CURSOR SERIES

Industrial application

C78

C78 ENT

This publication describes the characteristics, data and correct methods for repair operations on each component of the vehicle.

If the instructions provided are followed and the specified equipment is used, correct repair operations in the programmed time will be ensured, safeguarding against possible accidents.

Before starting to perform whatever type of repair, ensure that all accident prevention equipment is available and efficient.

All protections specified by safety regulations, i.e.: goggles, helmet, gloves, boot, etc. must be checked and worn.

All machining, lifting and conveying equipment should be inspected before use.

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C78 ENT Series

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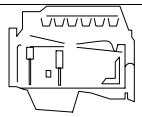
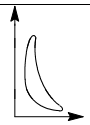
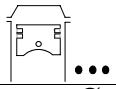
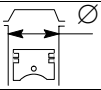
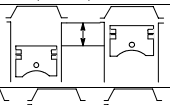
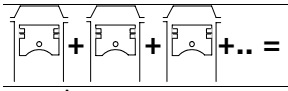
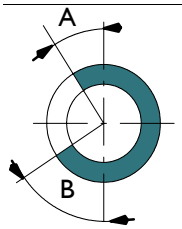
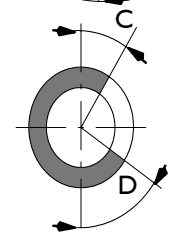
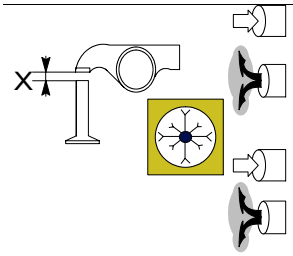
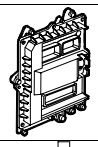
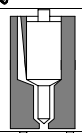
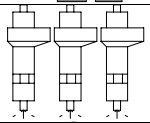
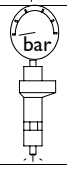
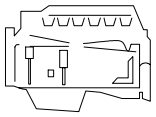
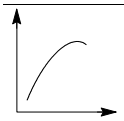
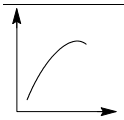
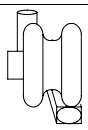
CORRESPONDENCE BETWEEN TECHNICAL CODE AND COMMERCIAL CODE

Technical Code	Commercial Code
F2BE0687A*B101	C78 ENT

SPECIFICATIONS

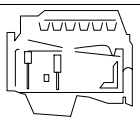
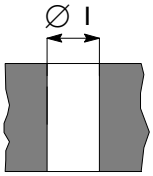
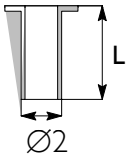
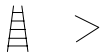
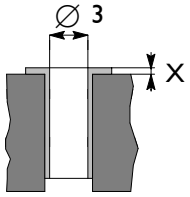
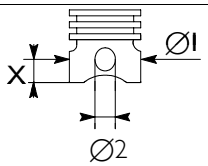
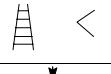
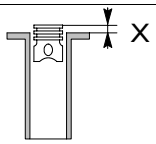
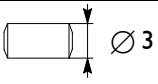
	Type		C78 ENT SERIES
	Cycle		4-stroke Diesel engine
	Fuel feed		Turbocharged
	Injection		Direct
	No. of cylinders		6 in line
	Bore	mm	115
	Stroke	mm	125
	Total displacement	cm^3	7790
 	VALVE TIMING		
	opens before T.D.C.	A	17°
	closes after B.D.C.	B	31°
	opens before B.D.C.	D	48°
	closes after T.D.C.	C	9°
	For timing check		
	X	mm	-
		mm	-
	Running		
	X	mm	0.40 to 0.50
		mm	0.40 to 0.50
	FEED		Through fuel pump - filters
	Injection type: Bosch		With electronically regulated injectors PDE 30 pump injectors controlled by overhead camshaft MS6.2 ECU
	Nozzle type		–
	Injection order		1 - 4 - 2 - 6 - 3 - 5
	Injection pressure	bar	1500
	Injector calibration	bar	290 ± 12

