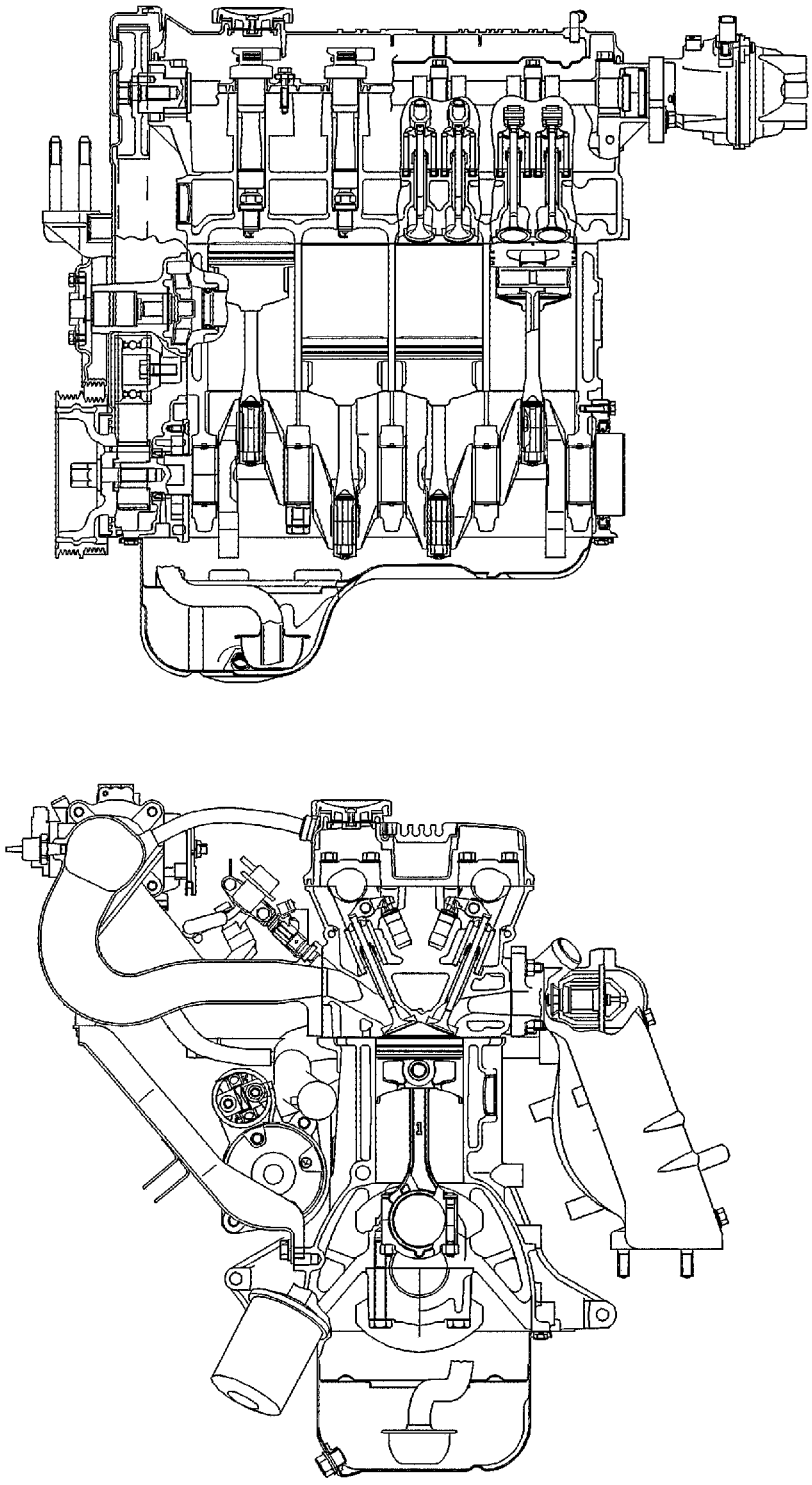
ENGINE
4G1 SERIES

CONTENTS



1EN0416

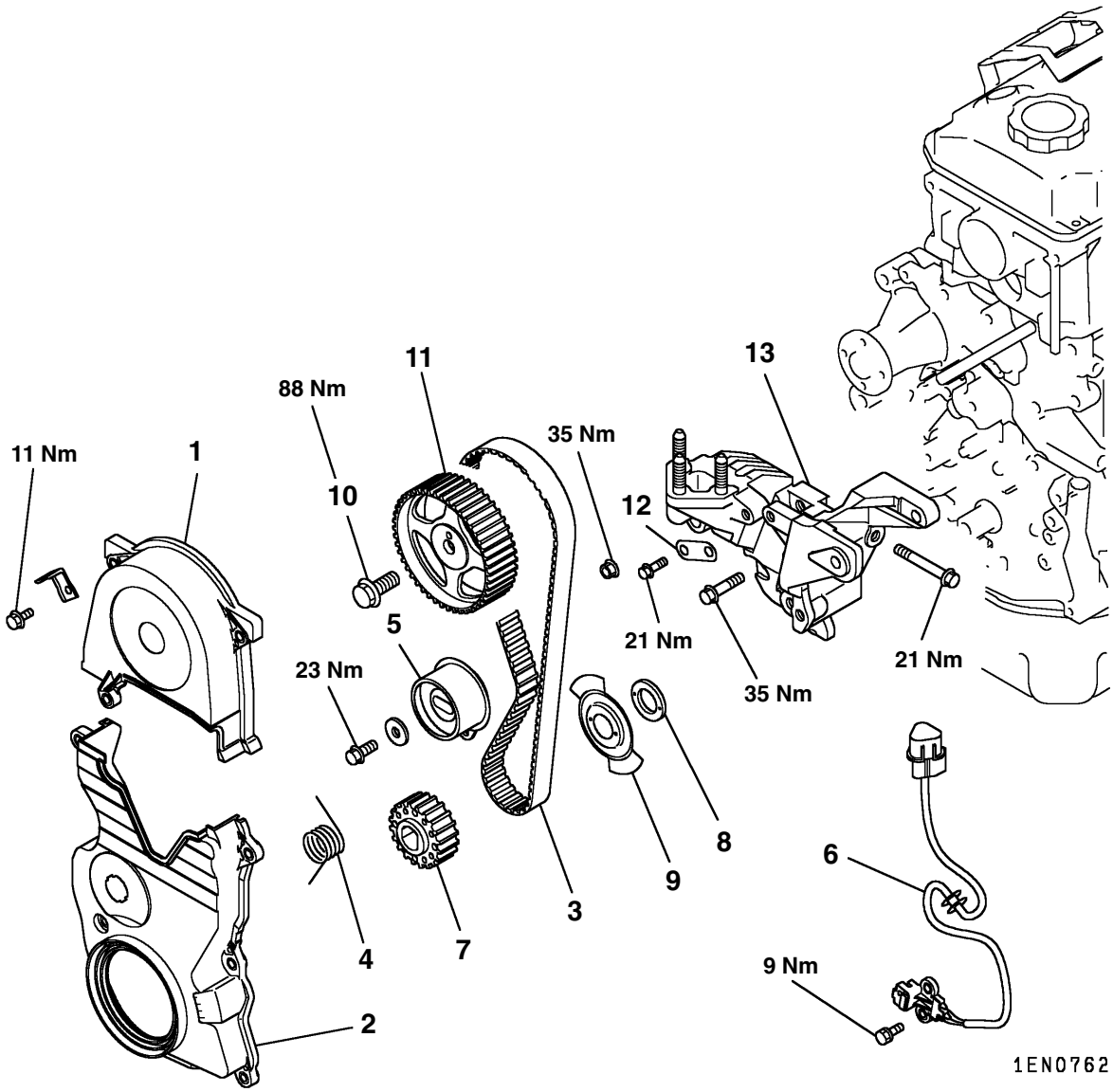
Descriptions		4G13 16-VALVE–CARBURETOR	4G13 16-VALVE–MPI
Type		In-line OHV, SOHC	In-line OHV, SOHC
Number of cylinders		4	4
Combustion chamber		Pentroof type	Pentroof type
Total displacement dm^3		1,299	1,299
Cylinder bore mm		71.0	71.0
Piston stroke mm		82.0	82.0
Compression ratio		9.5	10, 9.5*1
Number of valves	Intake	8	8
	Exhaust	8	8
Valve timing	Intake opens	BTDC 12°	BTDC 17°
	Intake closes	ABDC 48°	ABDC 39°
	Exhaust opens	BBDC 48°	BBDC 49°
	Exhaust closes	ATDC 12°	ATDC 7°
Lubrication system		Pressure feed, full-flow filtration	Pressure feed, full-flow filtration
Oil pump type		Trochoid type	Trochoid type
Cooling system		Water-cooled, forced circulation	Water-cooled, forced circulation
Water pump type		Centrifugal impeller type	Centrifugal impeller type

