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Email: enquiries@vca.gov.uk
Web: www.vca.gov.uk

Your Reference:

Date: 08 JANUARY 2008

Dear

MANUFACTURER OR ACCREDITED AGENT: Dongfeng Cummins Engine Company, Ltd.

ECE REGULATION/~~EEC DIRECTIVE~~: 24.03

Job No.	**~~Vehicle Type~~/Component**	**Approval No.**	**Index Rev. No.**
CSH184916	Engine: ISLe375 30	24R-032136	

1. This vehicle type/component has been tested and meets the requirements of the above ECE Regulation/EEC Directive. I enclose a set of approval documents, comprising the approval, test report and your documentation duly authenticated.

2. If you think there are any errors in the enclosed package, please contact Andrew Meadows, telephone 0117 952 4187, e-mail andrew.meadows@vca.gov.uk Patricia Britton, telephone 0117 952 4171, e-mail pat.britton@vca.gov.uk immediately. Please be aware that from the date of issue we have a three week holding period, any corrections required after this time will need to be corrected via an extension, index revision or correction 1 certificate, as appropriate.

ROAD TRAFFIC ACT 1988 - SECTION 80

3. The Secretary of State for Transport authorises, under section 80 of the Road Traffic Act 1988, the above manufacturer or accredited agent to apply to the motor vehicle type/part specified, the appropriate mark designated in the Motor Vehicles (Designation of Approval Marks) Regulations 1979, as amended. The conditions attached to this authorisation are set out overleaf.

4. If this approval/extension results in a change being needed to a vehicle information document issued under the goods vehicle or passenger car national type approval scheme, you should notify us (i.e. submit a 'notifiable alteration') as soon as possible, using the address VCA (Whole Vehicle), Room 1.2, The Eastgate Office Centre, Eastgate Road, Bristol BS5 6XX.

5. VCA is continually scrutinising the quality of the service it provides to customers, in order to discover more ways in which the standard can be improved. If you have a specific complaint concerning the way this job has been dealt with, our customer services leaflet gives guidance on the best approach. If you would like a copy, please contact the undersigned.

Yours sincerely

Product Certification

08-Jan-08
UK Approval Authority

1. CONDITIONS

1.1 This Approval may be withdrawn at any time and while held is subject to the following conditions.

2. CONDITIONS OF MOTOR VEHICLE PARTS

2.1 The holder of this approval shall put the approval mark described in the Motor Vehicles (Designation of Approval Marks) Regulations 1979 as amended only on Motor Vehicle Parts that:

a. Have been manufactured, assembled or completed in factories under his control and

b. Conform in all material respects with the samples, which were tested before this approval was issued.

2.2 The holder of this approval shall mark his products in the manner set out in the relevant Regulation/Directive as given in the Motor Vehicles (Designation of Approval Marks) Regulations 1979 as amended together with:

a. The approval number allocated by the Secretary of State for Transport.
b. His name or trademark
c. Any other markings specified in the appropriate international Regulation

2.3 The holder of this approval shall be prepared at any time to satisfy Department for Transport officials or agents of the Department, that the quality of the part being produced and marked or intended to be by him with the approval marking conforms in all material respects with that of the samples tested as the International Regulation requires.

2.4 The holder of this approval undertakes to admit duly authorised officials or agents of the Department at all reasonable times to any premises in which parts marked or intended to be marked are being manufactured, assembled or stored and to permit any such official or agent to inspect parts and all records relating to them and their production processes.

2.5 This approval may be suspended or withdrawn by the Secretary of State for Transport at any time without any particular length of notice being given and in the event of that being done the holder will absolve the Secretary of State from any claim for damages or compensation.

3. CONDITIONS FOR MOTOR VEHICLES

3.1 The holder of this approval shall put the approval mark described in the Motor Vehicles (Designation of Approval Marks) Regulation 1979 as amended only on Motor Vehicles fitted with Motor Vehicle parts which Motor Vehicles as fitted with such parts conform with the type of Motor Vehicle approved by as on behalf of the Secretary of State for Transport and only on Motor Vehicles that:

a. Have been manufactured, assembled or completed in factories under his control and

b. Conform in all material respects with the type of Motor Vehicle, which was tested before an approval certificate was issued.

3.2 The holder of this approval shall mark motor vehicles of the type approved. In the matter set out in the relevant Regulation/Directive using the authorised approval mark as given in the Motor Vehicles (Designation of Approval Marks) Regulation 1979 as amended together with the approval number allocated by the Secretary of State for Transport.

3.3 The holder of this approval shall mark Motor Vehicles of the type approved in the manner set out in the relevant Regulation annexed to the United Nations agreement of 1958 as amended using the authorised approval mark which comprises a capital letter E followed by the number 11 within a circle together with the approval number allocated by the Secretary of State for Transport.

3.4 The holder of this approval shall be prepared at any time to satisfy Department for Transport officials or agents of the Department that Motor Vehicles of the type approved which have been produced and marked or that are intended to be marked by him conform in all material respects with the type of vehicle approved.

3.5 The holder of this approval undertakes to admit duly authorised officials or agents of the Department at all reasonable times to any premises in which the Motor Vehicles of the type approved which have been or are intended to be marked are manufactured, assembled or stored and to permit any such official or agent to inspect the Motor Vehicles and all records relating to them and their production processes.

3.6 This approval may be suspended or withdrawn by the Secretary of State for Transport at any time without any particular length of notice given and in the event of that being done the holder will absolve the Secretary of State from any claim for damages or compensation.

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THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

E11

COMMUNICATION CONCERNING APPROVAL GRANTED OF A ENGINE TYPE WITH REGARD TO EMISSIONS OR MEASUREMENT OF POWER OF THE ENGINE ONLY, PURSUANT TO REGULATION NO 24.03

Approval No: 24R-032136 Extension No.:00

1. Trade name or mark of vehicle: N/A

2. Trade ~~name or~~ mark of engine: Dongfeng Cummins

3. Vehicle type: N/A

4. Engine type: ISLe375 30 Engine Approval No: N/A

5. Manufacturer's name and address:
Dongfeng Cummins Engine Company, Ltd.
High and New Technology Industry Development Zone,
Xiangfan, HuBei Province,
People Republic of China 441004

6. If applicable, name and address of manufacturer's representative: N/A

7. Engine submitted for Type Approval on: 10 October 2007

8. Technical service conducting Approval tests: Vehicle Certification Agency

9. Date of report issued by that service: 27 December 2007

10. Number of report issued by that service: CSH184916

08-Jan-08
UK Approval Authority

11. Test results:

11.1 Emissions

11.1.1 Tests at steady speeds:

Measurement points	Engine Speed n (rpm)	Power P (kW)	Nominal flow G (litres/sec)	Measured absorption values (m^{-1})
1	2100	270.93	154.86	0.008
2	1900	262.04	140.11	0.026
3	1700	251.01	125.36	0.028
4	1500	235.93	110.61	0.029
5	1300	211.96	95.86	0.024
6	1000	145.04	73.74	0.023

For engine type approval, power absorbed by the fan during the tests: Fan and alternator no fitted

11.1.2 Free acceleration tests

11.1.2.1 Engine test in accordance with Annex 5 (1) Not Applicable

Percentage of maximum rpm (2)	Percentage of maximum torque at rpm stated (2)	Measured absorption value m^{-1}	Corrected absorption value m^{-1}
100	100		
90	100		
100	90		
90	90		
100	80		
90	80		

(2) The lower limit may be that stated by the manufacturer in accordance with this Regulation, part I, paragraph 6.3.4

11.1.2.2 Engine test according to this Regulation, part I, or vehicle test according to part III (1): Corrected absorption value 0.91 m^{-1}, Inertia mass 1.0 $kg.m^2$.