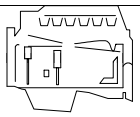
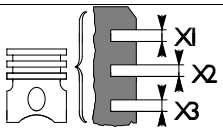
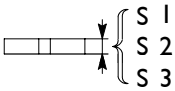
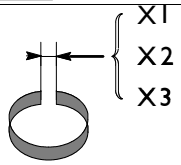
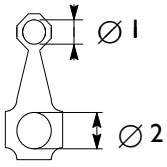
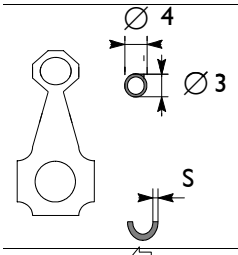
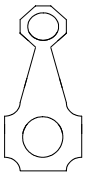
C78 ENT Series engines			TECHNICAL CODE
	Type		F2BE0687A*B101
ϱ	Compression ratio		16 ± 0.8
 	Max. output	kW (HP) rpm	220 (300) 2200
 	Max. torque	Nm (kgm) rpm	1250 (125) 1200
	Loadless engine idling	rpm	900
	Loadless engine peak	rpm	2430
	Bore x stroke Displacement	mm cm^3	115 x 125 7790
	**SUPERCHARGING** Turbocharger type		Intercooler Direct injection HX40W
	**LUBRICATION** Oil pressure (warm engine) - idling - peak rpm	 bar bar	Forced by gear pump, relief valve single action oil filter 4 5
	COOLING Water pump control **Thermostat** - start of opening	 °C	Liquid Through belt 85

Data, features and performances are valid only if the technician fully complies with all the installation requirements provided by Iveco Motors.

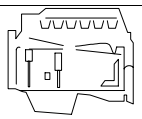
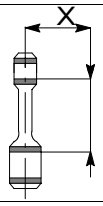
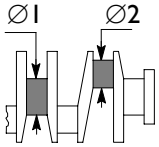
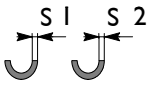
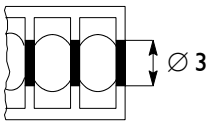
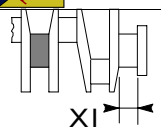
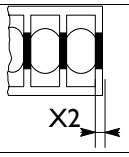
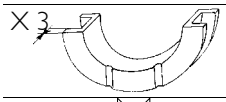
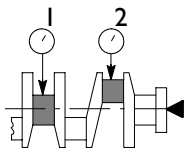
Furthermore, the use of the unit after overhaul showd conform to the original specified power and engine rev/min for which the engine has been designed.

ASSEMBLY CLEARANCE DATA

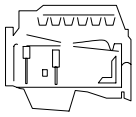
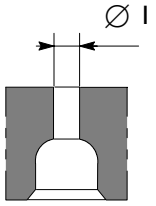
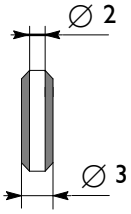
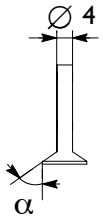
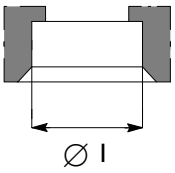
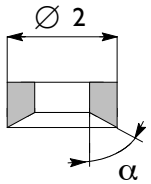
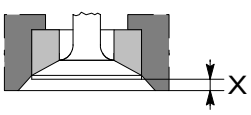
	Type	C78 ENT SERIES
CYLINDER BLOCK AND CRANK MECHANISM COMPONENTS		mm
	Cylinder sleeve bore Ø 1 upper lower	 130.200 to 130.225 128.510 to 128.535
	Cylinder liners: outer diameter: Ø 2 upper lower length L	 130.161 to 130.186 128.475 to 128.500
	Cylinder sleeve - crankcase bore upper lower	 0.014 to 0.064 0.010 to 0.060
IVECO PARTS 	Outside diameter Ø 2	
 * Available dia. class	Cylinder sleeve inside diameter Ø3 A* inside diameter Ø3 B* Protrusion X	 115.000 to 115.012 115.010 to 115.022 0.035 to 0.065
	Pistons: measuring dimension X outside diameter Ø 1 A• outside diameter Ø 1 B•• outside diameter Ø 2	 18 114.888 to 114.900 114.898 to 114.910 46.010 to 46.018 114.898 to 114.910
• Class A pistons supplied as spares. •• Class B pistons are fitted in production only and are not supplied as spares.		
	Piston - cylinder sleeve	0.100 to 0.124
IVECO PARTS 	Piston diameter Ø 1	–
	Pistons protrusion X	-
	Gudgeon pin Ø 3	45.994 to 46.000
	Gudgeon pin - pin housing	0.010 to 0.024