*1: LANCER for General Export

REWORK DIMENSIONS

Item				Standard	Limit
Cylinder head and valves					
Cylinder head oversize valve guide hole diameter mm		SOHC 12-VALVE	0.05 O. S.	12.040–12.058	–
			0.25 O. S.	12.240–12.258	–
			0.50 O. S.	12.490–12.508	–
		SOHC 16-VALVE	0.05 O. S.	10.550–10.568	–
			0.25 O. S.	10.750–10.768	–
			0.50 O. S.	11.000–11.018	–
		DOHC	0.05 O. S.	10.550–10.568	–
			0.25 O. S.	10.750–10.768	–
			0.50 O. S.	11.000–11.018	–
		DOHC GDI	0.05 O. S.	10.610–10.620	–
			0.25 O. S.	10.810–10.820	–
			0.50 O. S.	11.060–11.070	–
Oversize valve seat ring hole diameter mm	SOHC 12-VALVE	Intake (primary)	0.3 O. S.	27.300–27.325	–
			0.6 O. S.	27.600–27.625	–
		Intake (secondary)	0.3 O. S.	32.300–32.325	–
			0.6 O. S.	32.600–32.625	–
		Exhaust	0.3 O. S.	35.300–35.325	–
			0.6 O. S.	35.600–35.625	–
	SOHC 16-VALVE <4G13>	Intake	0.3 O. S.	28.300–28.321	–
			0.6 O. S.	28.600–28.621	–
		Exhaust	0.3 O. S.	26.300–26.321	–
			0.6 O. S.	26.600–26.621	–
	SOHC 16-VALVE <4G18>	Intake	0.3 O. S.	30.300–30.321	–
			0.6 O. S.	30.600–30.621	–
		Exhaust	0.3 O. S.	28.300–28.321	–
			0.6 O. S.	28.600–28.621	–
	DOHC	Intake	0.3 O. S.	31.300–31.325	–
			0.6 O. S.	31.600–31.625	–
		Exhaust	0.3 O. S.	27.800–27.825	–
			0.6 O. S.	28.100–28.125	–

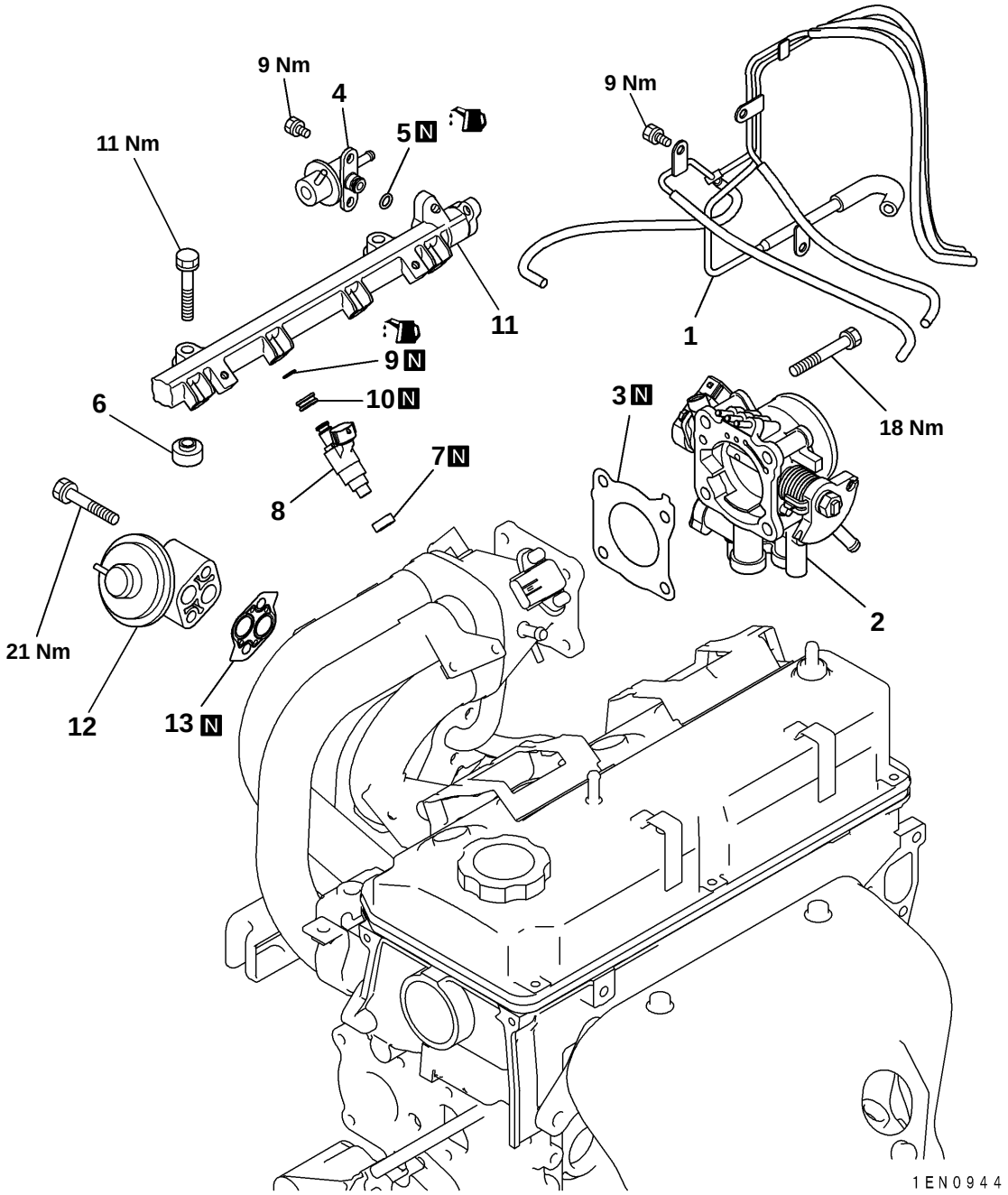
REMOVAL AND INSTALLATION <SOHC – Without timing belt rear cover>