Rpm at start: 600 rpm

11.2 Stated net maximum power (1): 268 kW at 2100 rpm

12. Make and type of opacimeter: AVL 4390 G004

13. Principal characteristics of engine type:

Engine working principle: Four stroke

Number and layout of cylinders: 6 in-line (1-5-3-6-2-4)

Cylinder capacity: 8849 cm^3

Fuel feed: Direct Injection

Supercharging equipment: YES

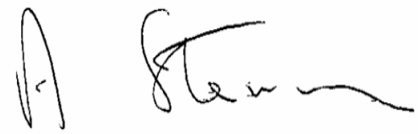
14. Approval GRANTED

15. Reason(s) for extension of approval: Not applicable

16. Place: BRISTOL

17. Date: 08 JANUARY 2008

18. Signature:



A W STENNING
Head of Product Certification

19. A list of the documents contained in the approval file transmitted to the administrative service which has granted approval is annexed to this communication.

CSH184916

Dongfeng Cummins Engine Company, Ltd.

XIANGFAN, HUBEI

DIESEL ENGINE TEST

TO

ECE REGULATION 24.03

Engine model (s): ISLe375 30

Max. 268 kW net at 2100 min^{-1}

(Rated 275 kW gross at 2100 min^{-1})

Test agency.....VCA
Job Number..... CSH184916
Date and location of test..... 10/17/2007，NAST, CHINA

INFORMATION DOCUMENT INDEX

R24.03 Annex 1	Pages 1 to 7
Combustion chamber and piston crown	Attachment 1
Additional anti-smoke device	Attachment 2
Boost control characteristics curve	Attachment 3
Declared engine performance	Attachment 4
Picture/drawing of engine	Attachment 5
Fan power absorption	Attachment 6
Alternator power absorbed	Attachment 7
Air Intake System	Attachment 8
E-Mark	Attachment 9

(E/ECE/324 E/ECE/TRANS/505 Rev 1/Add 23/Rev2 April 25, 1986)

REGULATION NO 24.03

ANNEX 1

ESSENTIAL CHARACTERISTICS OF THE VEHICLE AND THE C.I. ENGINE AND INFORMATION CONCERNING THE CONDUCT OF TESTS

0	**DESCRIPTION OF VEHICLE**	
0.1	Make:	Not applicable (N/A)
0.2	Type:	N/A
0.3	Name and address of manufacturer:	N/A
0.4	Engine type and approval No.:	ISLe375 30
1	**DESCRIPTION OF ENGINE**	
1.1	Make:	Dongfeng Cummins
1.2	Trade mark:	
1.3	Name and address of manufacturer:	Dongfeng Cummins Engine Company Ltd Automobile Industry Development Zone Xiangfan Hubei Province China 441004
1.4	Type:	ISLe375 30
1.5	Cycle:	four stroke / ~~two stroke~~ / ~~others~~
1.6	Bore:	114 mm
1.7	Stroke:	144.5 mm
1.8	Cylinder capacity:	8,849 cm^3
1.9	Number and layout of cylinders and firing order:	6 in-line (1-5-3-6-2-4)
1.10	Combustion system: description	Direct injection
1.11	Drawing(s) of combustion chamber and piston crown:	See Attachment 1
1.12	Compression ratio:	16.6:1 ± 0.5:1

1.13	Minimum cross-section area of inlet and outlet ports:	INLET 333 mm^2 OUTLET 642 mm^2
2	**COOLING SYSTEM:**	Liquid / ~~air cooling~~
2.1	**Characteristics of liquid-cooling system**	
2.1.1	Nature of liquid:	Water
2.1.2	Circulating pump(s): description or make(s) and type(s)	Cummins centrifugal
2.1.3	Radiator/fan system: description	Test cell system Fan not fitted on test – See Attachment 6
2.1.4	Drive ratio(s):	N/A
2.1.5	Max. temperature at outlet:	373 K
2.2	**Characteristics of air-cooling system**	
2.2.1	Blower system: characteristics or make(s) and type(s)	N/A
2.2.2	Drive ratio(s):	N/A
2.2.3	Temperature regulating system: Yes/no	N/A
2.2.4	Air ducting: description	N/A
2.2.5	Max. temperature at a characteristic place:	N/A
3	**AIR INTAKE SYSTEM AND FUEL FEED**	
3.1.1	Description and drawings of air intake system and its accessories (heating device, intake silencers, air filter, etc) or make(s) and type(s) if the test is made with complete system as supplied by the vehicle manufacturer, in a vehicle or on a test bench:	See Attachment 8
3.1.2	Maximum permitted depression of air intake at a characteristic place (specify location of measurement):	3.73 kPa at inlet to compressor
3.2	**Pressure charger:**	yes / ~~no~~
3.2.1	Description of the pressure charger system:	- see page 7
3.2.2	Characteristics or make(s) and type(s):	- see page 7
3.2.3	Max. temperature of the air at the outlet of the intake intercooler:	348 K
3.3	**Injection system**	

3.3.1	*Low pressure section*		
3.3.1.1	Fuel feed		
3.3.1.2	Characteristic pressure or make(s) and type(s):	Variable pressure / Cummins	
3.3.2	*High pressure section*		
3.3.2.1	Description of the injection system:	- see page 7	
3.3.2.1.1	Pump: description or make(s) and type(s)	- see page 7	
3.3.2.1.2	Delivery:	183 ± 5 mm^3 per stroke at engine speed of: 2100 min^{-1} at full injection	
	Mention the method used:	On engine / ~~on pump bench~~	
	If boost control is supplied, state the characteristic fuel delivery and boost pressure versus engine speed:	See Attachment 3	
3.3.2.1.3	Static injection timing:	N/A	
3.3.2.1.4	Automatic injection advance range:	Electronic	
3.3.3	*Injection piping*	***Pump-rail***	***Rail-injector***
3.3.3.1	Length:	394± 2 mm	217 ± 2 mm
3.3.3.2	Internal diameter:	3 mm	3 mm
3.3.4	*Injector(s)*		
3.3.4.1	Make(s):	- see page 7	
3.3.4.2	Type(s):	- see page 7	
3.3.4.3	Opening pressure:	N/A, ~~or characteristic diagram~~	
3.3.5	*Governor*		
3.3.5.1	Description of the governor system or make(s) and type(s):	Cummins Electronic (Automotive/VS)	
3.3.5.2	Speed at which cut-off starts under full load:	2130 ± 20 min^{-1}	
3.3.5.3	Maximum no-load speed:	2330 min^{-1}	
3.3.5.4	Idling speed:	600 - 800 min^{-1} (nominal 700 min^{-1})	

E 3.4 **Cold Start System**

Description or make(s) and type(s): Cummins Electrical Grid Heater

E 3.5 **Additional anti-smoke devices (if any, and if not covered by another heading):**
Air/fuel ratio (AFC) control –
See Attachment 2

4 VALVE TIMING

4.1 Maximum lift of valves and angles of opening and closing in relation to dead centres (nominal values):

INTAKE / INLET:	11.8 mm lift,	open 14.2° BTDC,	close 47.1° ABDC
EXHAUST / OUTLET:	12.1 mm lift,	open 51.8° BBDC,	close 19.6° ATDC

5 EXHAUST SYSTEM

5.1 Description of exhaust equipment if the test is made with the complete equipment provided by the engine or vehicle manufacturer: N/A

Specify the back pressure at maximum net power and the location of measurement:
N/A

Indicate the effective volume of the exhaust: N/A

5.2 If the test bench equipment is used, specify the back pressure at maximum net power and the location of measurement: 10.1 kPa at turbine outlet

Indicate the effective volume of the exhaust: 65,200 cm^3 (test cell system)

6 LUBRICATION SYSTEM

6.1 Description of system

6.2 Circulating pump: yes / ~~no~~

Description or make(s) and type(s): Cummins gear type

6.3 Oil cooler: yes / ~~no~~

Description or make(s) and type(s): Cummins water cooled, plate type

6.4 Mixture with fuel: ~~yes~~ / no

Lubrication oil/fuel ratio: N/A

7 OTHER ENGINE DRIVEN AUXILIARIES

7.1 Auxiliaries necessary for an operation of the engine on test bench, other than the fan. State characteristics, or make(s) and type(s): None

