FI SERIES

Vehicle application

S23

S23 ENT C

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.

Publication edited by
Iveco Motors
Iveco SpA
PowerTrain
Mkt. Advertising & Promotion
Viale dell'Industria, 15/17
20010 Pregnana Milanese
Milano (Italy)
Print **P1D32S001GB/W** - 2nd Ed. 02.2005
S23 ENT C Series

Produced by:

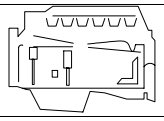
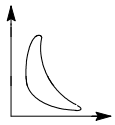
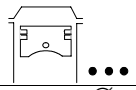
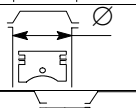
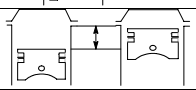
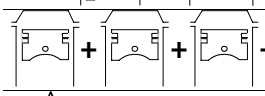
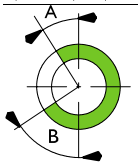
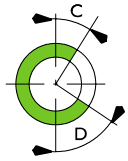
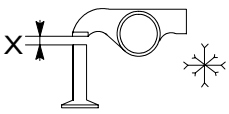
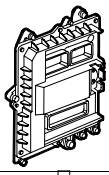
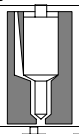
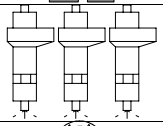
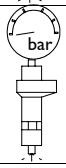
SATIZmsx INTERNATIONAL

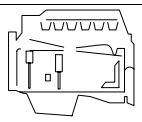
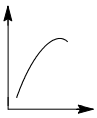
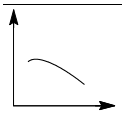
B.U. TECHNICAL PUBLISHING
Iveco Technical Publications
Lungo Stura Lazio, 15/19
10156 Turin - Italy

CORRESPONDENCE BETWEEN TECHNICAL CODE AND COMMERCIAL CODE

Technical Code	Commercial Code
F1AE0481B*A0..	S23 ENT C
F1AE0481B*B0..	S23 ENT C

SPECIFICATIONS

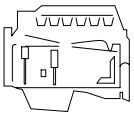
	Type		S23 ENT C SERIES
	Cycle		Four-stroke diesel engine
	Power		Supercharged with intercooler
	Injection		Direct
	Number of cylinders		4 in-line
	Bore	mm	88
	Stroke	mm	94
	Total displacement	cm^3	2300
 	**TIMING**		
	start before T.D.C. end after B.D.C.	A B	14° 27°
	start before B.D.C. end after T.D.C.	D C	54° 10°
	Checking timing		
	X	mm	-
	X	mm	-
	Checking operation		
	X	mm	0.20 to 0.30
	X	mm	0.45 to 0.55
	**FUEL FEED**		
	Injection Type:	 Bosch	high pressure common rail EDC16
	Nozzle type		Injectors
	Injection sequence		1 - 3 - 4 - 2
	Injection pressure	bar	1600

S23 ENT C Series engines			TECHNICAL CODE
	Type		**F1AE0481*B...**
ϱ	Compression ratio		18
 	Maximum power	kW (HP) rpm	85 (116) 3000 ÷ 3900
 	Maximum torque	kW (HP) rpm	270 (27.5) 1800 ÷ 2800
	Slow running of engine with no load	rpm	800
	Fast idling speed of engine with no load	rpm	4600
	Pressure at T.D.C.	*bar	20 ÷ 26
	Minimum permissible pressure at T.D.C.	*bar	16
	Bore x stroke Displacement	mm cm^3	88 x 94 2300
	TURBOCHARGING Turbocharger type		With intercooler KKK K03-2072-EDC 5.68
Turbocharger shaft radial play			-
Turbocharger shaft end float			-
Maximum stroke of pressure relief valve opening		mm	3.5 ±0.5
Pressure corresponding to maximum stroke:		bar	1.5 ±0.002
	LUBRICATION		forced by gear pump, pressure relief valve, oil filter with integral cartridge with total filtering
 	Oil pressure with engine hot (100°C ±5°C): at idling speed at top speed	 bar bar	 ≥0.6 4
	COOLING		by centrifugal pump, thermostat for adjustment, coolant temperature, fan with electromagnetic coupling, radiator, heat exchanger
	Water pump control: Thermostat: start of opening:		by belt N. I. 82 ±2 °C

(*) The pressure is measured by setting the engine turning with the aid of just the starter motor, with an oil temperature of 40 – 50°C.

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

Furthermore, the users assembled by the setter shall always be in conformance to couple, power and number of turns based on which the engine has been designed.

S23 ENT C Series engines			TECHNICAL CODE
	Type		**F1AE0481 B**
	FLUIDS		
	Capacity:		
	engine sump		
	at minimum level	liters	3
		kg	2.65
	engine sump		
	at maximum level	litres	4.3
 Urania Daily Urania LD 5		kg	3.78
	quantity in circulation in cartridge filter and heat exchanger		
		litres	1.4
		kg	1.23
	quantity of oil for first filling	liters	5.7
		kg	5.02

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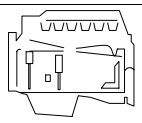
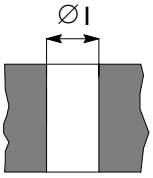
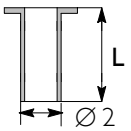
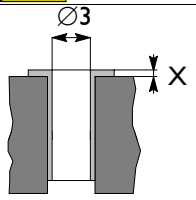
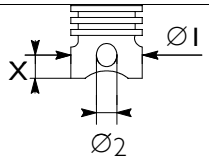
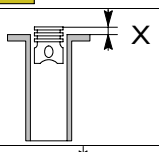
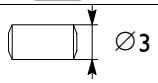
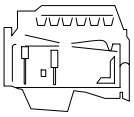
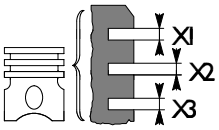
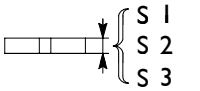
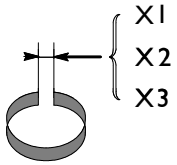
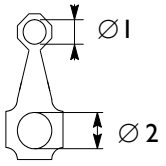
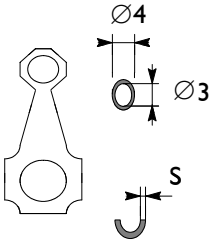
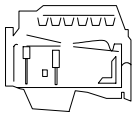
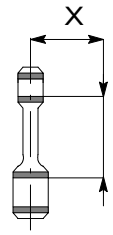
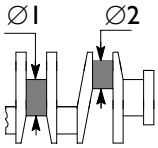
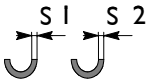
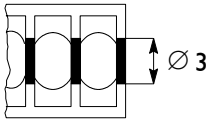
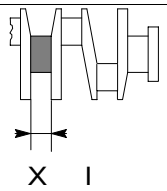
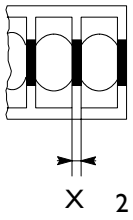
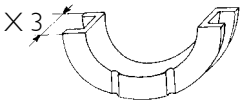
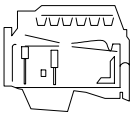
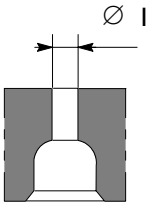
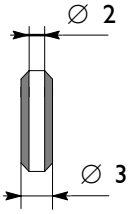
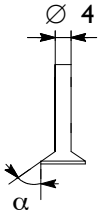
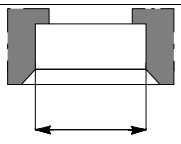
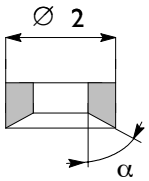
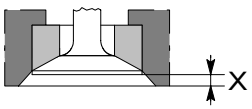
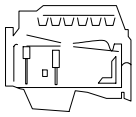
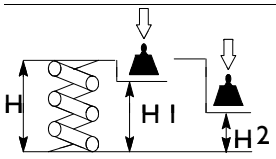
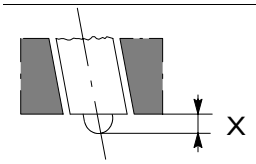
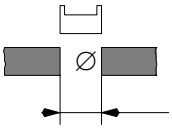
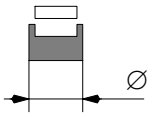
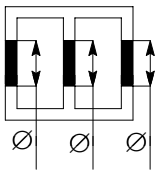
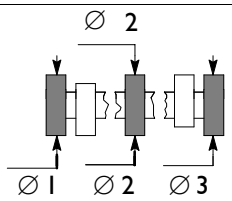
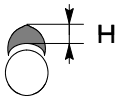
ASSEMBLY DATA – CLEARANCES