Removal steps

1. Timing belt upper cover
2. Timing belt lower cover
◀A▶ ▶D◀ 3. Timing belt
▶C◀ 4. Tensioner spring
▶C◀ 5. Timing belt tensioner
6. Crankshaft angle sensor <Without Distributor>
▶B◀ 7. Crankshaft sprocket
▶B◀ 8. Spacer <Without Distributor>
▶B◀ 9. Sensing blade <Without Distributor>
◀B▶ ▶A◀ 10. Camshaft sprocket bolt
11. Camshaft sprocket
12. Bracket
13. Engine support bracket

REMOVAL AND INSTALLATION <SOHC–MPI – FRONT WHEEL DRIVE (FROM 2001 model FOR EUROPE)>

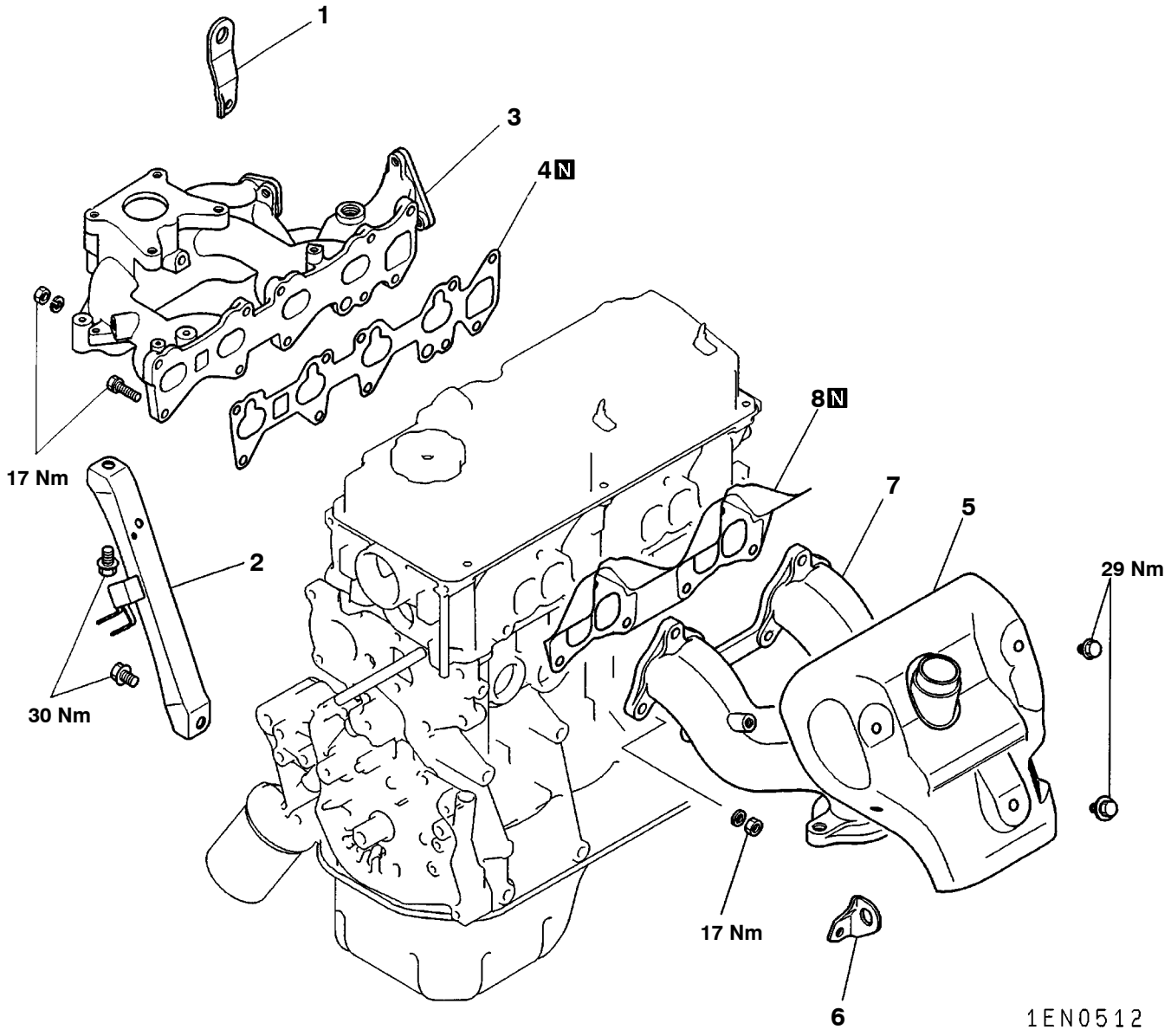


Removal steps

1. Vacuum pipe and hose
2. Throttle body assembly
3. Gasket
▶B◀ 4. Fuel pressure regulator
5. O-ring
6. Insulator
7. Insulator
▶A◀ 8. Injector
9. O-ring
10. Grommet
11. Delivery pipe
12. EGR valve
13. Gasket