7.1.1 Generator/alternator: yes / ~~no~~
Not fitted on test –
See Attachment 7

7.1.2 Other:

E 7.2 **Additional auxiliaries in operation when test is conducted in a vehicle.** State characteristics, or make(s) and type(s): N/A

E 7.3 **Transmission**

State moment of inertia of combined flywheel and transmission ay condition when no gear is engaged, or description, make(s) and type(s) (for torque converter):

1. 1.0kg.m^2

8 ENGINE PERFORMANCE (declared by the manufacturer)

8.1	Idling speed:	600 - 800 min^{-1} (nominal 700 min^{-1})
8.2	Maximum rated speed:	2100 min^{-1}
8.3	Minimum rated speed:	1000 min^{-1}
8.4	Max. net torque of engine on bench:	1535 Nm at 1300 min^{-1} (1550 Nm gross at 1100-1400 min^{-1})
8.5	Max. net power of engine on bench:	268 kW at 2100 min^{-1} (275 kW gross at 2100 min^{-1})
	Indicate power absorbed by fan:	4.50 kW at 2100 min^{-1} (see Attachment 6)

8.5.1 *Test on Bench*

Declared powers at the points of measurement referred to in Annex 4, Paragraph 2.2 shall be stated in Table 1.

Table 1: Declared speeds and powers of the engine / ~~vehicle~~ submitted for approval

(Speeds to be agreed with the test authority)

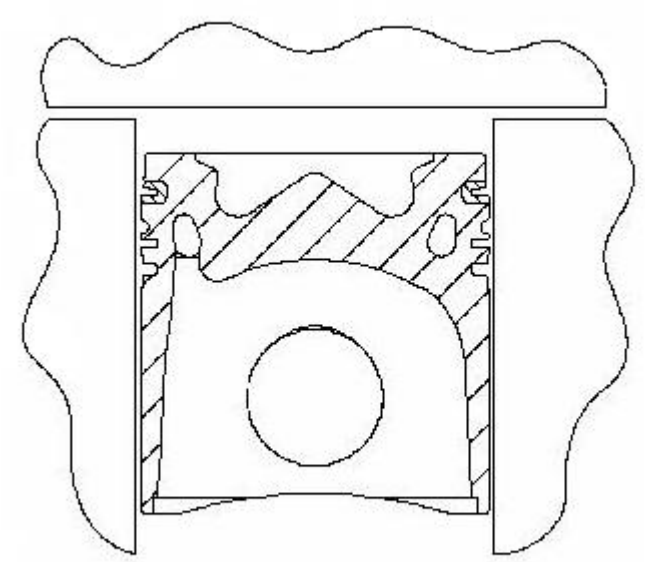
Measurement point	Engine speed:n (min^{-1})	Power: p kW
1	1000	**140.7**
2	1100	**177.1**
3	1500	**234.3**
4	1700	**249.5**
5	1900	**261.1**
peak torque	1300	**209.2**
peak power	2100	**270.0**

PERFORMANCE PARTS LIST
(Pressure charger, fuel pump, injectors)

3.2	**Pressure charger:**	
3.2.1	Description of the pressure charger system:	wastegate turbocharger
3.2.2	Characteristics or make(s) and type(s):	Holset HX40W
3.3	**Injection system**	
3.3.2	*High pressure section*	
3.3.2.1	Description of the injection system:	
3.3.2.1.1	Pump: description or make(s) and type(s)	Cummins CCR1600
3.3.4	*Injector(s)*	
3.3.4.1	Make(s):	Cummins
3.3.4.2	Type(s):	0 445

ANNEX 1: ATTACHMENTS

ATTACHMENT 1: Combustion Chamber and Piston Crown



ANNEX 1: ATTACHMENTS

ATTACHMENT 2: Additional Anti-Smoke Device

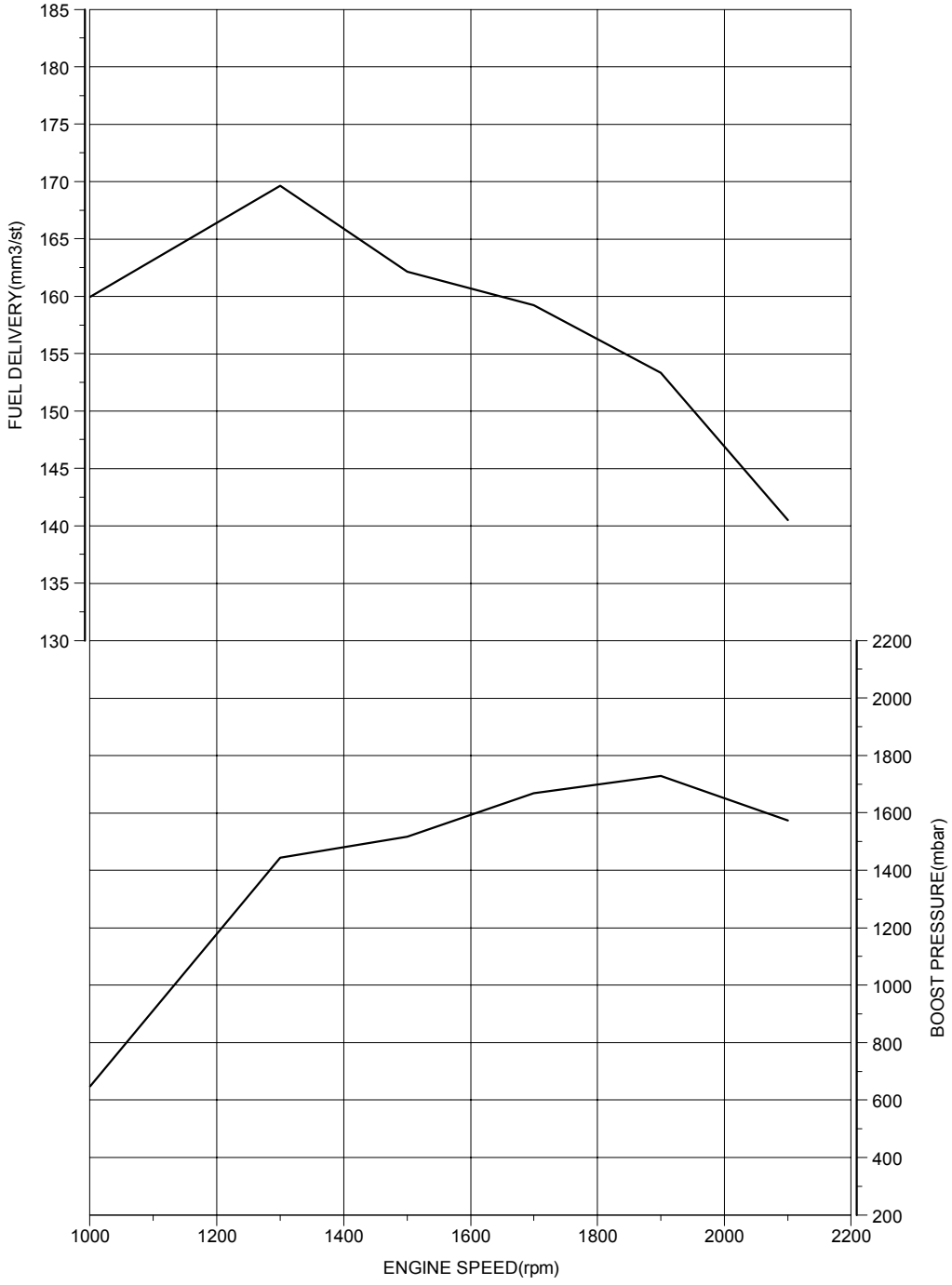
Air/fuel ratio control (AFC) is an electronic table incorporated in the Cummins software stored in the electronic control module, designed to regulate the fuel delivery output to correspond with the inlet manifold pressure on turbocharged engines during acceleration and lugging.