	Type	S23 ENT C SERIES
CYLINDER ASSEMBLY AND CRANK MEMBERS		
	Cylinder liners: ∅ 1	88.002 ÷ 88.022
	Cylinder liners: outside diameter ∅ length L	- - -
	Cylinder liners – crankcase seats (interference)	-
	Outside diameter ∅ 2	-
	Cylinder liners: (protrusion from bottom of crankcase) inside diameter ∅ 3	- -
	Pistons: supplied as spares type measurement X outside diameter ∅ 1 seat for pin ∅ 2	MAHLE MONDIAL 45.5 87.832 ÷ 87.846 31.003 ÷ 31.009
	Piston – cylinder liners	0.156 ÷ 0.190
	Piston diameter ∅ 1	0.4
	Piston protrusion from crankcase X	0.3 ÷ 0.6
	Piston gudgeon pin ∅ 3	30.990 ÷ 30.996
	Piston gudgeon pin – pin seat	0.07 ÷ 0.019

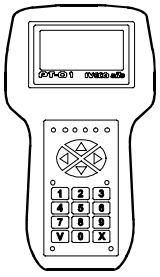
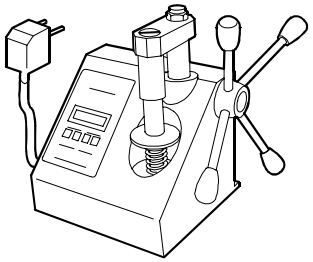
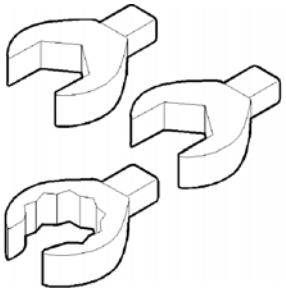
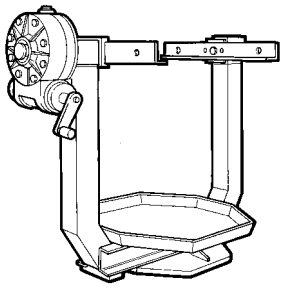
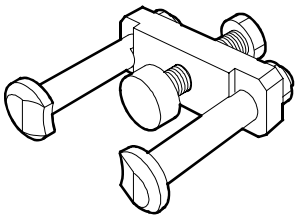
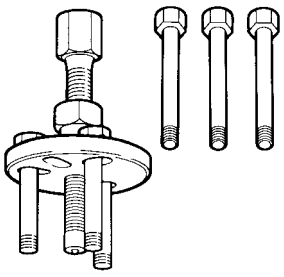
	Type	S23 ENT C SERIES
CYLINDER ASSEMBLY AND CRANK MEMBERS		mm
	Type of piston	MAHLE MONDIAL
	Piston ring slots X1*	2.200 ÷ 2.230
	X2	2.050 ÷ 2.070
	X3	2.540 ÷ 2.560
	* measured on Ø of 85 mm	
	Piston rings: S1*	2.068 ÷ 2.097
	S2	1.970 ÷ 1.990
	S3	2.470 ÷ 2.490
	* measured on Ø of 85 mm	
	Piston rings – slots 1	0.103 ÷ 0.162
	2	0.060 ÷ 0.100
	3	0.050 ÷ 0.090
	Piston rings	0.4
	Piston ring end opening in cylinder liner:	
	X1	0.20 ÷ 0.35
	X2	0.60 ÷ 0.80
	X3	0.25 ÷ 0.50
	Small end bushing seat Ø 1	34.460 ÷ 34.490
	Connecting rod bearing seat* Ø 2	62.833 ÷ 62.841
	* connecting rod supplied as spare part	
	Small end bushing diameter	
	outside Ø 4	34.560 ÷ 34.585
	inside Ø 3	31.010 ÷ 31.020
	Big end bearing shells supplied as spare part S	-
	Small end bushing – seat (interference)	0.07 ÷ 0.125
	Piston gudgeon pin – bushing	0.014 ÷ 0.030
	Big end bearing shells	0.254 - 0.508

	Type	S23 ENT C SERIES
CYLINDER ASSEMBLY AND CRANK MEMBERS		mm
	Measurement X Maximum error on alignment of connecting rod axes =	125 0.09
 	Main journals Ø 1 No. 1-2-3-4 No. 5 Crankpins Ø 2 Main bearing shells S1* Big end bearing shells S2* * supplied as spare parts	 71.182 ÷ 71.208 76.182 ÷ 76.208 59.015 ÷ 59.038 2.165 ÷ 2.174 1.883 ÷ 1.892
	Main bearing housings Ø 3 No. 1-2-3-4 No. 5	 75.588 ÷ 75.614 80.588 ÷ 80.614
	Bearing shells - main journals	0.032 ÷ 0.102
	Bearing shells – crankpins	0.035 ÷ 0.083
	Main bearing shells Big end bearing shells	0.254 ÷ 0.508 0.254 ÷ 0.508
	Main journal for shoulder X 1	31.020 ÷ 31.170
	Main bearing housing for shoulder X 2	25.790 ÷ 25.840
	Half thrust washers X 3	30.810 ÷ 30.960
	Crankshaft shoulder	0.060 ÷ 0.260