7. INTAKE AND EXHAUST MANIFOLDS

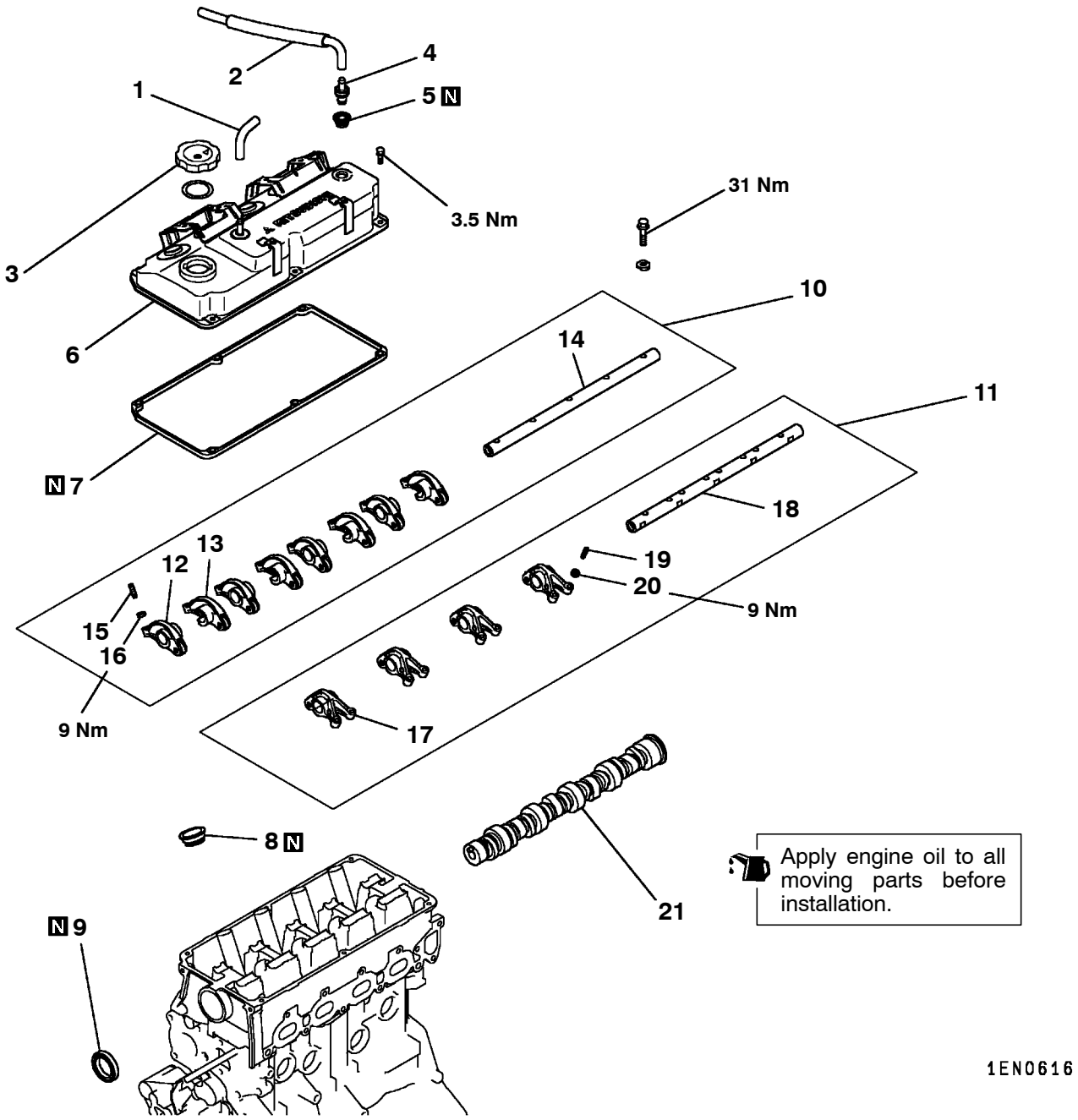
REMOVAL AND INSTALLATION <SOHC 12-VALVE-CARBURETOR>



Removal steps

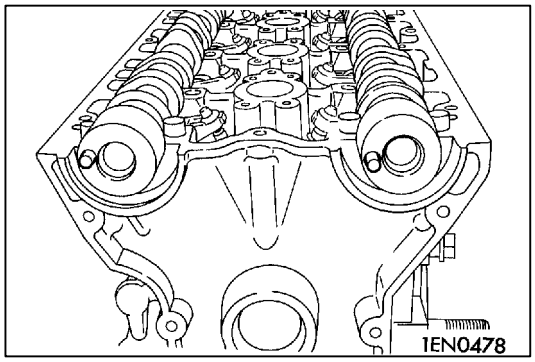
1. Engine hanger
2. Intake manifold stay
3. Intake manifold
4. Intake manifold gasket
5. Exhaust manifold cover
6. Engine hanger
7. Exhaust manifold
8. Exhaust manifold gasket

REMOVAL AND INSTALLATION <SOHC 16-VALVE (With Adjusting screw)>



Removal steps

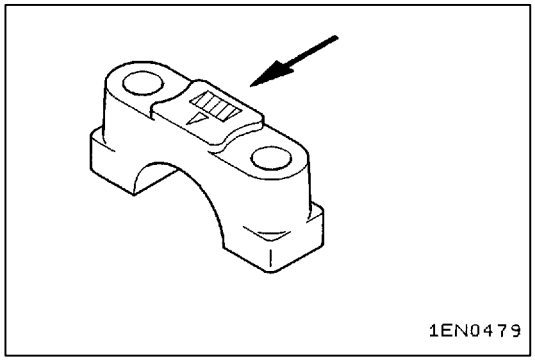
1. Breather hose
2. P.C.V. hose
3. Oil filler cap
4. P.C.V. valve
5. P.C.V. valve gasket
6. Rocker cover
7. Rocker cover gasket
8. Oil seal
- ▶F◀ 9. Oil seal
- ▶E◀ 10. Rocker arms and rocker arm shaft, intake
- ▶E◀ 11. Rocker arms and rocker arm shaft, exhaust
12. Rocker arm A
13. Rocker arm B
- ▶D◀ 14. Rocker arm shaft
- ▶C◀ 15. Adjusting screw
16. Nut
17. Rocker arm C
- ▶D◀ 18. Rocker arm shaft
- ▶C◀ 19. Adjusting screw
20. Nut
21. Camshaft



▶B◀ BEARING CAP INSTALLATION

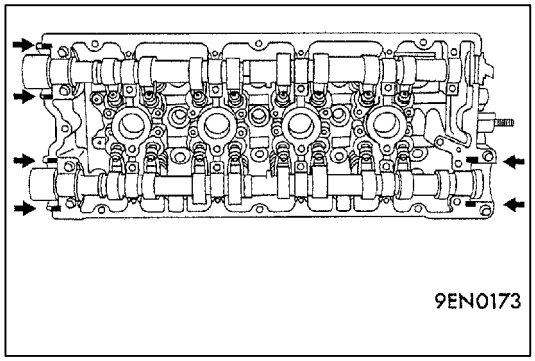
(1) Position the camshaft dowel pins as shown.