When a turbocharged engine is accelerated, there is sometimes a delay between the throttle arriving at full fuel position, and the turbocharger providing boost pressure to the combustion chamber. Consequently there is not sufficient air to completely burn the fuel, resulting in excessive smoke during this operation.

The AFC algorithm – in conjunction with engine sensors, will determine the air pressure in the intake manifold during this period and adjust the fuel pressure to limit the amount of fuel injected, thus reducing the smoke produced.

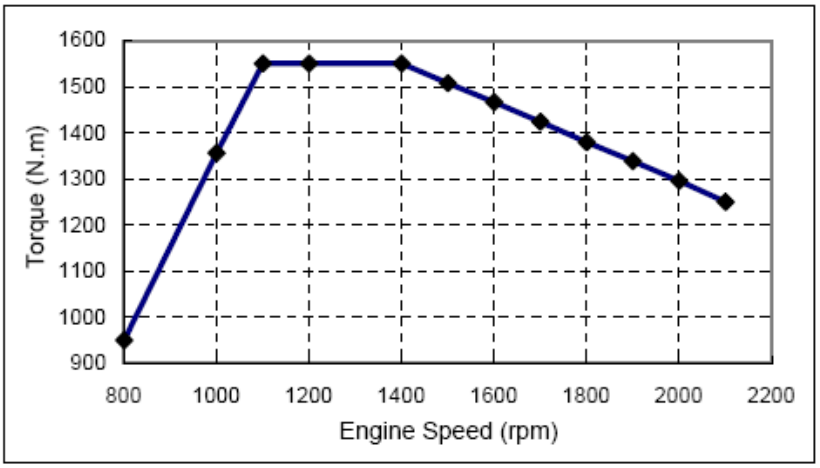
ANNEX 1: ATTACHMENTS

ATTACHMENT 3: Boost Control Characteristics Curve



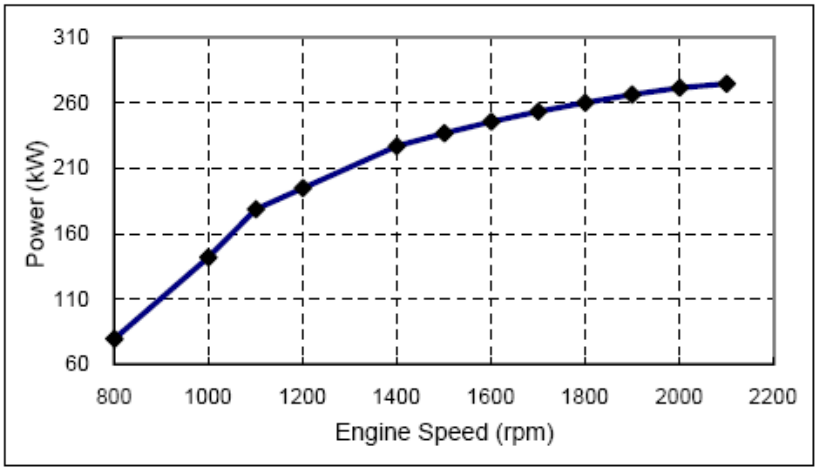
ANNEX 1: ATTACHMENTS

ATTACHMENT 4: Declared Engine Performance



Torque

rpm	N.m
800	950
1000	1356
1100	1550
1200	1550
1400	1550
1500	1508
1600	1466
1700	1424
1800	1380
1900	1338
2000	1296
2100	1250

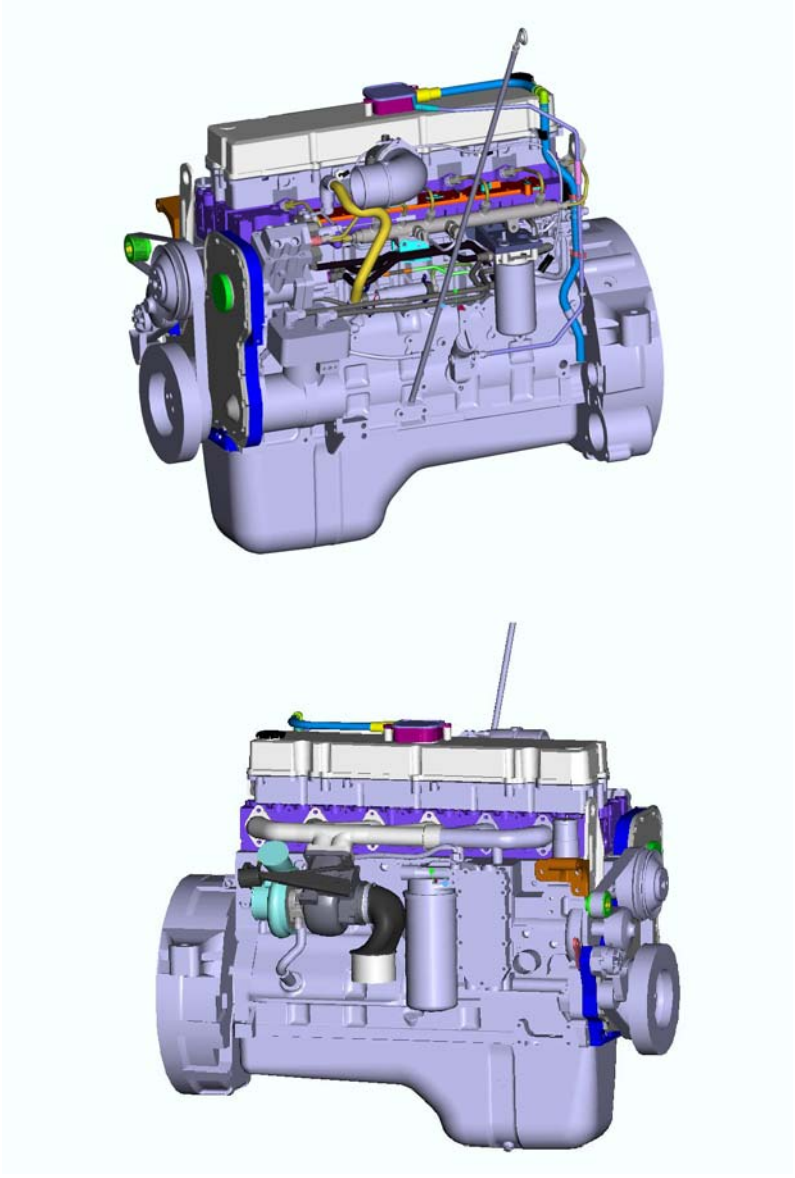


Power

rpm	kW
800	80
1000	142
1100	179
1200	195
1400	227
1500	237
1600	246
1700	253
1800	260
1900	266
2000	271
2100	275