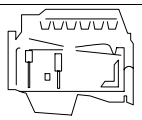
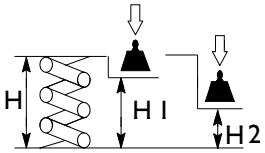
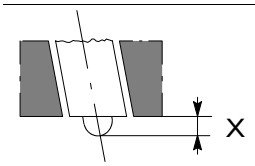
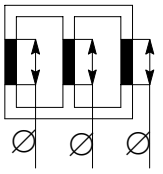
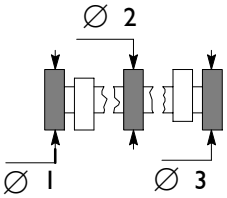
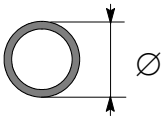
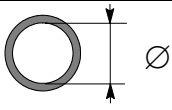
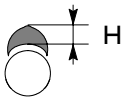
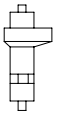
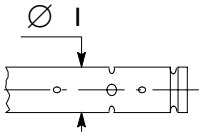
	Type	C78 ENT SERIES
CYLINDER BLOCK AND CRANK MECHANISM COMPONENTS		mm
	Piston ring grooves X1*	2.71 to 2.74
	X2	2.55 to 2.57
	X3	4.02 to 4.04
	*measured on Ø of 112 mm	
	Piston rings: trapezoidal seal S1*	2.575 to 2.595
	lune seal S2	2.470 to 2.490
	milled scraper ring with slits and internal spring S3	3.975 to 3.990
	*measured on Ø of 112 mm	
	Piston rings - grooves 1	0.115 to 0.165
	2	0.060 to 0.100
	3	0.030 to 0.065
IVECO PARTS 	Piston rings	–
	Piston ring end gap in cylinder liners:	
	X1	0.35 to 0.50
	X2	0.70 to 0.95
	X3	0.30 to 0.60
	Small end bush housing Ø1	49.975 to 50.000
	Big end bearing housing Ø2	77.000 to 77.030
	Selection classes Ø2 1	77.000 to 77.010
	2	77.010 to 77.020
	3	77.020 to 77.030
	Small end bush diameter	
	outside Ø4	50.055 to 50.080
	inside Ø3	46.015 to 46.030
	Big end bearing shell S	
	Red	2.000 to 2.010
	Green	2.011 to 2.020
	Yellow●	2.021 to 2.030
	Small end bush - housing	0.055 to 0.105
	Piston pin - bush	0.015 to 0.036
IVECO PARTS 	Big end bearing shells	0.127 - 0.254 - 0.508
	Connecting rod weight	g.
	Class A	2890 to 2920
	B	2921 to 2950
	C	2951 to 2980

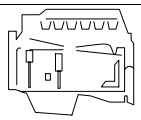
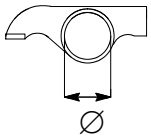
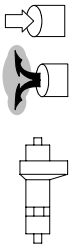
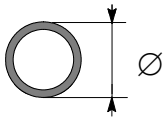
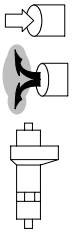
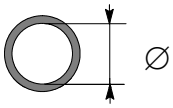
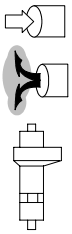
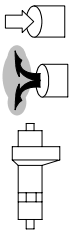
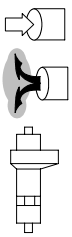
● Fitted in production only and not supplied as spares