NOTE
With the camshaft dowel pins in this position, the camshaft notches for tightening cylinder head bolt are correctly positioned.



(2) Bearing caps Nos. 2 to 5 are the same shape. Be sure to install them in order of their cap numbers and check the identification marks to ensure that the intake and exhaust sides are not reversed.

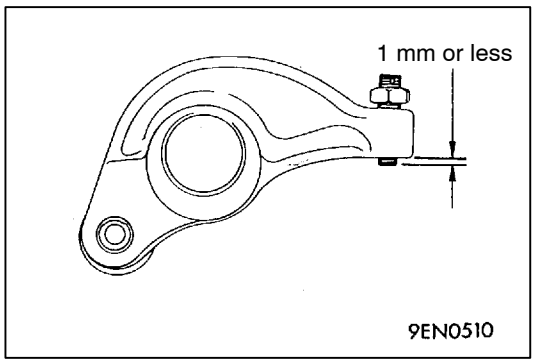
Identification marks:
I: Intake
E: Exhaust



(3) Apply the specified sealant to the surfaces that are to mate with the cylinder head. Then, tighten the bearing cap bolts - for the middle caps first, then for the outer caps, and soon. Tighten the bolts a little at a time such that each bolt is tightened to the specified torque in the final sequence.

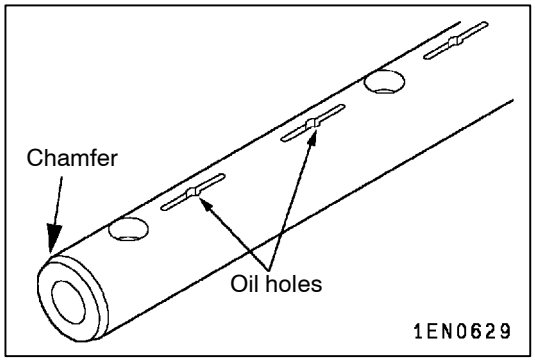
Specified sealant:
3M ATD Part No. 8660 or equivalent

(4) Check that the rocker arms are installed correctly.



▶C◀ ADJUSTING SCREW INSTALLATION

(1) Install provisionally the screw to the rocker arm. Insert it so that the end of the screw is flush with the edge of the rocker arm or projects slightly (1 mm or less).

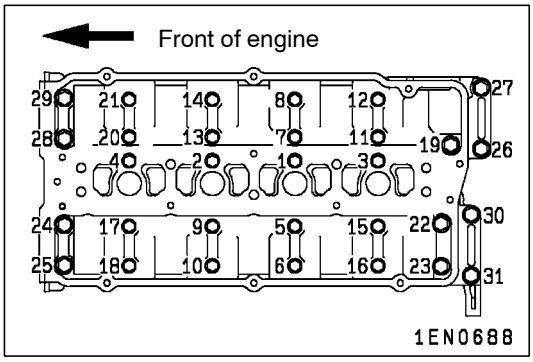


▶D◀ ROCKER ARM SHAFT INSTALLATION

(1) Place the end with the larger chamfered side toward the flywheel side. <SOHC 12-VALVE>
Place the end with the larger chamfered side toward the timing belt side. <SOHC 16-VALVE>

NOTE
The rocker arm shaft for intake valves have eight oil holes.

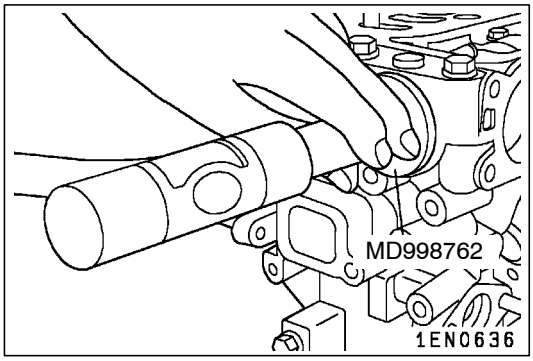
(2) Place the section of the shaft with the oil holes toward the cylinder head.



(4) Install the beam camshaft and tighten the bolts to the specified torque in the order shown in the illustration.

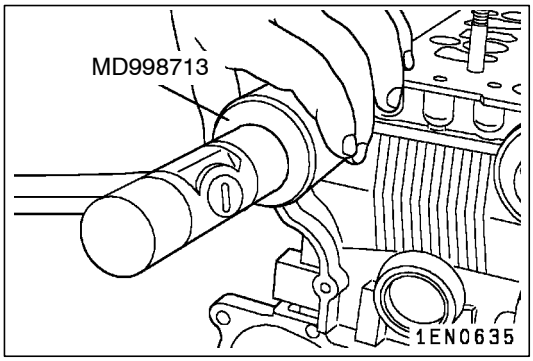
Tightening torque
11 Nm (M6)
25 Nm (M8)

(5) After tightening the bolts, completely wipe out the liquid gasket that has overflowed the intake part before the gasket is hardened (within 15 minutes after application of liquid gasket).



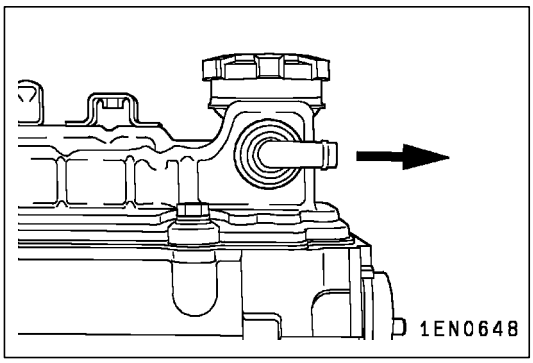
▶D◀ SEMI-CIRCULAR PACKING INSTALLATION

Using the special tool, install the semi-circular packing.