ANNEX 1: ATTACHMENTS

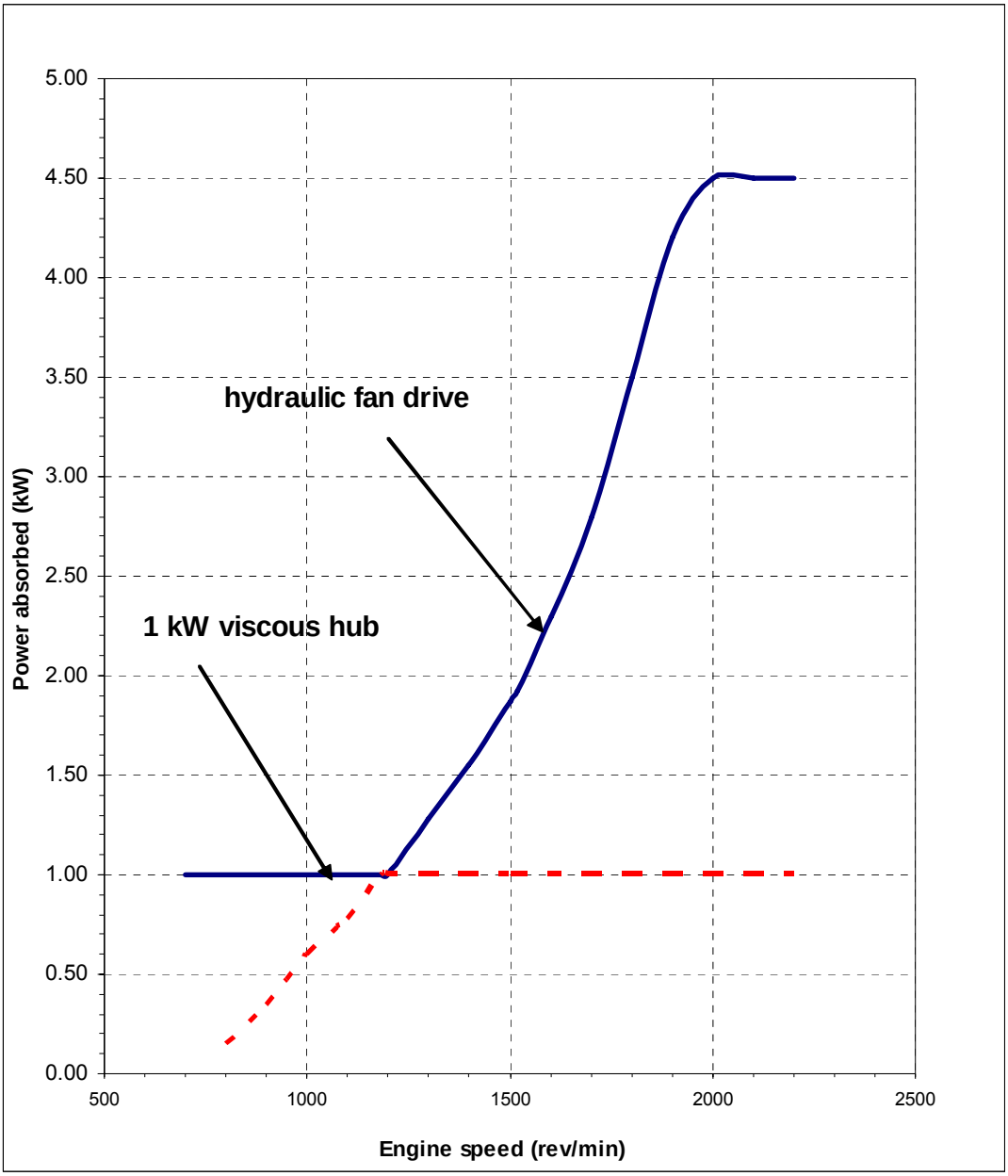
ATTACHMENT 5: Picture/Drawing of Engine



ANNEX 1 - ATTACHMENTS

ATTACHMENT 6: Fan Power Absorption

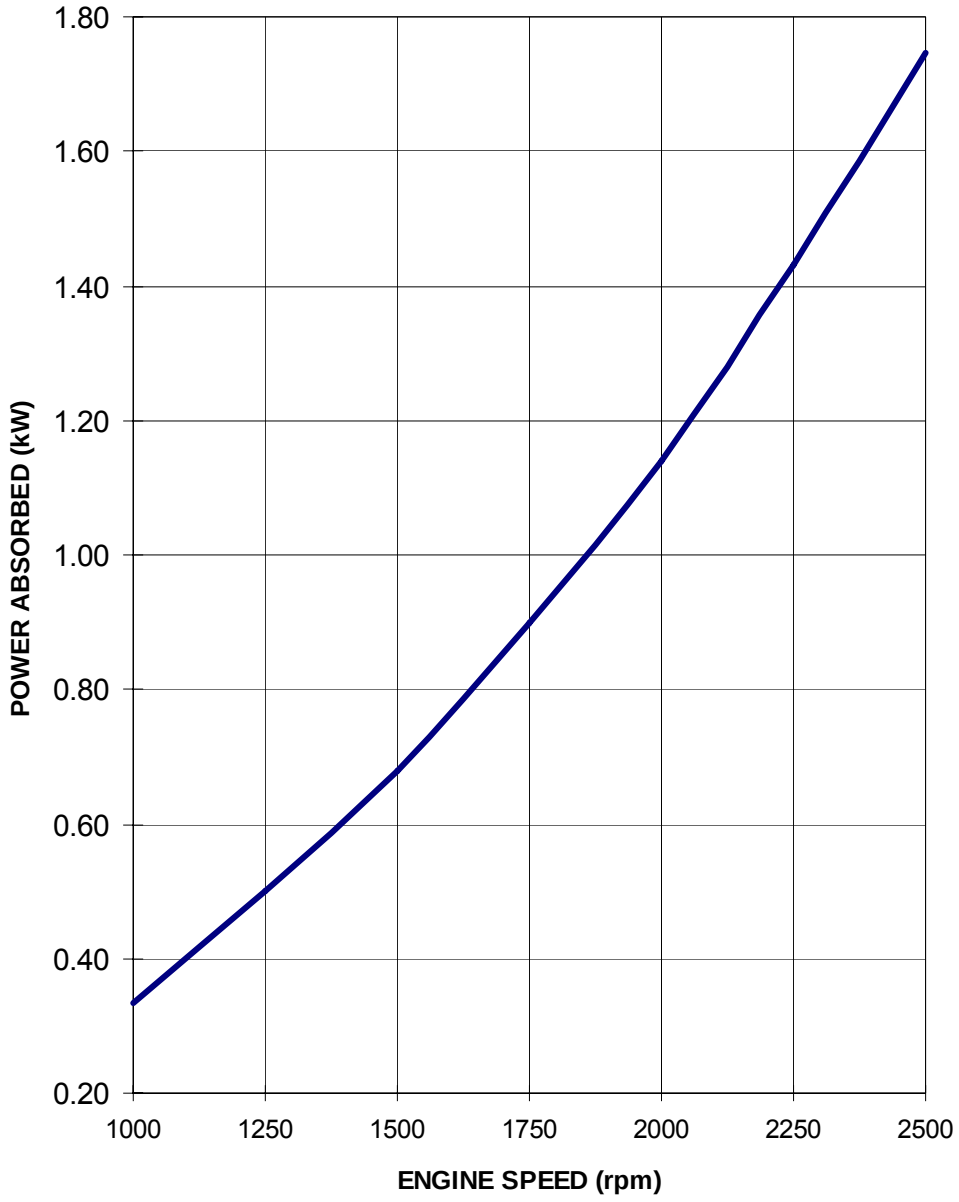
Viscous hub (maximum slip) plus hydraulic fan drive