	Type	C78 ENT SERIES
CYLINDER BLOCK AND CRANK MECHANISM COMPONENTS		mm
	Measuring dimension X	125
	Max. connecting rod axis misalignment tolerance —	0.08
	Main journals Ø1	
	- nominal	82.910 to 82.940
	- class 1	82.910 to 82.919
	- class 2	82.920 to 82.929
	- class 3	82.930 to 82.940
	Crankpins Ø2	
	- nominal	72.915 to 72.945
	- class 1	72.915 to 72.924
	- class 2	72.925 to 72.934
	- class 3	72.935 to 72.945
	Main bearing shells S1	
	Red	3.000 to 3.010
	Green	3.011 to 3.020
	Yellow●	3.021 to 3.030
	Big end bearing shells S2	
	Red	2.000 to 2.010
	Green	2.011 to 2.020
	Yellow●	2.021 to 2.030
	Main bearing housings Ø3	
	- nominal	89.000 to 89.030
	- class 1	89.000 to 89.009
	- class 2	89.010 to 89.019
	- class 3	89.020 to 89.030
	Bearing shells - main journals	0.040 to 0.098
	Bearing shells - big ends	0.035 to 0.093
	Main bearing shells	0.127 - 0.254 - 0.508
	Big end bearing shells	0.127 - 0.254 - 0.508
	Main journal, thrust bearing X1	39.96 to 40.04
	Main bearing housing, thrust bearing X2	32.94 to 32.99
	Thrust washer halves X3	3.38 to 3.43
	Driving shaft shoulder	0.11 to 0.34
	Alignment — 1 - 2	≤ 0.05
	Ovality ⬭ 1 - 2	_0.010
	Taper ⟋ 1 - 2	0.010

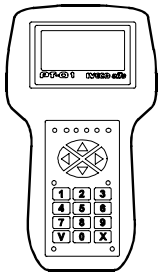
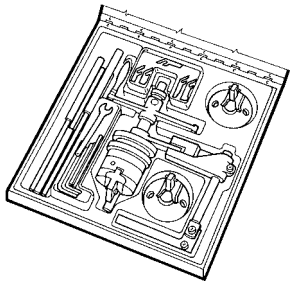
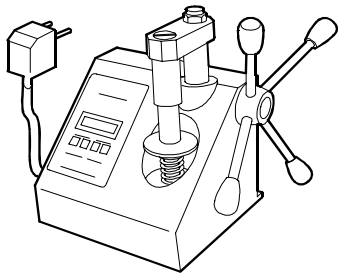
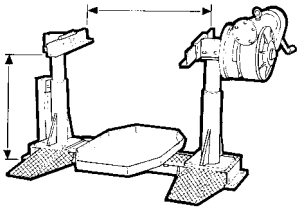
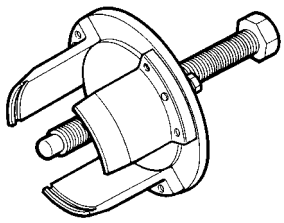
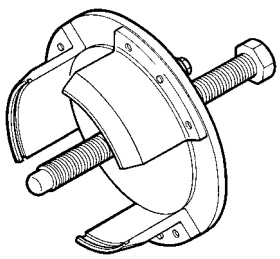
● Fitted in production only and not supplied as spares

	Type	C78 ENT SERIES
CYLINDER HEADS - VALVE TRAIN		mm
	Valve guide housings in cylinder head Ø1	12.980 to 12.997
	Valve guide Ø 2 Ø 3	8.023 to 8.038 13.012 to 13.025
	Valve guides - housings in the cylinder heads	0.015 to 0.045
	Valve guide	–
	Valves: Ø 4 α Ø 4 α	7.970 to 8.985 60° 30′ ± 7′ 30″ 7.970 to 8.985 45° + 15′
	Valve stem and its guide	0.038 to 0.068
	Housing in head for valve seat Ø1 Ø1	41.985 to 42.020 40.985 to 41.020
	Outside diameter of valve seat; angle of valve seat in cylinder head: Ø 2 α Ø 2 α	42.060 to 42.075 60° - 30′ 41.060 to 41.075 45° - 30′
	Recessing of valve X	0.5 to 0.8 1.6 to 1.9
	Between valve seat and head	0.040 to 0.090