▶E◀ OIL SEAL INSTALLATION

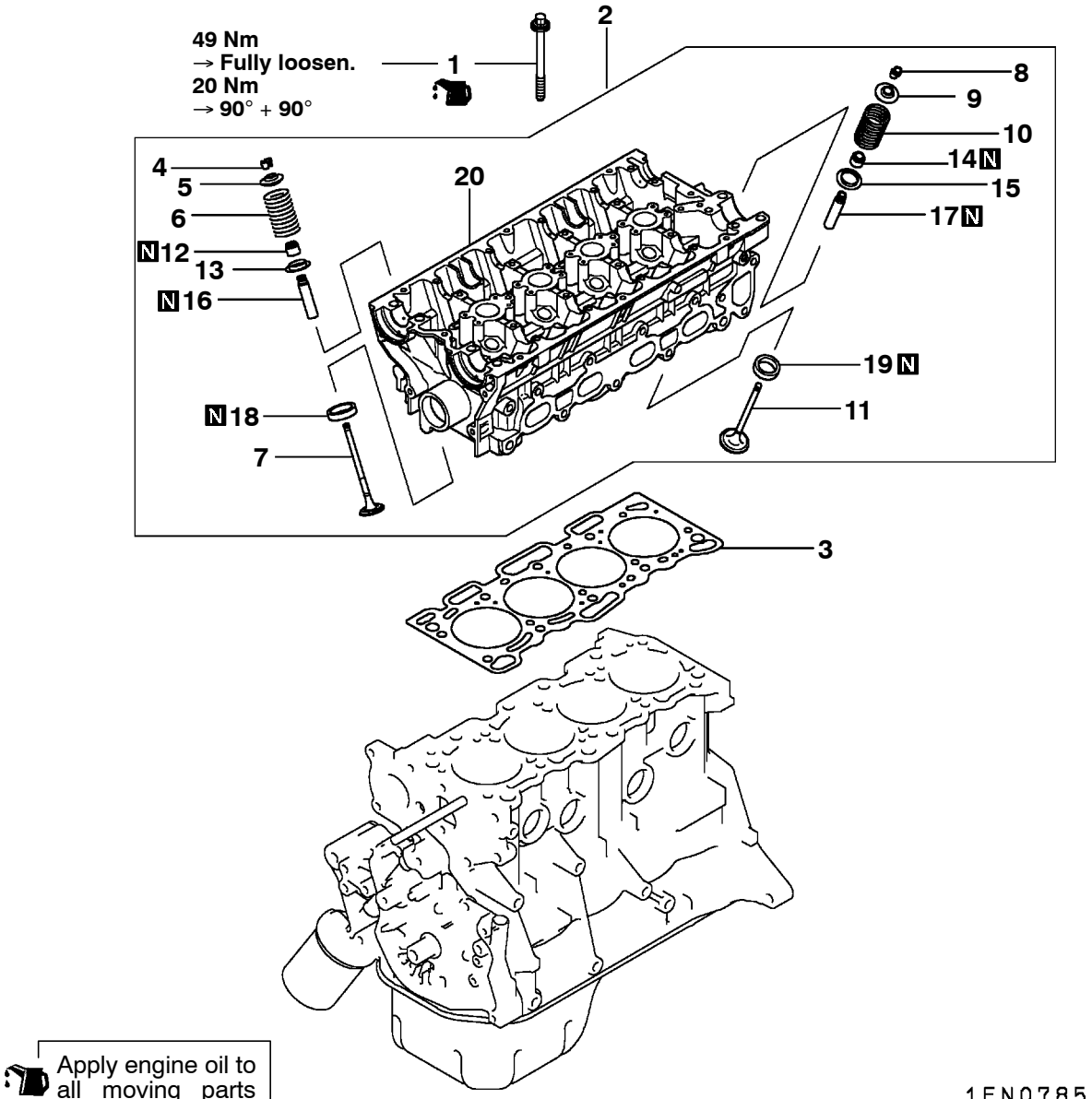
Using the special tool, install the oil seal.



▶F◀ P.C.V. VALVE INSTALLATION

Install the P.C.V. valve with its nipple directed as shown.

REMOVAL AND INSTALLATION <DOHC>



Removal steps

◀A▶ ▶D◀ 1. Cylinder head bolt
2. Cylinder head assembly
3. Cylinder head gasket
◀B▶ ▶C◀ 4. Retainer lock
5. Valve spring retainer
▶B◀ 6. Valve spring
7. Intake valve
◀B▶ ▶C◀ 8. Retainer lock
9. Valve spring retainer
▶B◀ 10. Valve spring
11. Exhaust valve
◀C▶ ▶A◀ 12. Valve stem seal
13. Valve spring seat
◀C▶ ▶A◀ 14. Valve stem seal
15. Valve spring seat
16. Intake valve guide
17. Exhaust valve guide
18. Intake valve seat
19. Exhaust valve seat
20. Cylinder head

VALVE GUIDE REPLACEMENT SERVICE POINTS

(1) Using a press, push the valve guide out toward the cylinder block side.
(2) Rebore the valve guide hole in the cylinder head to match the oversize valve guide that is to be fitted.

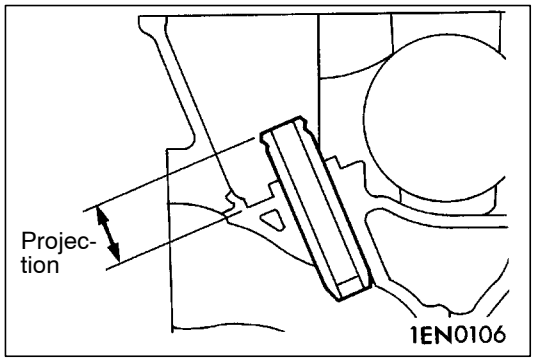
Caution
Do not install a valve guide of the same size again.

Valve guide hole diameters (SOHC 12-VALVE)
0.05 O.S.: 12.040 - 12.058 mm
0.25 O.S.: 12.240 - 12.258 mm
0.50 O.S.: 12.490 - 12.508 mm

Valve guide hole diameters (SOHC 16-VALVE, DOHC)
0.05 O.S.: 10.550 - 10.568 mm
0.25 O.S.: 10.750 - 10.768 mm
0.50 O.S.: 11.000 - 11.018 mm

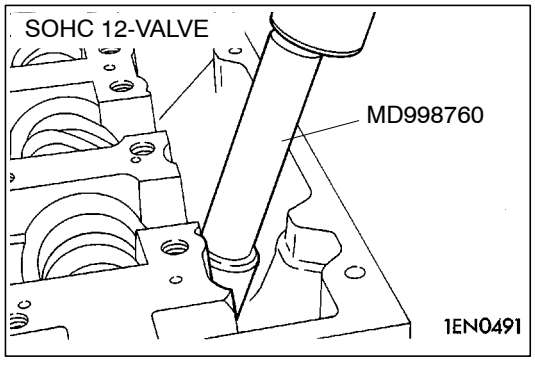
Valve guide hole diameters (DOHC-GDI)
0.05 O.S.: 10.61 - 10.62 mm
0.25 O.S.: 10.81 - 10.82 mm
0.50 O.S.: 11.06 - 11.07 mm

(3) Press-fit the valve guide until it projects by the specified amount.