ANNEX 1 - ATTACHMENTS

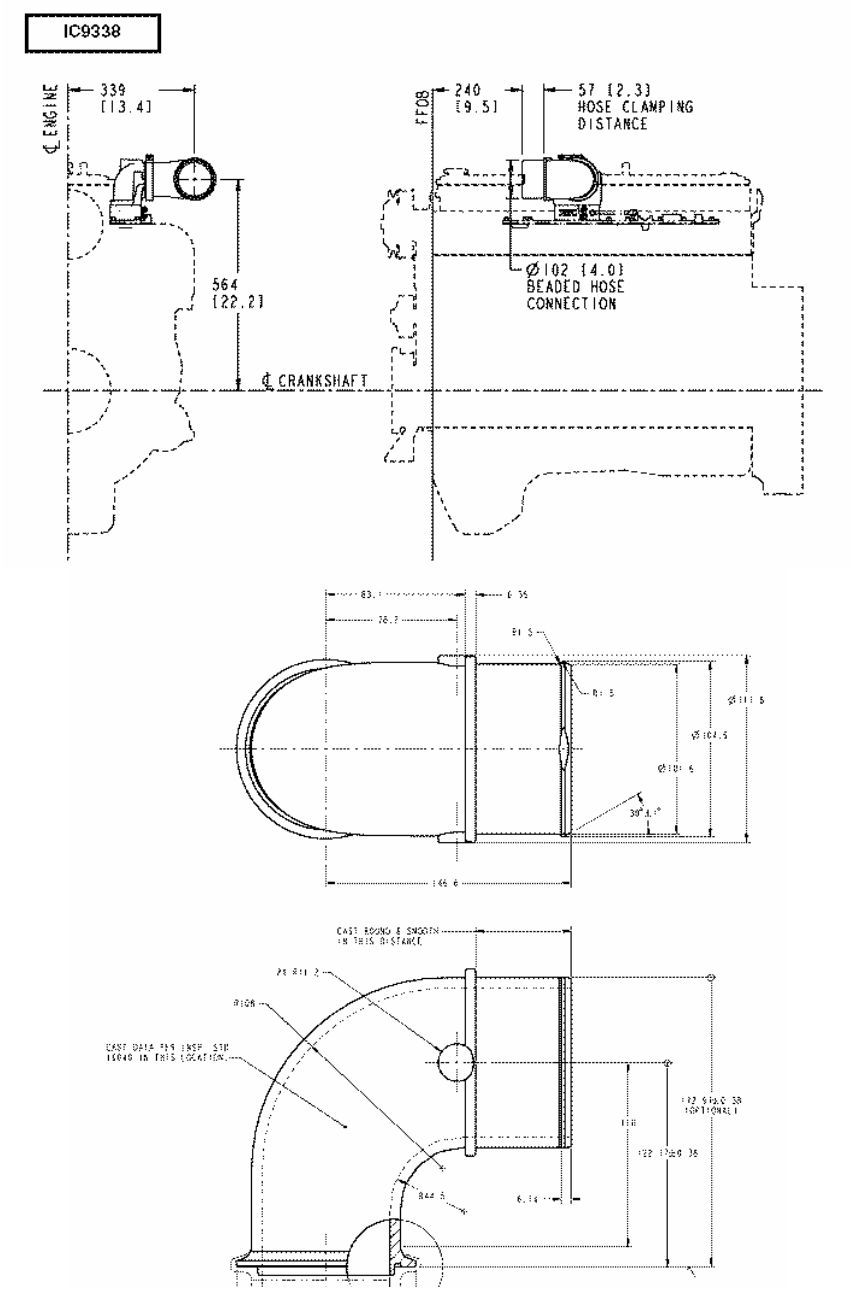
ATTACHMENT 7: Alternator Power Absorbed

CAV AC203 – drive ratio 3.0:1



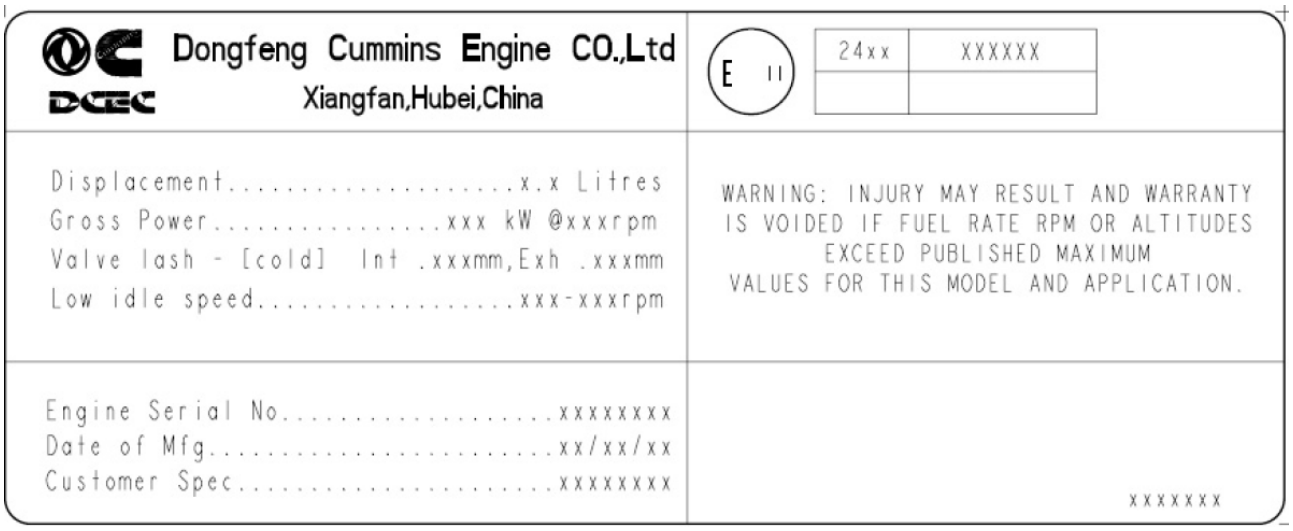
ANNEX 1: ATTACHMENTS

ATTACHMENT 8: Air Intake System



ANNEX 1: ATTACHMENTS

ATTACHMENT 9: E-mark



VEHICLE CERTIFICATION AGENCY

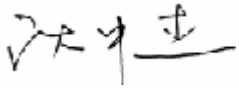
Vehicle Certification Agency, 1 The Eastgate Office Centre
Eastgate Road, Bristol, BS5 6XX, United Kingdom
☎Switchboard: 0117 951 5151
System and Component Section Fax: 0117 952 4163

TEST REPORT: Engine Power – Positive ignition
Engine Power and smoke – Compression ignition

Report/Job Number: CSH184916

TEST DETAILS	
Subject	Engine smoke
EC Directive	/
ECE Regulation	Regulation 24.03
Location of Test	STATE AUTOMOTIVE QUALITY SUPERVISING AND TESTING CENTRE (XIANG FAN)
Date of Test	16 OCTOBER 2007
VCA Representative	Mr. Shenzhongjie
Manufacturer's Representative	Mrs. Huzhongping
Reason for Test	New Approval

MANUFACTURER DETAILS	
Manufacturer's Name	Dongfeng Cummins Engine Company, Ltd.
Manufacturer's Address	Automobile Industry Development Zone, Xiangfan, HuBei Province, Republic of China 441004
Model Type & description	ISLe375 30
Category	

CONCLUSION	The above mentioned engine was tested in accordance with the above Directives and Regulations and was found to comply in all respects. Signature:  Name: Shen.zhongjie Position: Test Engineer Date: 27 December 2007

LIST OF ANNEXES

ANNEX	No of PAGES	SUBJECT
1		RISK ASSESSMENT CONTROL MEASURES CHECKLIST
2	3	Engine power raw data, calculations and results
3	1	Steady state smoke results (As applicable)
4	1	Free acceleration smoke results (As applicable)
5	1	Graph of net power and net torque versus engine speed
6	-	

Para (R24)	*Parameter*	*Complies*

Engine checking:

Part Identifiers	
Engine type:	ISLe375 30
Engine Serial #:	P/N: 4943137 ESN: DF50155986 S/N: 2187 D/C: 2007-04-04 E/C: AX90021-02 GOV SC
Pump	Maker: Cummins Type: CCR1600
Turbo Charger:	Maker: Holset Type: HX40W
ECU:	Hardware : CM2150/CONTINENTAL; Software : SC97694 Cummins
Rail Bar and Pump	Maker: BOSCH TYPE : 04-07-09 000916 L2 0445226025 3963815

Engine details

	Engine corresponds to that agreed in job content meeting		**Complies**
	Check of manufacturer's documentation		**Complies**
Ann4, 3.1.1	Total running hours prior to test:	>40 **at least more than 100Hours**	**Complies**
Ann10, Table 1	Standard intake system fitted	~~Yes /~~ **No simulation**	**Complies**
Ann10, Table 1	Standard exhaust system fitted	~~Yes /~~ **No simulation**	**Complies**
Ann4, 3.3.1	Air intake temperature measurement within 0.15 m upstream of the point of entry to the air cleaner, or if no air cleaner is used, within 0.15 m of the air inlet horn		**Complies**
Ann10, 5.1, Table 1, note 1b	Exhaust back pressure measurement within a point 150 mm downstream from the termination of the part of the exhaust system mounted on the engine.		**Complies**
Ann10, Table II	All engine setting are in accordance with manufacturer's		**Complies**