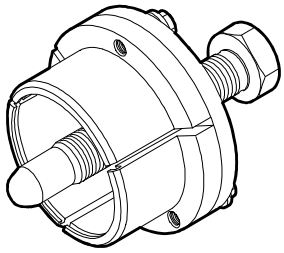
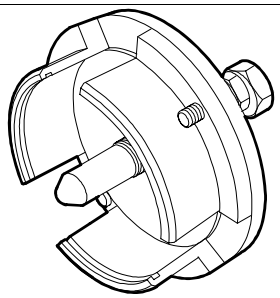
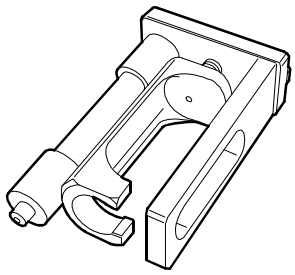
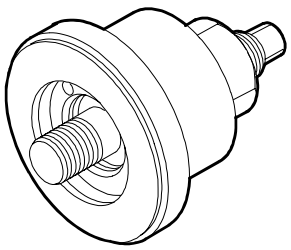
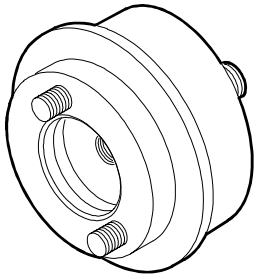
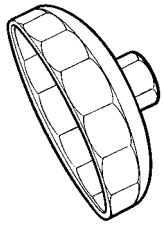
	Type	S23 ENT C SERIES
CYLINDER HEAD – TIMING SYSTEM		mm
	Guide valve seats on cylinder head Ø1	9.980 ÷ 10.000
	Valve guides Ø 2 Ø 3	6.023 ÷ 6.038 10.028 ÷ 10.039
	Valve guides and seats on head (interference)	0.028 ÷ 0.059
IVECO PARTS	Valve guides	0.05 - 0.10 - 0.25
	Valves: Ø 4 α Ø 4 α	5.975 ÷ 5.990 44°45' ±7.5' 5.975 ÷ 5.990 44°45' ±7.5'
	Valve stem and relevant guide	0.033 ÷ 0.063
	Seat on head for valve seat: Ø1 Ø1	31.390 ÷ 31.415 31.390 ÷ 31.415
	Outside diameter of valve seats; angle of valve seats on cylinder head: Ø 2 α Ø 2 α	31.495 ÷ 31.510 44.5° ±5' 31.495 ÷ 31.510 44.5° ±5'
	Recessing X X	0.5 ÷ 0.8 0.5 ÷ 0.8
	Between valve seat and head	0.08 - 0.12 0.08 - 0.12
IVECO PARTS	Valve seats	-

	Type	S23 ENT C SERIES
CYLINDER HEAD – TIMING SYSTEM		mm
	Valve spring height: free spring H under a load of: N243 ± 12 H1 N533 ± 24 H2	 54 45 35
	Injector protrusion X	2.77 ÷ 3.23
	Seats for tappets on cylinder head normal Ø	12.016 ÷ 12.034
	Normal diameter tappets	11.988 ÷ 12.000
	Between tappets and seats	0.016 ÷ 0.046
	Camshaft pin seats in cylinder overhead 1 ⇒ 7 Ø 1 Ø 2 Ø 3	 48.987 ÷ 49.013 46.987 ÷ 47.013 35.987 ÷ 36.013
	Camshaft supporting pins: Ø 1 Ø 2 Ø 3	 48.925 ÷ 48.950 46.925 ÷ 46.950 35.925 ÷ 35.950
	Supporting pins and seats	0.037 ÷ 0.088
	Useful cam height H H	 3.77 4.203

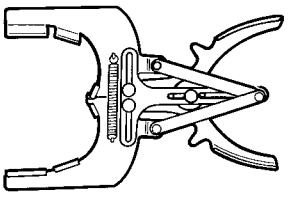
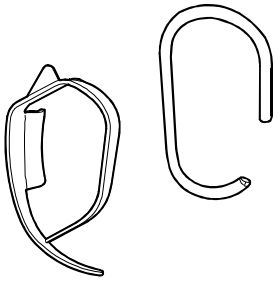
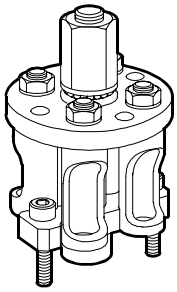
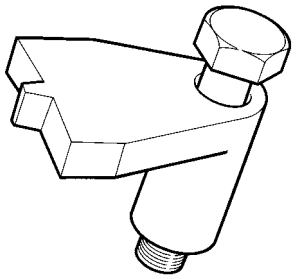
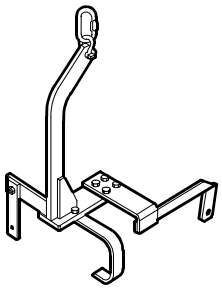
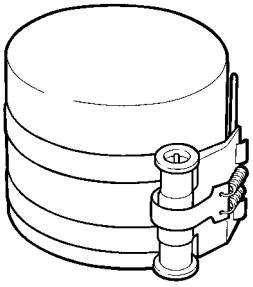
TOOLS

TOOL NO.		DESCRIPTION
8093731		Tester PT01
99305047		Appliance to check spring loads
99317915		Set of six box-type wrenches (14-17-19 mm)
99322205		Rotary telescopic stand for overhauling assemblies (capacity 700 daN, torque 120 daN/m)
99340028		Extractor for camshaft pulley
99340035		High-pressure pump toothed pulley extractor

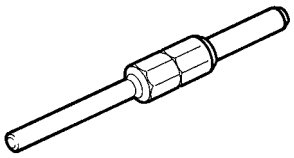
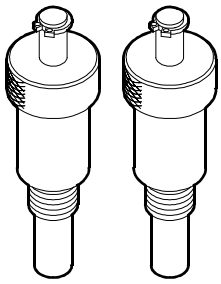
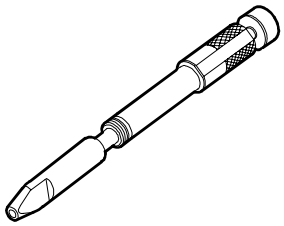
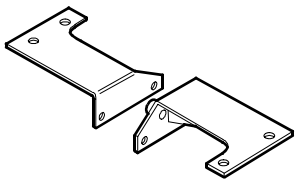
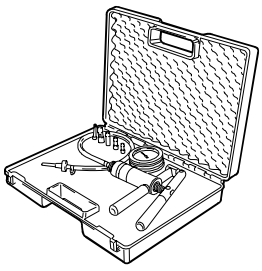
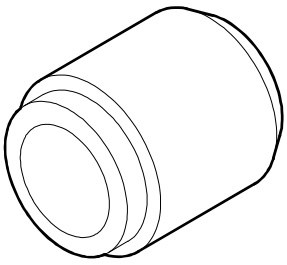
TOOLS

TOOL NO.		DESCRIPTION
99340057		Tool to remove crankshaft front gasket
99340058		Tool to remove crankshaft rear gasket
99342153		Tool to extract injectors
99346254		Keying device for mounting crankshaft front gasket
99346255		Keying device for mounting crankshaft rear gasket
99360076		Tool to remove cartridge filters