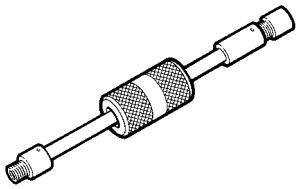
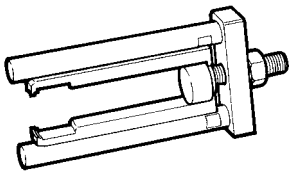
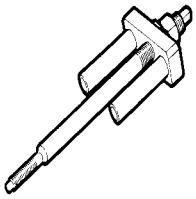
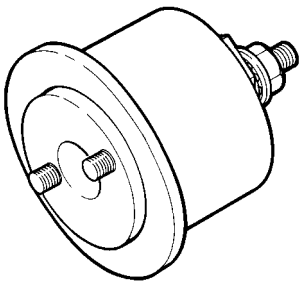
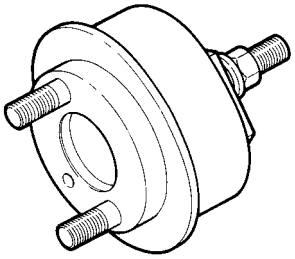
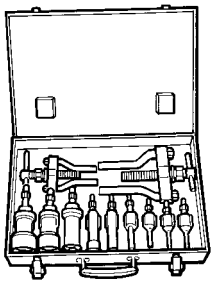
	Type	C78 ENT SERIES
CYLINDER HEADS - VALVE TRAIN		mm
	Valve outside spring height: free height H under a load of: N 454 ± 22 H1 N 840 ± 42 H2	 62.6 48.5 36.5
	Injector protrusion X	0.7
	Camshaft bush housing fitted in the cylinder head: 1 ⇒ 7 Ø	80.000 to 80.030
	Camshaft journal diameter: 1 ⇒ 7 Ø	75.924 to 75.940
	Camshaft bushing outer diameter: Ø	80.090 to 80.115
	Camshaft bushing inner diameter: Ø	75.990 to 76.045
	Bushings and housings in engine block	0.060 to 0.115
	Bushings and journals	0.050 to 0.121
	Cam lift:   	 8.07 7.63 8.80 to 8.82
	Rocker shaft Ø 1	37.984 to 38.000

	Type	C78 ENT SERIES
CYLINDER HEADS - VALVE TRAIN		mm
	Bushing housing in rocker arms 	41.000 to 41.016 41.000 to 41.016 42.000 to 42.016
	Bushing outer diameter for rocker arms: 	41.097 to 41.135 41.097 to 41.135 42.066 to 42.091
	Bushing inner diameter for rocker arms: 	38.025 to 38.041 38.025 to 38.041 38.015 to 38.071
	Between bushings and housings 	0.081 to 0.135 0.081 to 0.135 0.050 to 0.091
	Between rocker arms and shaft 	0.025 to 0.057 0.225 to 0.057 0.015 to 0.087
TURBOCHARGER		
Type		HOLSET HX40W
End float		–
Radial play		–

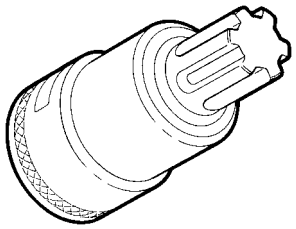
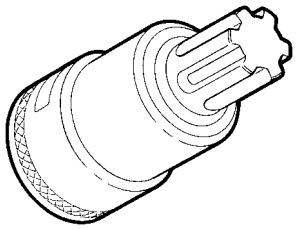
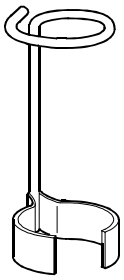
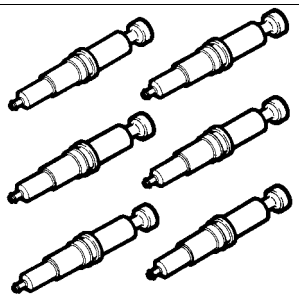
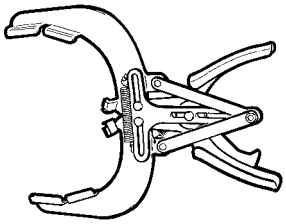
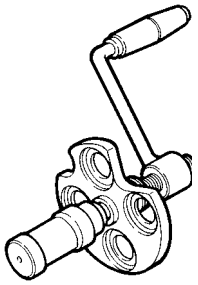
TOOLS