Para (R24)	*Parameter*		*Complies*
	specifications:		
Ann10, 5.1.1	Permitted auxiliaries (worst case) **not** fitted:		**Complies**
	1) Fan	Model: no known	
	2) Generator	Model: no known	
Ann10, 5.1.1	Permitted auxiliaries fitted:		**N/A**
	1) /	Model:/	
	2)/	Model:/	
Ann10, 5.1.2	Other auxiliaries fitted:		**N/A**
	1) /	Model:/	
	2)/	Model:/	
	Power absorbed details available for auxiliaries		
	Test Equipment Details		
	Site:	**Xiang Fan Test Centre Engine cell Lab.**	
Ann10, 1.3	Dynamometer make:	**AVL**	
	Model:	**APA404/E/2801**	
	Type:		
	Calibration date: Due date	**13 January 2008**	
Ann2, 12.	Opacimeter make (if applicable)	**AVL**	
	Type:	**AVL 439**	
	Calibration date: Due date	**13 January 2008**	
Ann10, 4.2	Tachometer:	**AVL**	
Ann10, 4.4, 4.5	Temperature gauges:	**AVL**	
Ann10, 4.7, 4.8	Pressure gauges:	**TYP8863 AVL**	
Ann10, 4.6	Barometer:	**TYP8863 AVL**	
Ann10, 4.3	Fuel measuring device:	**AVL**	
	Type:	**/**	
7.3	Exhaust volume:	**Test cell system**	
	All test equipment correctly positioned:		**Complies**

Para (R24)	*Parameter*	*Complies*

Determination of test speeds (compression ignition engines)

Note: Combine compulsory test speeds for R24.03 and 72/306, and include additional speeds (eg ±50rpm) around maximum power and maximum torque to confirm peaks.

72/306

Highest test speed (Maximum Power):	N/A
Lowest test speed:	N/A
(Lowest test speed = higher of 1000rpm or 45% of max. power engine rpm)	
(Highest test speed - Lowest test speed) / 5	N/A

NB 72/306 requires 6 speeds spaced equally between max power and min. rated.

Ann10, 5.4

R24.03

Highest test speed (Governed):	2100 rpm
Lowest test speed:	1000 rpm
Peak torque speed:	1300 rpm

NB: R24 requires the following speeds: governed, min. rated, peak power and peak torque.

Idle speed :	700 rpm
Engine run out speed :	2130 rpm

Atmospheric Conditions:

Compression ignition

Ann4, 3.3.2 Factors F and fa between 1.02 and 0.98 at start and during test

Ann10, 6.4.2.3 Correction factor α_d between 0.9 and 1.1 during test

Positive ignition

Correction factor α_a between 0.93 and 1.07 during test

Para (R24)	*Parameter*	*Complies*
	Engine settings:	
Ann10, Table1, note 1b	Exhaust back pressure within ±1kPa of manufacturer's declared value	**Complies**
Ann10, Table1, note 1a	Intake pressure within 100Pa of manufacturer's declared value	**Complies**
	Temperature at inter-cooler outlet within manufacturer's specification	**Complies**
	Water and oil at manufacturer's declared normal operating temperatures	**Complies**
	Net power results	**see Annex I**
	The results in Annex I comply with requirements for measurement of net power as per:	
	ECE Regulation 85	N/A
	ECE Regulation 24.03 (Annex 10)	**Complies**
	Directive 80/1269/EEC as last amended	N/A
	Declared Net Power: 268 kW @ 2100rpm	
	Declared Net Torque: 1535 Nm @ 1300rpm	
	The declared net power is within the tolerance of measured power given in:	**Complies**
	ECE Regulation 85 (±2% @ Max power, ±4% @ other points)	N/A
	ECE Regulation 24.03 Annex 10 (±2% @ Max Power, -2%, +6% @ other points)	**Complies**
	Directive 80/1269/EEC as last amended (±2% @ Max power, ±4% @ other points)	N/A

Para (R24)	*Parameter*	*Complies*
	Steady state smoke results – (If applicable)	**see Annex II**
	Free Acceleration Smoke Test – (If applicable)	**see Annex III**
	Are all engine operation parameters correct and stabilised?	**Y**
Ann8, 3.8	Is the smoke tube pressure at idle and max rpm within 40 - 65 mm H2O?	**Complies**
Ann8,3.9	Did the smoke tube temperature remain between 70 - 140 °C during test?	**Complies**
Ann5, 1.3	Are F and fa between 1.02 and 0.98?	**Complies**
6.3.7	Are the values of XM less than A? (turbo-charged engines only)	**Complies**
	The results in Annex II & III comply with the measurement of visible pollutants at steady speed and under free acceleration as per:	**Complies**
	ECE Regulation 24.03 Directive 72/306/EEC as last amended	**Complies** N/A

(Note the data here is a summary of that required for R24, R85, 80/1269 and may exceed that required for a single approval)

Job number		CSH184916
Date of test		17-Oct-07
Engine is		water cooled
Fuel consumption measured		gravimetrically
Chassis dynamometer	Make	AVL
	Model	APA404/E/2801
	Type	
Opacimeter	Make	AVL
	Type	AVL 439
Engine idle speed		700 rpm
Oil temp point of measurement		
Fuel state		liquid

Depending on fuel type enter information in the boxes below

Compression ignition - liquid fuel

	Make	Fangyuan
	Specification	diesel fuel
	Cetane number	53.2
	Cetane Index	50.1
	sulfur	50 ppm
	spec density	0.837 g/cm^3 at 288 K
	LCV	/ kJ/kg

Compression ignition - gaseous fuel N/A

	Feed system	
	Gas	
	Specification	
	Oil/gas proportion	
	LCV	kJ/kg

Lubricant

Make	Kangshen
Specication	CH-4 SJ
SAE viscosity	15W/40

ANNEX I

Directives 72/306/EEC and 80/1269/EEC as amended, ECE Regulation 24.03, Annex 10 and ECE Regulation 85

ISLe375 30

Engine power and smoke (compression ignition)

Job/Report No: CSH184916

Engine: ISLe375 30
Cubic capacity: 8.849 Litres
Number of cylinders: 6
2 or 4 stroke: 4

Declared fuel rate: 182.9 mm3/stroke
at: 2100 rpm
Density: 0.837 kg/l@15^{0}C

Engine Speed	rpm		2100	1900	1700	1500	1300	1000
Indicated torque	Nm	1.	1232	1317	1410	1502	1557	1385
		2.						
Indicated Power	kW		270.93	262.04	251.01	235.93	211.96	145.04
Fuel consumption	kg/hr	1.	57.3	58.01	53.84	50.29	45.31	30.55
		2.						
Temperature at injection pump	°C		37.3	38.0	38.2	38.2	38.2	38.2
Temperature at fuel measurement	°C		38.5	38.8	38.9	38.9	38.9	39
Temperature of Coolant	°C		85	85	82	82	82	82
Oil temperature @ Sump	°C		98	98	97	96	95	95
Air Intake temperature	°C	1.	21.1	21.2	21.3	21.4	21.5	21.9
	°C	2.						
Intake depression	kPa (X)		3.7	3.0	2.5	2.0	1.0	1.0
Temperature after turbo-charger	°C		169.3	172.5	170.4	172	170.2	128.8
Pressure after turbo-charger	bar		1.80	1.91	1.91	1.87	1.80	1.00
	kPa (Y)*		179.81	191	191	186.62	180.47	99.76
Temperature at intercooler outlet	°C		50.7	48.8	44.8	43	39.4	25.9
Pressure at intercooler outlet	bar		1.7	1.8	1.8	1.8	1.7	1.0
	kPa (Y)**		166.29	178.73	180.61	178.43	173.88	96.13
Exhaust temperature	°C		515	565	573	593	609	643
Exhaust pressure	mbar		117.0	112.0	104.0	91.0	87.0	73.0
	kPa		11.7	11.2	10.4	9.1	8.7	7.3
Barometric pressure(H:72/306)	mbar		1013.0	1013.0	1013.0	1013.0	1013.0	1013.0
	kPa		101.3	101.3	101.3	101.3	101.3	101.3
Humidity	%		52.6	53.5	52.1	48.5	43.7	40.7
Vapour pressure	kPa		1.31	1.34	1.32	1.23	1.12	1.07
Dry atmospheric (ps)	kPa		99.99	99.96	99.98	100.07	100.18	100.23
Smoke unit	%		0.343409	1.111774	1.196781	1.239257	**1.026693**	0.984125

