) 74 72 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 74 72 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 75 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 75 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 75 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.450 (0.2150) 75 70 68 66 64 62 60 68 62 60 60 88 60 40 20 80 88 60 40 40 40 40 80 80 80 40 80 80 80 80 80 80 80 80 80 80 80 80 80
72 70 68 66 64 62 60 58 56 54 52 50 38 88 88 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 40 88 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 40 40 88 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2146) 72 70 68 66 64 62 60 58 56 54 52 40 40 88 36 34 32 30 28 26 24 22 20 18 16 14 12 5.450 (0.2145) 74 72 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.450 (0.2150) 74 72 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.450 (0.2150) 74 72 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.480 (0.2157) 74 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.490 (0.2161) 72 70 68 66 64 62 60 58 46 24 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 46 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 72 70 68 66 64 62 60 58 46 46 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 72 70 68 66 64 62 60 58 46 46 40 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 72 70 68 66 64 62 60 58 46 46 40 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165)
74 72 70 68 66 64 62 60 58 56 54 52 40 8 8 6 64 62 60 58 56 54 52 40 8 8 8 64 82 60 58 56 54 52 40 8 8 66 64 62 60 58 56 54 52 40 8 8 66 64 62 60 58 56 54 52 40 8 8 66 64 62 60 58 56 54 42 40 88 86 43 82 80 88 88 88 88 88 88 88 88 88 88 88 88
74 72 70 68 66 64 62 60 58 56 54 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 5.470 (0.2154) 72 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.480 (0.2157) 74 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.480 (0.2157) 75 70 70 70 88 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.490 (0.2161) 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 46 46 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 46 46 40 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 46 46 40 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2167)
72 70 68 66 64 62 60 58 56 54 42 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.480 (0.2157) 74 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.490 (0.2161) 72 70 68 66 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.490 (0.2165) 74 72 70 68 66 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.500 (0.2165) 77 72 70 68 66 64 62 60 58 46 44 24 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 78 72 70 68 66 64 62 60 58 46 44 24 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 78 72 70 68 66 64 62 60 68 62 60 68 64 64 42 40 38 36 34 32 30 28 26 24 22 20 5.530 (0.2173)
74 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 5.490 (0.2161) 72 70 68 66 64 62 60 58 56 44 42 40 38 36 34 32 30 28 26 24 22 20 18 5.500 (0.2165) 74 72 70 68 66 64 62 60 58 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 5.510 (0.2169) 72 70 68 66 64 62 60 68 64 62 60 68 46 40 40 40 38 36 34 32 30 28 26 24 22 20 18 5.550 (0.2169)
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72 70 68 66 64 62 60 58 46 46 44 42 40 38 36 34 32 30 28 26 24 22 20 5.520 (0.2173) 74 72 70 68 66 64 62 60 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 5.530 (0.2177)
74 72 70 68 66 64 62 60 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 5.530 (0.2177)
79/70/20/20/20/20/20/20/20/20/20/20/20/20/20
74 72 70 68 66 84 62 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 5.550 (0.2185) 72 70 68 66 84 62 50 50 48 46 44 42 40 38 36 34 32 30 28 26 24 5.560 (0.2189)
74 72 70 68 66 64 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 5.570 (0.2193)
72 70 68 66 64 52 52 50 48 46 44 42 40 38 36 34 32 30 28 26 5.580 (0.2197)
74 72 70 88 66 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 5.590 (0.2201) 72 70 68 66 54 54 52 50 48 46 44 42 40 38 36 34 32 30 28 56 600 (0.2205)
72 70 68 56 56 54 52 50 48 46 44 42 40 38 36 34 32 30 5.620 (0.2213)
72 70 58 58 56 54 52 50 48 46 44 42 40 38 36 34 32 5.640 (0.2220)
72 60 60 58 56 54 52 50 48 46 44 42 40 38 36 34 5.660 (0.2228) 62 62 60 58 56 54 52 50 48 46 44 42 40 38 36 5.680 (0.2236)
64 64 62 60 58 56 54 52 50 48 46 44 42 40 38 55 700 (0.2244)
66 66 64 62 60 58 56 54 52 50 48 46 44 42 40 5.720 (0.2252)
68 68 66 66 64 62 60 58 56 54 52 50 48 46 44 42 5.740 (0.2260)
*a Valve Lifter Selection Chart (Exhaust)

*a	Valve Lifter Selection Chart (Exhaust)	*b	Measured Clearance mm (in.)
*c	Installed Lifter Thickness mm (in.)	-	-

Exhaust valve clearance (Cold): 0.29 to 0.39 mm (0.0114 to 0.0154 in.)

EXAMPLE:

A 5.340 mm (0.2102 in.) lifter is installed and the measured clearance is 0.480 mm (0.0189 in.). Replace the 5.340 mm (0.2102 in.) lifter with a No. 48 lifter.

New Lifter Thickness:

ı	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
	06	5.060 mm (0.1992 in.)	30	5.300 mm (0.2087 in.)	54	5.540 mm (0.2181 in.)
	08	5.080 mm (0.2000 in.)	32	5.320 mm (0.2094 in.)	56	5.560 mm (0.2189 in.)

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2051 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252 in.)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260 in.)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

d. Install the camshafts. Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CAMSHAFT>INSTALLATION

e. Check the valve clearance.

If the result is not as specified, adjust the valve clearance.

10.INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY LH Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>REASSEMBLY

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■ 11.INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>REASSEMBLY

12.INSTALL SPARK PLUG 19100P

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>INSTALLATION

■ 13.INSTALL IGNITION COIL ASSEMBLY 19500

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>INSTALLATION

14.INSTALL INTAKE AIR SURGE TANK

Click hereEngine / Hybrid System>1GR-FE INTAKE / EXHAUST>INTAKE MANIFOLD>INSTALLATION

15.ADD ENGINE COOLANT

Click hereEngine / Hybrid System>1GR-FE COOLING>COOLANT>REPLACEMENT

16.INSPECT FOR COOLANT LEAK

Click hereEngine / Hybrid System>1GR-FE COOLING>COOLING SYSTEM>ON-VEHICLE INSPECTION

■ 17.INSPECT IGNITION TIMING

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE>ON-VEHICLE INSPECTION