TOOL NO.		DESCRIPTION
8093731		Tester PT01
99305019		Full-optional tool-kit to rectify valve seat
99305047		Equipment for spring load check
99322230		Rotary telescopic stand
99340051		Extractor for crankshaft front gasket
99340052		Extractor for crankshaft rear gasket

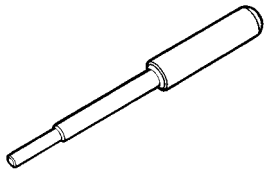
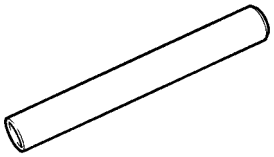
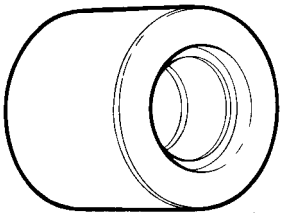
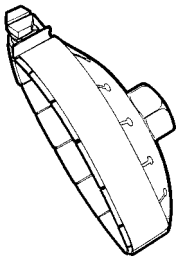
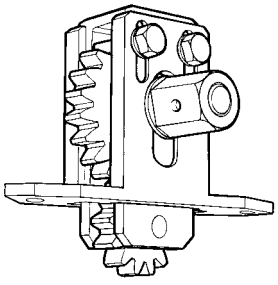
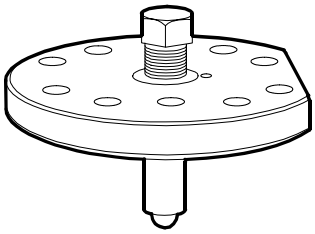
TOOLS

TOOL NO.		DESCRIPTION
99340205		Percussion extractor
99342148		Injector extractor
99342149		Extractor for injector-holder
99346245		Tool to install the crankshaft front gasket
99346246		Tool to install the crankshaft rear gasket
99348004		Universal extractor for 5 to 70 mm internal components

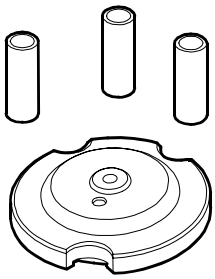
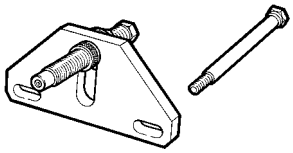
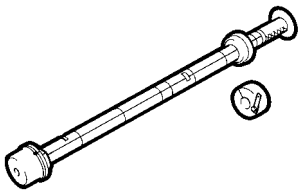
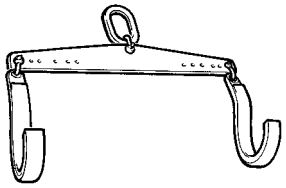
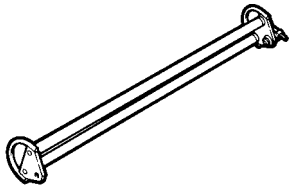
TOOLS

TOOL NO.		DESCRIPTION
99350072		Box wrench for transmission gear support fixing screws
99350074		Box wrench for block junction bolts to the underblock
99360144		Skid retaining tools (12+6) for rocker arm adjusting screws during rocker arm shaft removal/ refitting
99360177		Injector housing plug
99360184		Pincers for removing and refitting circlips and pistons (105-160 mm)
99360264		Tool to take down-fit engine valves