Directives 72/306/EEC and 80/1269/EEC as amended, ECE Regulation 24.03, Annex 10 and ECE Regulation 85

ISLe375 30

Diesel Power and Smoke, TURBOCHARGED

INTERCOOLED

Job/Report No: CSH184916

Engine Speed		2100	1900	1700	1500	1300	1000
A (99/ps)^0.7	dry atmos	99.99	99.96	99.98	100.07	100.18	100.23
		0.9931	0.9933	0.9931	0.9925	0.9917	0.9914
B (T/298)^1.5	A.I.T (K)	294.1	294.2	294.3	294.4	294.5	294.9
		0.9804	0.9809	0.9814	0.9819	0.9824	0.9844
fa = A x B		0.9737	0.9744	0.9747	0.9746	0.9743	0.9759
F (Valid 72/306 requires 0.98-1.02)		0.9848	0.9850	0.9852	0.9853	0.9855	0.9862
C mg/min		955000	966833	897333	838167	755167	509167
D Cycles/min		1050	950	850	750	650	500
E Swept Volume Litres		8.849	8.849	8.849	8.849	8.849	8.849
F q = C/DE		102.78	115.01	119.30	126.29	131.29	115.08
G Absolute Inlet Pressure, mb/kPa,	(Baro -X)	97.6	98.3	98.8	99.3	100.3	100.3
H Absolute Outlet Pressure, mb/kPa,	(Baro + Y)	267.6	280.0	281.9	279.7	275.2	197.4
I r = H/G (When naturally-aspirated, set 1)		2.74	2.85	2.85	2.82	2.74	1.97
J qc = q/r = F/I		37.49	40.37	41.81	44.83	47.85	58.46
fm = 0.036 qc - 1.14		0.30	0.31	0.37	0.47	0.58	0.96
α d = fa^fm		0.9920	0.9919	0.9907	0.9879	0.9849	0.9768

Directives 72/306/EEC and 80/1269/EEC as amended, ECE Regulation 24.03, Annex 10 and ECE Regulation 85

ISLe375 30

Diesel Power and Smoke,

Job/Report No: CSH184916

Measurement																		
Engine speed, rpm	2100	1900	1700	1500	1300	1000	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Specific fuel consumptior (indicated) g/kWh	211.49	221.38	214.49	213.15	213.76	210.64	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Corrected Power, kW	268.77	259.92	248.67	233.07	208.77	141.67	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Corrected Torque, Nm	1222.2	1306.3	1396.8	1483.8	1533.6	1352.8	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Power to be subtracted for 1.	6.00	5.20	3.90	2.70	1.50	1.30												
other auxiliares, kW 2.																		
3.																		
Power absorbed by fan, kW To be subtracted if fan not fitted																		
Net Power, kW	262.8	254.7	244.8	230.4	207.3	140.4	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Net Torque, Nm	1194.9	1280.2	1374.9	1466.6	1522.5	1340.4	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Corrected Specific Fuel Consumption (net) g/kWh	218.1	227.7	220.0	218.3	218.6	217.6	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!

ANNEX II

Directives 72/306/EEC and 80/1269/EEC as amended, ECE Regulation 24.03, Annex 10 and ECE Regulation 85

Diesel Power and Smoke,

Report/Job No:

Operation No
Paragraph (R24)

Steady State Smoke Test Result

ISLe375 30

	Test No	1	2	3	4	5	6
Ann4,2.2	Engine Speed, rpm	2100	1900	1700	1500	1300	1000
	Indicated Power, kW	270.93	262.04	251.01	235.93	211.96	145.04
	Exhaust Pipe back pressure, kPa	11.7	11.2	10.4	9.1	8.7	7.3
†	Smoke Valve pressure, mm H2O < 75	✓	✓	✓	✓	✓	✓
†	Smoke tube temp limit ° C >70	✓	✓	✓	✓	✓	✓
†	Smoke Valve temp	✓	✓	✓	✓	✓	✓
	Fuel Consumption		#REF!		Limit 182.9 ±4% mg/stroke @ 2100rpm		
	Air intake temp, °C	21.1	21.2	21.3	21.4	21.5	21.9
	Inlet depression, kPa	3.70	3.00	2.50	2.00	1.00	1.00
Ann4,4.1	Nominal gas flow, L/s	154.86	140.11	125.36	110.61	95.86	73.74
Ann7	Limit, m^{-1}	1.206	1.270	1.343	1.421	1.528	1.734
Ann4,4.2	Opacity, %	0.34	1.11	1.20	1.24	1.03	0.98
	m^{-1}	0.008	0.026	0.028	0.029	0.024	0.023
	difference	1.198	1.244	1.315	1.392	1.504	1.711
Ann5, 3.1	Result nearest limit (SM)	0.008	------	------	------	------	------
	Corresponding limit (SL)	1.206	------	------	------	------	------
	Hartridge units with cold start engaged	------	------	------	------	------	------

† Tick to show compliance

ANNEX III

Directives 72/306/EEC and 80/1269/EEC as amended, ECE Regulation 24.03, Annex 10 and ECE Regulation 85

Diesel Power and Smoke, ISLe375 30

Report/Job No: CSH184916

Operation No

Paragraph (R24)

Free Acceleration Smoke Test

Ann5, 1.1.1 Water temperature: 85 °C Oil temperature: 93 °C

Ann10, 5.3.2 Intake air temperature: 21.1 °C

Ann4, 3.3 Barometric pressure (H): 759.81 mm Hg

Barometric pressure: 101.30 kPa Vp: 1.75 kPa ps: 99.6 kPa

Factor F = 0.9916 x 0.9934 = 0.9851

Ann4, 3.3.1.2 Factor fa = 0.9961 x 0.9804 = 0.9766

Test No	Inertia (1) =1.0 kgm^2		Inertia (2) kgm^2		Inertia (3) kgm^2		Inertia (4) = kgm^2	
Ann5, 2.3	Opacity	XM m^{-1}	Opacity	XM m^{-1}	Opacity	XM m^{-1}	Opacity	XM m^{-1}
Ann5, 2.5,2.6 1								
2								
3								
4								
5								
6								
7	22.40755							
8	12.70526							
9	10.23096							
10	19.8644	0.41						

			Inertia (1)	Inertia (2)	Inertia (3)	Inertia (4)
Ann5, 2.6	FAS test result:	(XM)	0.41			
Ann 5, 3	Result nearest to limit in steady speed tes	(SM)	0.008			
	Corresponding limit:	(SL)	1.206			
	Corrected result:	(XL)				
	SL/SM = 150.696		150.696			
	X1L = SL/SM x XM =		62.37			
	X2L = XM + 0.5 =		0.91			
	Absorbed coefficient to be marked on Vehicle		0.91			

Highest absorption coefficient, steady speed test 0.03 m^{-1}

Corresponding limit + 0.5 (A) 1.92 m^{-1}

FAS test result (XM) I(1)= 0.41 m^{-1}, I(2)= m^{-1}

I(3)= m^{-1}, I(4)= m^{-1}

(For turbocharged engines XM must be less than A)

Engine net power and torque