Standard value:
SOHC 12-VALVE: 17 mm
SOHC 16-VALVE, DOHC: 23 mm

Caution
1. **The valve guide must be installed from the upper side of the cylinder head.**
2. **The valve guides differ in length on the intake and exhaust sides. (48 mm for intake valve; 55 mm for exhaust valve)**
3. **After press-fitting the valve guide, insert a new valve and check that it slides smoothly.**

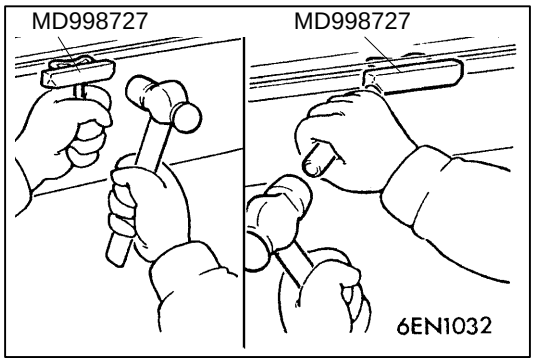


INSTALLATION SERVICE POINTS

▶A◀ VALVE STEM SEAL INSTALLATION

(1) Install the valve spring seat.
(2) Install a new valve stem seal using the special tool shown in the illustration.

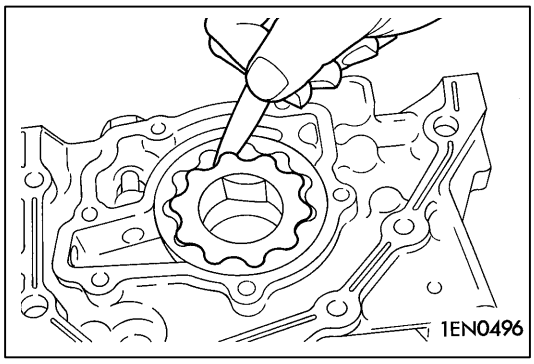
Caution
1. **Valve stem seals cannot be reused.**
2. **The valve stem seal must be installed using the correct special tool. Incorrect installation could result in oil leaking past the valve guide.**



REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL

(1) Remove the oil pan mounting bolts.
(2) Knock the special tool between the oil pan and cylinder block as shown in the illustration.
(3) Tapping the side of the special tool, slide the tool along the oil pan/cylinder block seal and thus remove the oil pan.

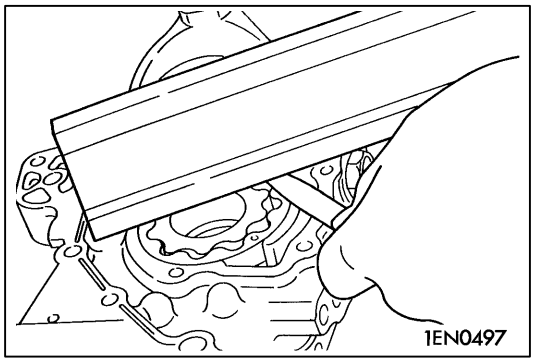


INSPECTION

1. OIL PUMP

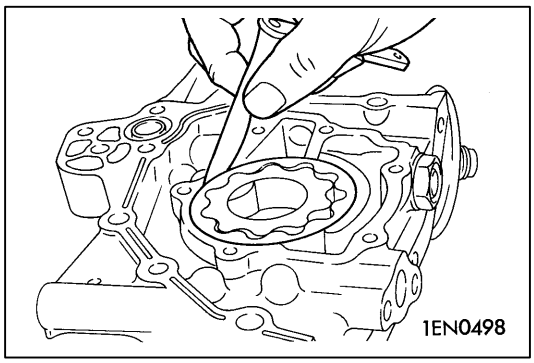
(1) Fit the rotor into the front case.
(2) Check the tip clearance using a thickness gauge.

Standard value: 0.03 – 0.08 mm



(3) Check the side clearance using a straight edge and thickness gauge.

Standard value: 0.04 – 0.10 mm



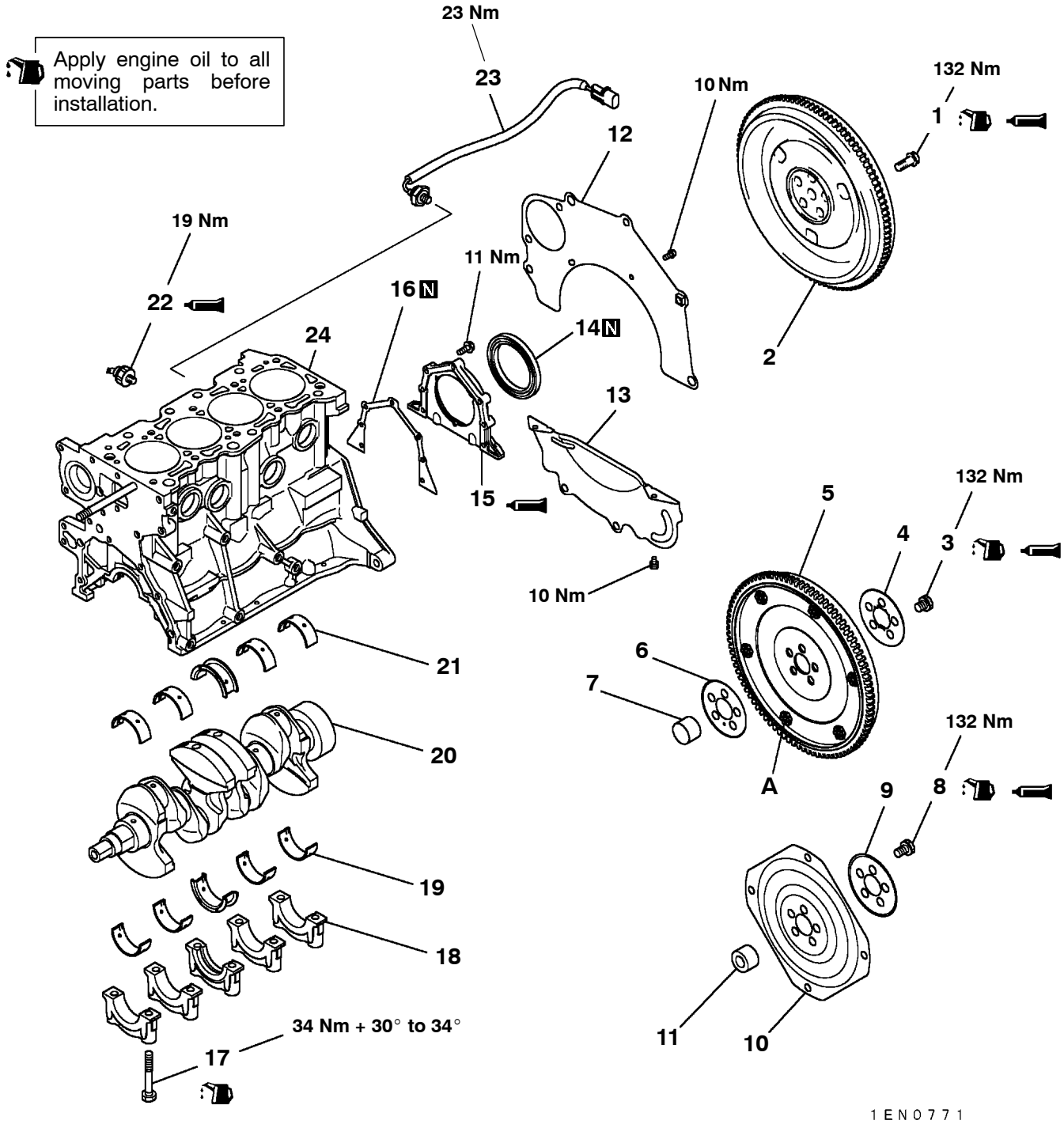
(4) Check the body clearance using a thickness gauge.