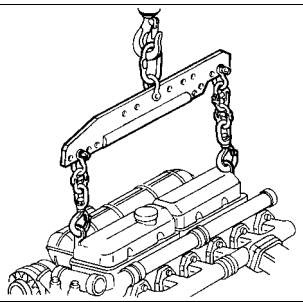
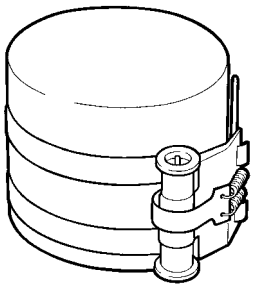
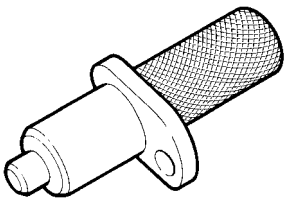
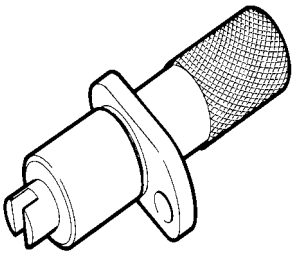
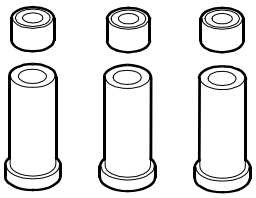
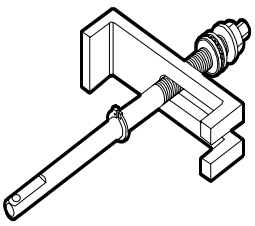
TOOLS

TOOL NO.		DESCRIPTION
99360288		Tool to remove valve guide
99360292		Tool to install gasket on valve guide
99360294		Tool to drive valve guide
99360314		Tool to remove cartridge filters
99360321		Tool to rotate engine flywheel
99360334		Tool for checking cylinder barrel projection.

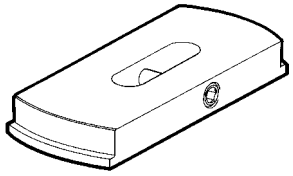
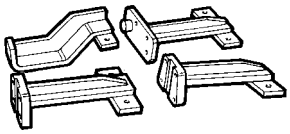
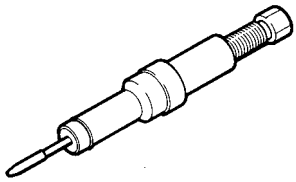
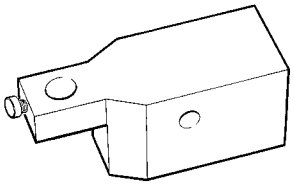
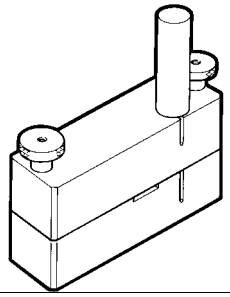
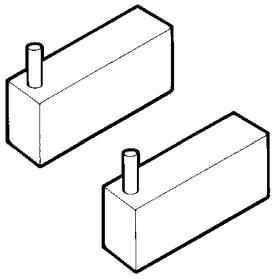
TOOLS

TOOL NO.		DESCRIPTION
99360335		Cylinder barrel compression cap (to be used with 99360334)
99360351		Tool to stop engine flywheel
99360487		Tool to take down and fit back camshaft bushes
99360500		Tool to lift crankshaft
99360551		Bracket to take down and fit engine flywheel
99360558		Tool to lift and transport rocker shaft