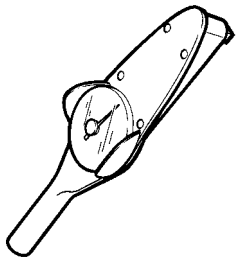
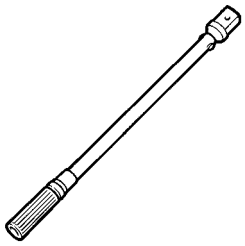
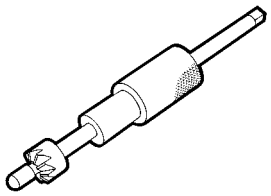
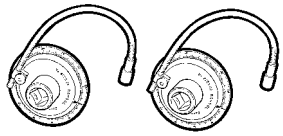
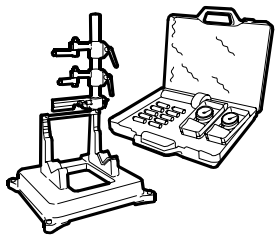
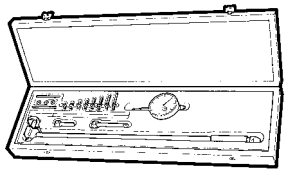
TOOLS

TOOL NO.		DESCRIPTION
99360183		Pliers for mounting rings on engine pistons
99360191		Guide for flexible belt
99360260		Tool for removing and refitting engine valves
99360306		Tool to retain engine flywheel
99360544		Arm for removing and refitting engine
99360605		Band to insert standard and oversized pistons into the cylinders

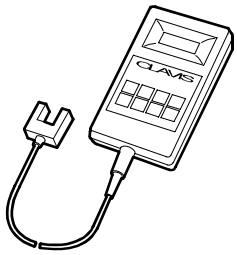
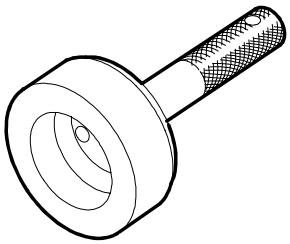
TOOLS

TOOL NO.		DESCRIPTION
99360608		Tool for positioning timing gear
99360614		Tool (2) for camshaft timing
99360615		Tool for crankshaft timing
99361038		Brackets securing engine to rotary stand 99322205
99367121		Manual pump to measure pressure and vacuum
99374458		Keying device for mounting oil seal gasket on camshaft front cover

TOOLS

TOOL NO.		DESCRIPTION
99389819		Torque wrench (0-10 Nm) with square 1/4" connection
99389829		9x12 coupling torque wrench (5-60 Nm)
99394038		Milling cutter to regrind injector seat
99395216		Pair of meters for angular tightening with square 1/2" and 3/4" connection
99395363		Complete square to check for connecting rod distortion
99395687		Bore meter (50 – 178 mm)

TOOLS

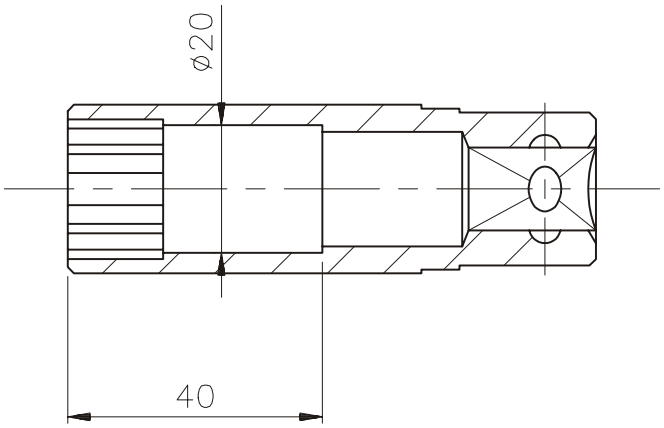
TOOL NO.		DESCRIPTION
99395849		Device for checking belt tension (frequency from 10.0 to 600 Hz)
99396037		Centring ring for crankshaft front gasket cover

EXPERIMENTAL TOOLS

This section shows the working drawings for the experimental tools (S.P.) used in overhauling the engine described in this section, which may be made by the repair shops.

VARIA DA ART. COMMERCIALE USAG cod.235L 1/2" – Ch.19

SOLO PER QUANTO INDICATO

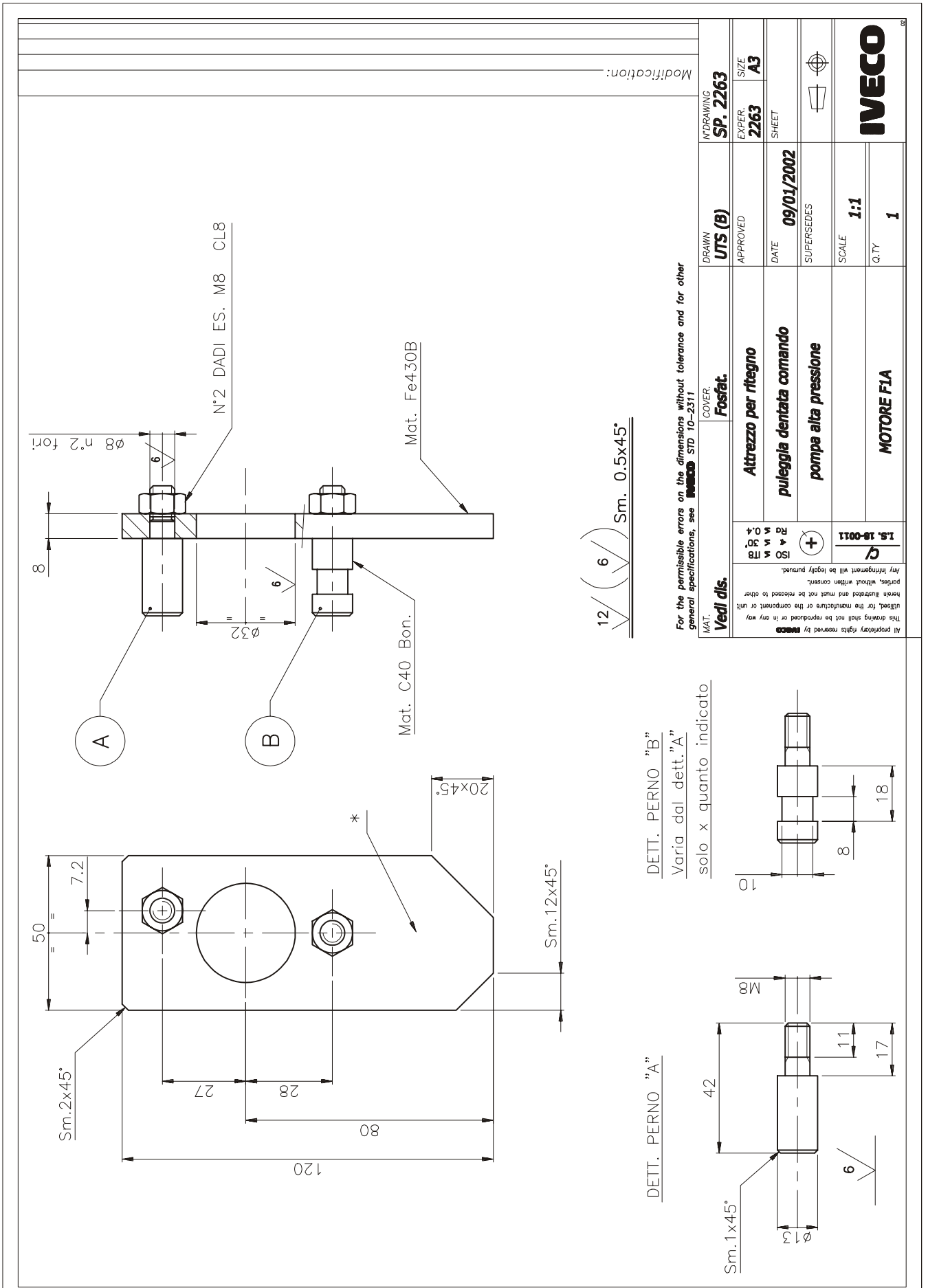


Modification:

For the permissible errors on the dimensions without tolerance and for other general specifications, see **IVECO** *STD 10–2311*

MAT.	COVER.	DRAWN	N°DRAWING
/	/	UTS (B)	SP. 2262

ISO ≤ IT8 ∢ ≤ 30' Ra ≤ 0.4	Chiave poligonale (19mm)	APPROVED	EXPER. 2262	SIZE A4
	per sensore pompa acqua	DATE 19/06/2001	SHEET	
		SUPERSEDES		
C/ I.S. 18-0011		SCALE 1:1	IVECO	
	MOTORE F1A	Q.TY 1		02


Modification:
N°DRAWING SP. 2263
SIZE A3
EXPER. 2263
SHEET
DRAWN UTS (B)
APPROVED
DATE 09/01/2002
SUPERSEDES
SCALE 1:1
Q.TY 1
COVER. Fosfat.
MAT. Vedi dis.
Attrezzo per ritegno puleggia dentata comando pompa alta pressione
MOTORE F1A
I.S. 18-0011
ISO ∢ ITB ∢ 30° Ra ≤ 0,4
For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO STD 10-2311
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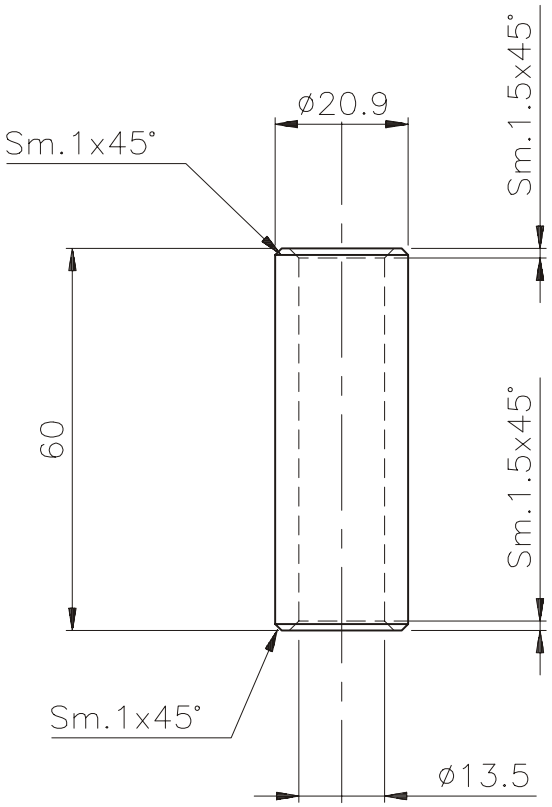
Any infringement will be legally pursued.
IVECO
N°2 DADI ES. M8 CL8
Mat. Fe430B
Mat. C40 Bon.
Ø8 n.2 fori.
Ø32
12 6 Sm. 0.5x45°
DETT. PERNO "B"
Varia dal dett."A"
solo x quanto indicato
DETT. PERNO "A"
Sm.2x45°
Sm.12x45°
Sm.1x45°
20x45°
M8
Ø12

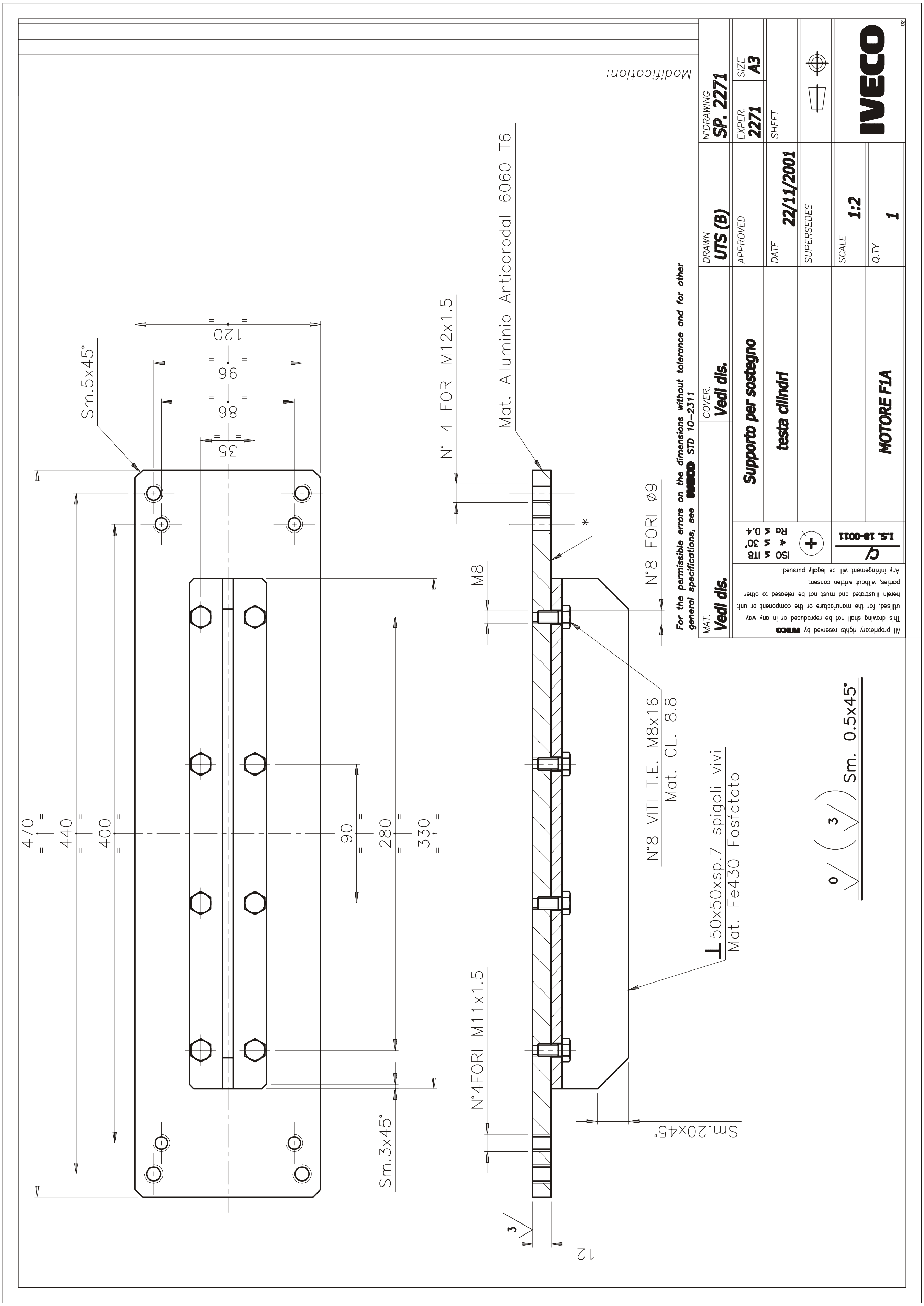


Modification:

For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO *STD 10–2311*

MAT.	COVER.	DRAWN	N°DRAWING
Pom / Nylon	/	UTS (B)	SP. 2264

	Perni di centraggio sovratesta	APPROVED	EXPER. 2264	SIZE A4
ISO ≤ IT8 ∢ ≤ 30' Ra ≤ 0.4	e per piantaggio guarnizione	DATE 19/06/2001	SHEET	
	guida valvole	SUPERSEDES		
C/ I.S. 18-0011		SCALE 1:1	IVECO	
	MOTORE F1A	Q.TY 2		02


Modification:
N°DRAWING SP. 2271
SIZE A3
EXPER. 2271
SHEET
IVECO
DRAWN UTS (B)
APPROVED
DATE 22/11/2001
SUPERSEDES
SCALE 1:2
Q.TY 1
MAT. Vedi dis.
COVER. Vedi dis.
Supporto per sostegno
testa cilindri
MOTORE F1A
For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO STD 10-2311
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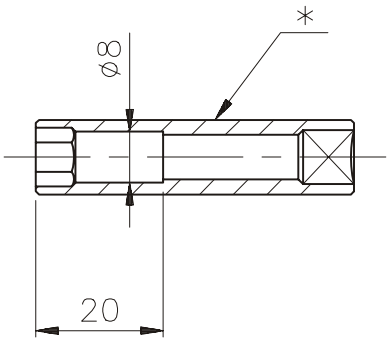
Any infringement will be legally pursued.
I.S. 18-0011
Mat. Alluminio Anticorodal 6060 T6
N° 4 FORI M12x1.5
N°8 FORI Ø9
N°8 VITI T.E. M8x16
Mat. CL. 8.8
⊥50x50xsp.7 spigoli vivi
Mat. Fe430 Fosfatato
Sm. 0.5x45°
Sm.5x45°
Sm.3x45°
Sm.20x45°
N°4FORI M11x1.5
M8
470
440
400
90
280
330
120
96
86
35
12

VARIA DA ART. COMMERCIALE USAG cod.235EL 1/4" – Ch.8

SOLO PER QUANTO INDICATO



6

Sm. 0.5x45°

Modification:

For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO *STD 10–2311*

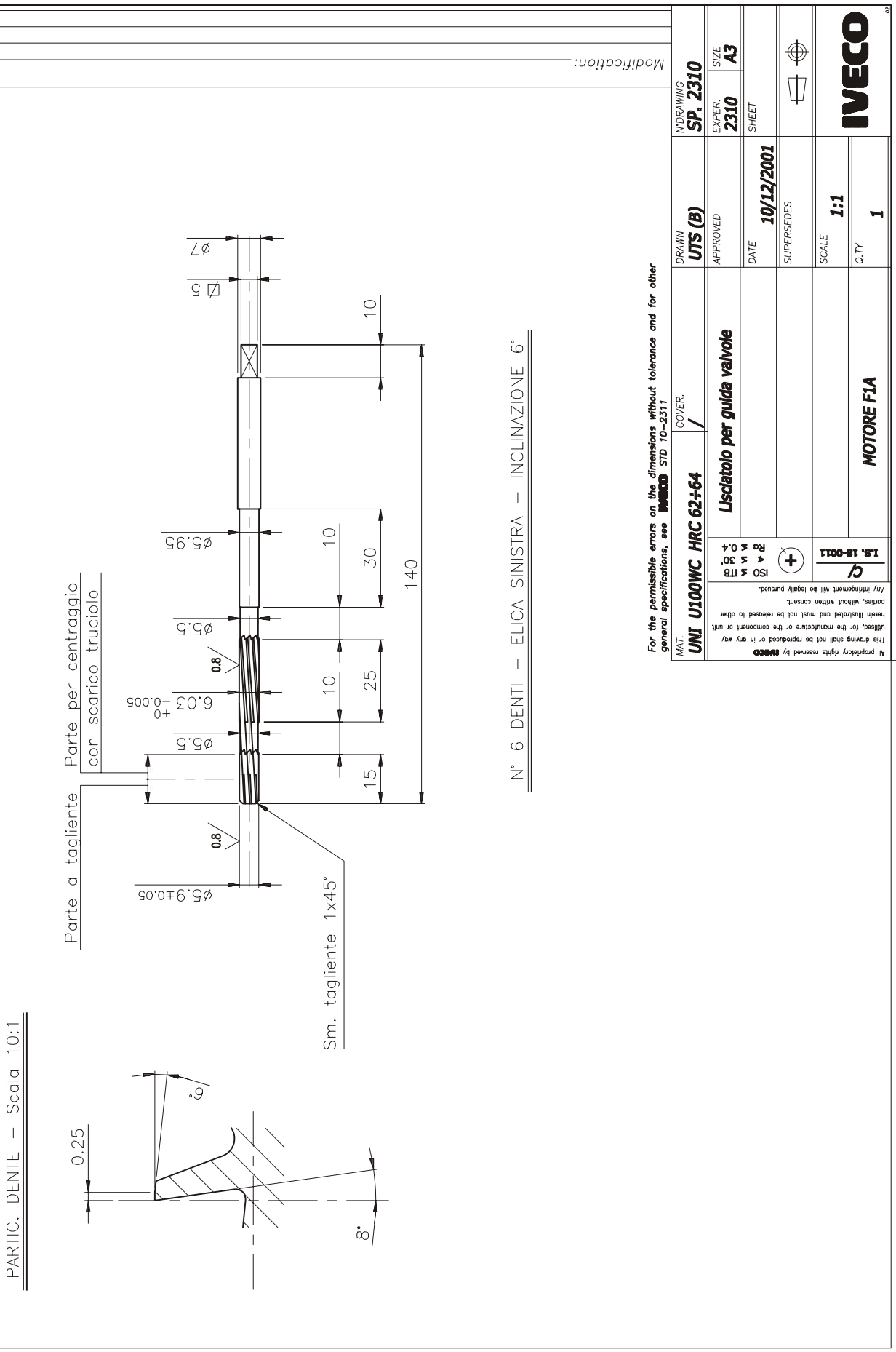
MAT.	COVER.	DRAWN	N°DRAWING
/	/	UTS (B)	SP. 2275