Standard value: 0.10 – 0.18 mm

Limit: 0.35 mm

12. CRANKSHAFT AND CYLINDER BLOCK

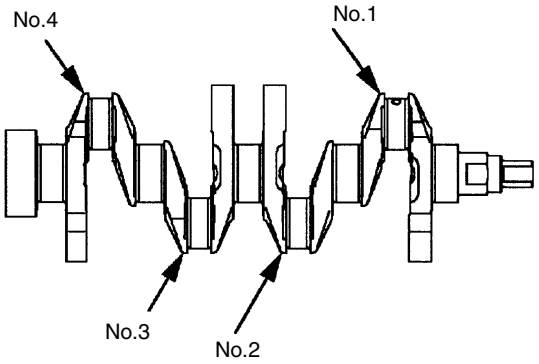
REMOVAL AND INSTALLATION <EXCEPT GDI>



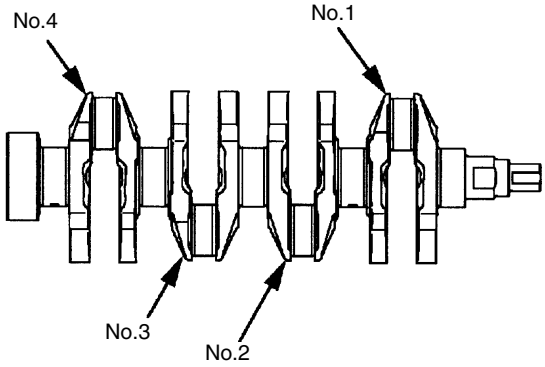
►E◄ CONNECTING ROD BEARING INSTALLATION

4G13, 4G15

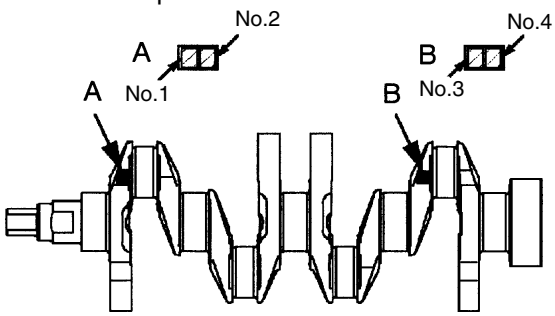
Color code positions

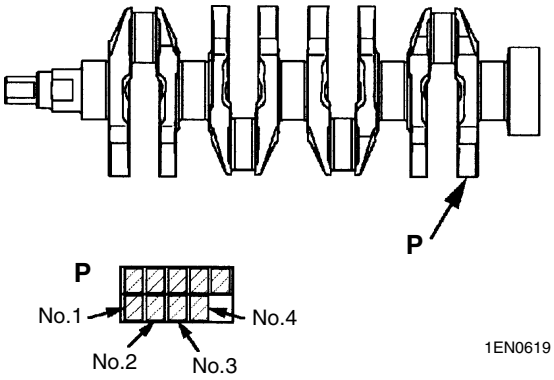


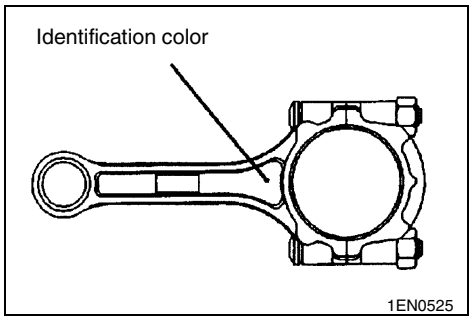
4G18



Identification mark positions



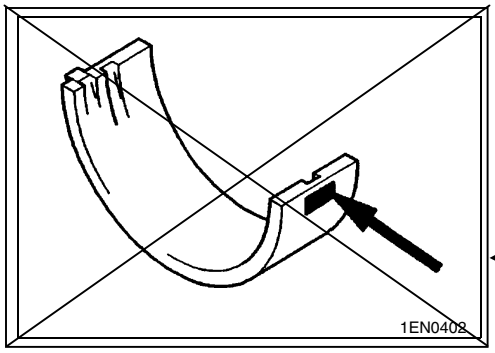




(1) Select bearings according to crankshaft and connecting rod identification marks or color codes, referring to the following table.

Crankshaft identification mark	Connecting rod identification color	Bearing identification mark	**or color**
I Yellow **<Incorrect>** **or** **<Correct>**	White	1	**or Yellow**
	None	1	**or Yellow**
	Yellow	2	**or None**
II None **<Incorrect>** **or** **<Correct>**	White	1	**or Yellow**
	None	2	**or None**
	Yellow	3	**or Blue**
III White **<Incorrect>** **or** **<Correct>**	White	2	**or None**
	None	3	**or Blue**
	Yellow	3	**or Blue**

<Added>



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To be replaced by the one on following page.