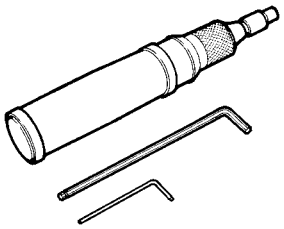
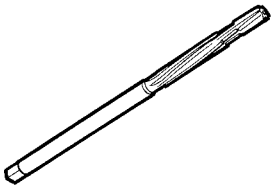
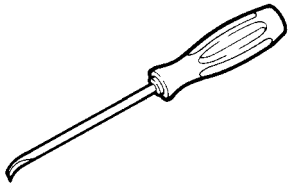
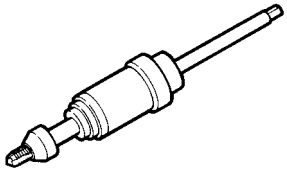
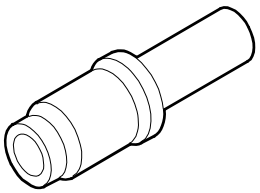
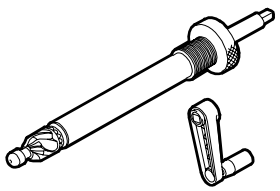
TOOLS

TOOL NO.		DESCRIPTION
99360585		Balance for lifting and handling engine
99360605		Belt to insert piston in cylinder liner (60 - 125 mm)
99360612		Engine flywheel timing pin
99360613		Tool for timing of phonic wheel on timing gear
99360703		Tool to stop cylinder liners
99360706		Tool to extract cylinder liners

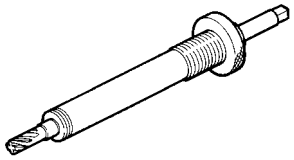
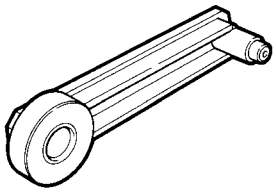
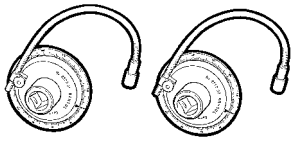
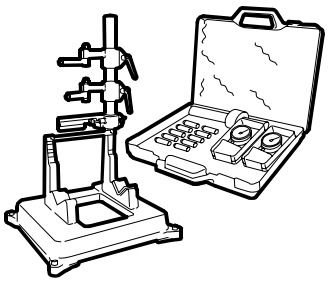
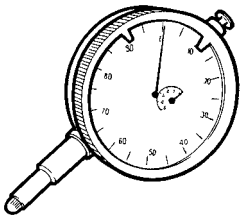
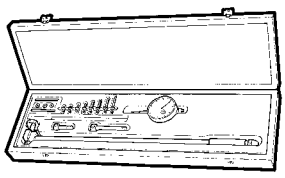
TOOLS

TOOL NO.		DESCRIPTION
99360724		Tool to extract the cylinder liners (to be used with 99360723)
99361035		Brackets fixing the engine to rotary stand 99322230
99365054		Tool for injector holder heading
99370415		Tool to detect cylinder liner projections (use with 99395603)
99378100		Tool for printing engine identification plates (to be used with special punches)
99378101 * **99378102 •** **99378105 ■** **99378106 ▲**		Punches (**A * - B •** - **E ■** - **F ▲**) for printing engine identification plates (to be used with 99378100)

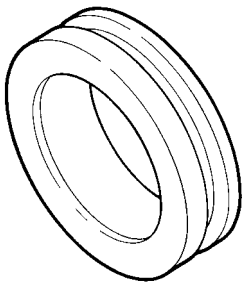
TOOLS

TOOL NO.		DESCRIPTION
99389834		Dynamometric screwdriver to calibrate screws for injector solenoid valve
99390310		Valve guide sleeker
99390772		Tool to remove residues from injector holder
99390804		Tool to thread injector holders to be extracted
99394014		Guide bush (to be used with 99394041 or 99394043)
99394041		Cutter to rectify injector holder housing (to be used with 99394015)

TOOLS

TOOL NO.		DESCRIPTION
99394043		Reamer to rectify injector holder lower side (to be used with 99394015)
99395215		Gauge for centre distance check between camshaft and idle gear
99395216		Measuring pair for angular tightening with 1/2" and 3/4" square couplings
99395363		Complete square to check connecting rod squaring
99395603		Dial gauge (0 - 5 mm)
99395687		Reaming gauge (50-178 mm)

TOOLS

TOOL NO.		DESCRIPTION
99396033		Centering ring of crankshaft front cap