Bussola (8 mm) per montaggio/	APPROVED	EXPER. 2275	SIZE A4
smontaggio candelette	DATE 25/07/2001	SHEET	
	SUPERSEDES		
	SCALE 1:1	IVECO	
MOTORE F1A	Q.TY 1		

ISO ≤ IT8 ≤ 30' Ra ≤ 0.4

C/ I.S. 18-0011

02


Modification:
PARTIC. DENTE – Scala 10:1
0.25
6°
8°
Parte per centraggio
con scarico truciolo
Parte a tagliente
Sm. tagliente 1x45°
N° 6 DENTI – ELICA SINISTRA – INCLINAZIONE 6°
Ø7
5
10
Ø5.95
10
30
140
Ø5.5
0.8
6.03 +0 −0.005
10
25
Ø5.5
15
0.8
Ø5.9±0.05
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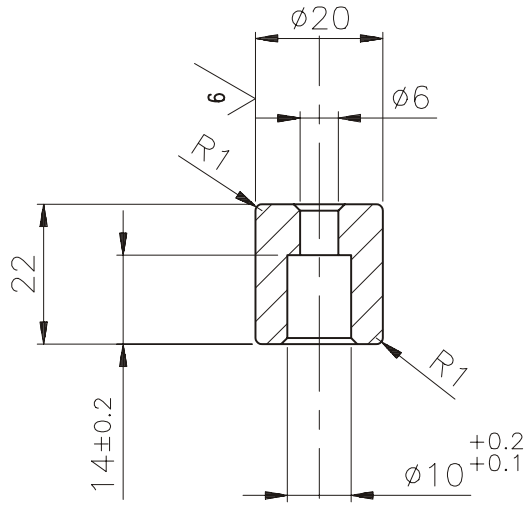
utilised, for the manufacture of the component or unit
herein illustrated and must not be released to other
parties, without written consent.
Any infringement will be legally pursued.
ISO ≤ IT8
Ra ≤ 0.4 3°
For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO STD 10-2311
MAT. UNI U100WC HRC 62÷64
COVER. /
Lisciatoio per guida valvole
DRAWN UTS (B)
APPROVED
DATE 10/12/2001
SUPERSEDES
N°DRAWING SP. 2310
EXPER. 2310
SHEET
SIZE A3
SCALE 1:1
Q.TY 1
I.S. 18-0011
MOTORE F1A
IVECO
02



Modification:

For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO *STD 10–2311*

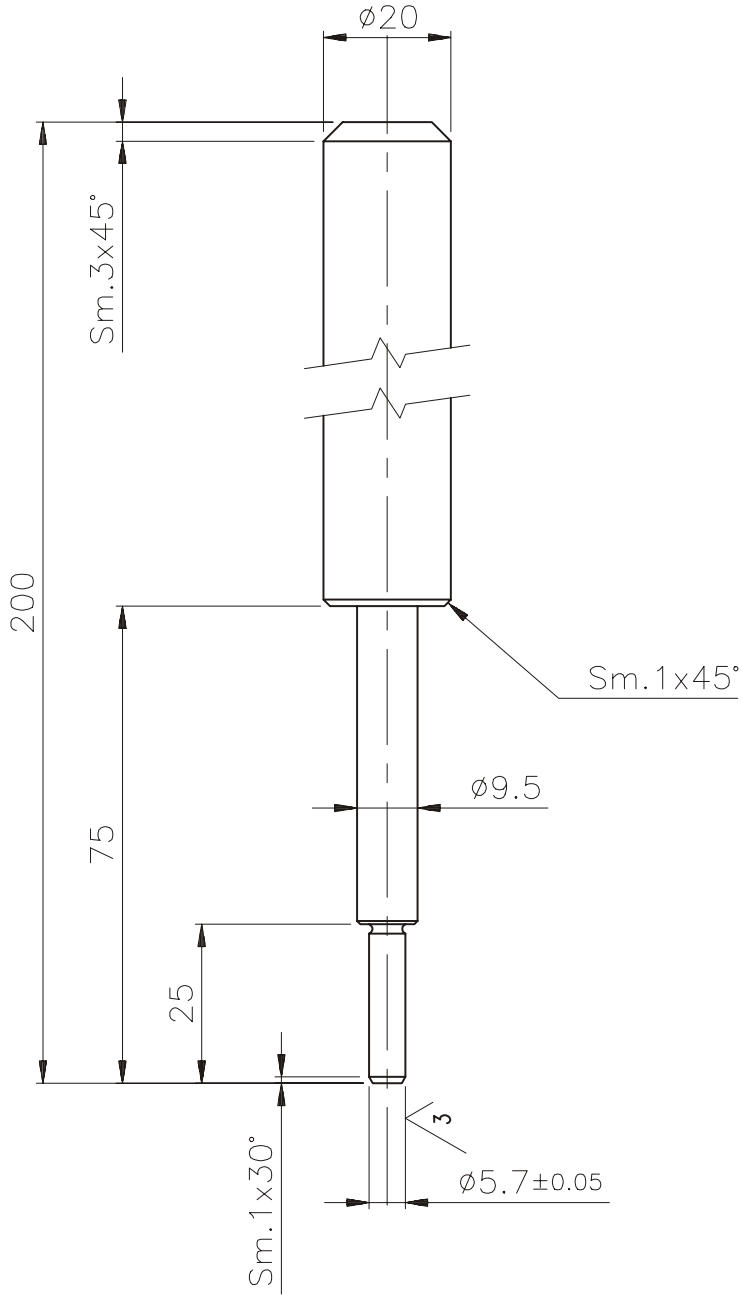
MAT.	COVER.	DRAWN	N°DRAWING
39NiCrMo3 Bon.	Fosfat.	UTS (B)	SP. 2311

ISO ≤ IT8 ± ≤ 30' Ra ≤ 0.4

C/ I.S. 18-0011

Battitoio per piantaggio	APPROVED	EXPER. 2311	SIZE A4
guida valvole	DATE 10/12/2001	SHEET	
(usare con sp. 2312)	SUPERSEDES		
	SCALE 1:1	IVECO	
MOTORE F1A	Q.TY 1		

02



Modification:

For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO *STD 10–2311*

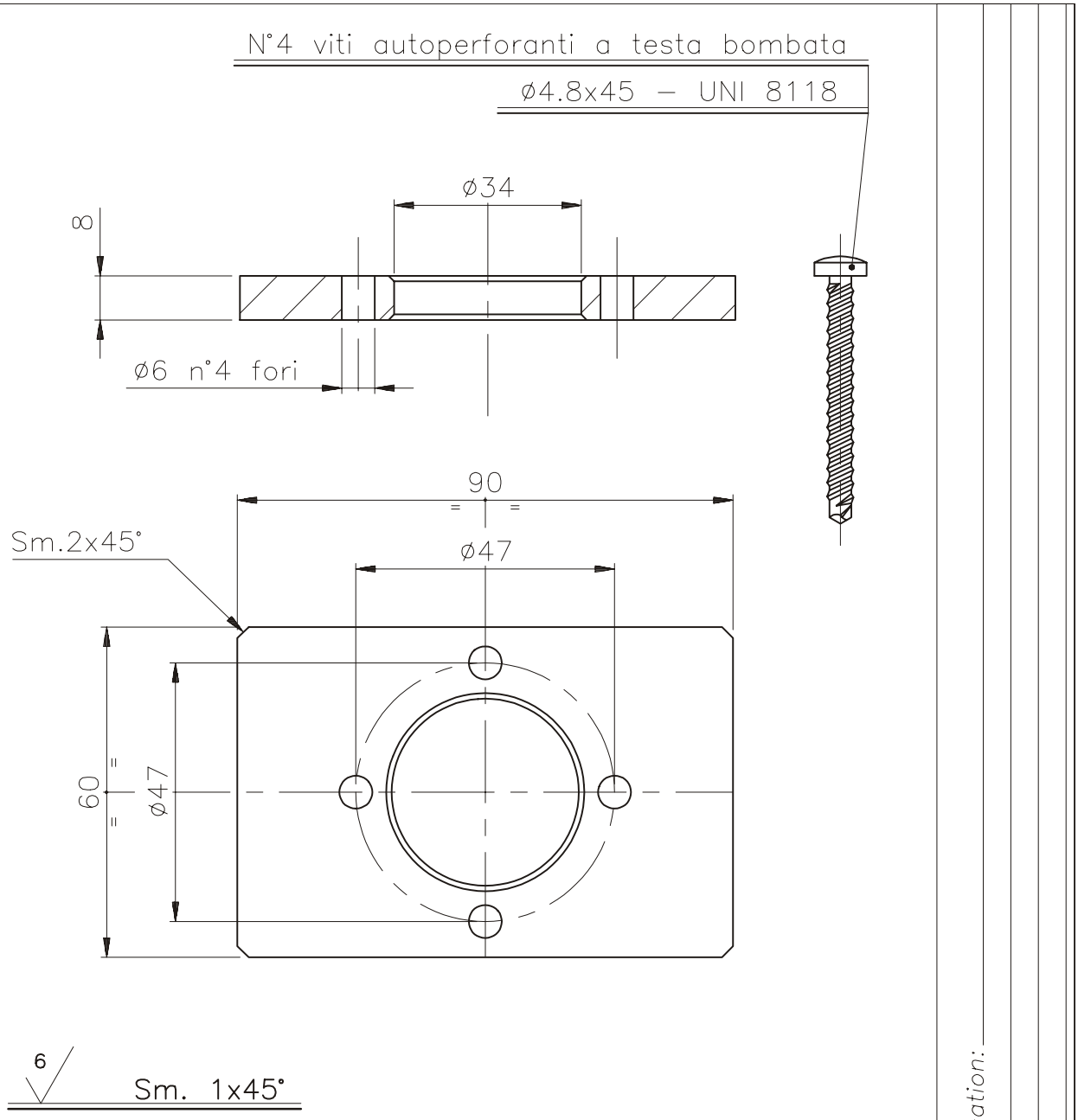
MAT.	COVER.	DRAWN	N°DRAWING
39NiCrMo3 Bon.	Fosfat.	UTS (B)	SP. 2312

ISO ≤ IT8
∢ ≤ 30'
Ra ≤ 0.4

C/
I.S. 18-0011

Battitoio per spiantaggio	APPROVED	EXPER. 2312	SIZE A4
guida valvole	DATE 10/12/2001	SHEET	
	SUPERSEDES		
	SCALE 1:1	IVECO	
MOTORE F1A	Q.TY 1		

02



For the permissible errors on the dimensions without tolerance and for other general specifications, see **IVECO** *STD 10–2311*

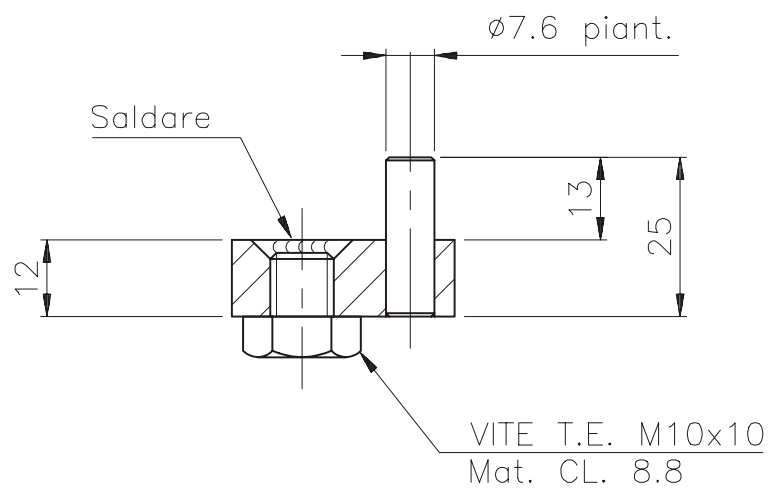
MAT.	COVER.	DRAWN	N°DRAWING
Fe430B	Fosfat.	UTS (B)	SP. 2325

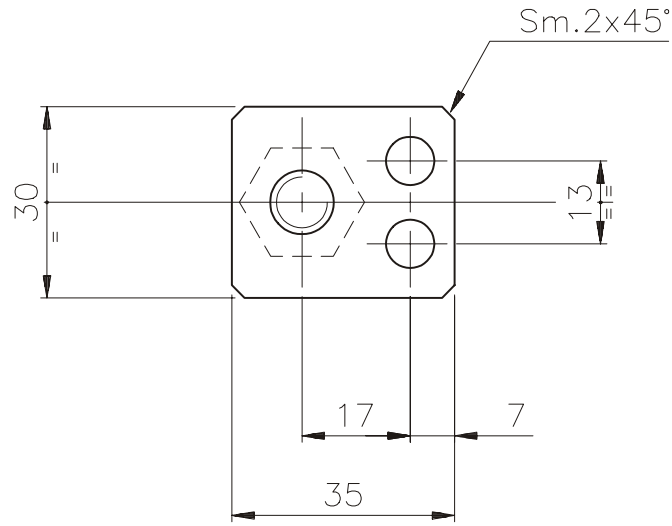
ISO ≤ IT8 ± ≤ 30' Ra ≤ 0.4

C/ I.S. 18-0011

Attrezzo per estrazione	APPROVED	EXPER. 2325	SIZE A4
guarnizione albero distribuzione	DATE 01/02/2002	SHEET	
	SUPERSEDES		
	SCALE 1:1	IVECO	
MOTORE F1A	Q.TY 1		

02





6 Sm. 0.5x45°

For the permissible errors on the dimensions without tolerance and for other general specifications, see IVECO *STD 10–2311*

Modification:

MAT.	COVER.	DRAWN	N°DRAWING
C40 Bon.	Fosfat.	UTS (B)	SP.2341

Chiave per tensionamento tenditore		APPROVED	EXPER. 2341	SIZE A4
cinghia compressore condizionatore		DATE 05/03/2002	SHEET	
		SUPERSEDES		
		SCALE 1:1	IVECO	
MOTORE F1A		Q.TY 1		

ISO ≤ IT8 ≤ 30' Ra ≤ 0.4

C/ I.S. 18-0011

02