



EU TYPE-APPROVAL CERTIFICATE

Communication concerning the:

- ~~EU type approval,~~
- extension of EU type approval,
- ~~refusal of EU type approval,~~
- ~~withdrawal of EU type approval,~~

of an ~~engine type~~/engine family ⁽¹⁾ with regard to gaseous and particulate pollutant emission pursuant to Regulation (EU) 2016/1628, as last amended by (Commission Delegated) ⁽¹⁾ Regulation (EU) 2018/989 ⁽¹⁾⁽²⁾ (of the European Parliament and of the Council) ⁽¹⁾

EU Type Approval No: **e24*2016/1628*2018/989EV5/D*0229*02**

Reason for extension/~~refusal~~/~~withdrawal~~ ⁽¹⁾:

**- See “Reason for Extension or Revision”
in manufacturer’s information document
for details**

SECTION I

- | | | |
|-------|--|--|
| 1.1. | Make (trade name(s) of manufacturer): | Perkins Engines Co Ltd,
also branded as Caterpillar |
| 1.2. | Commercial name(s) (if applicable): | 904J-E36TADDS (Perkins),
C3.6 (Caterpillar) |
| 1.3. | Company name and address of manufacturer: | Perkins Engines Co Ltd
Frank Perkins Way
Peterborough
PE1 5FQ United Kingdom |
| 1.4. | Name and address of manufacturer's authorised representative (if any): | Caterpillar Energy Solutions GmbH
Attn: General Manager Research and
Development
Carl-Benz-Strasse 1
68167 Mannheim
Germany |
| 1.5. | Name(s) and address(es) of assembly/manufacture plant(s): | Perkins Engines Co Ltd
Frank Perkins Way
Peterborough
PE1 5FQ United Kingdom |
| 1.6. | Engine type designation /engine family designation/FT ⁽¹⁾ : | NRE5V03.6HTA |
| 1.7. | Category and sub-category of the engine
type /engine family ⁽¹⁾⁽⁴⁾ : | NRE-v-5 |
| 1.8. | Emissions durability period category: | Not Applicable/Cat 1/Cat 2/Cat 3 ⁽¹⁾ |
| 1.9. | Emissions stage: | V/ SPE |
| 1.10. | Engine for snow throwers ⁽⁵⁾ : | Yes/No ⁽¹⁾ |

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SECTION II

1. Technical service responsible for carrying out the tests: **TÜV SÜD Auto Service GmbH,
Westendstraße 199,
D-80686 München,
Germany.**
2. Date(s) of test report(s): **10.02.2020**
3. Number(s) of test report(s): **18-01030-CP-GBM-00 up to 02**

SECTION III

The undersigned hereby certifies the accuracy of the manufacturer's description in the attached information document of the engine type/engine family ⁽¹⁾ described above, for which one or more representative samples, selected by the approval authority, have been submitted as prototypes and that the attached test results apply to the engine type/engine family ⁽¹⁾.

1. The engine type/engine family ⁽¹⁾ meets/~~does not meet~~ ⁽¹⁾ the requirements laid down in Regulation (EU) 2016/1628.
2. The approval is: **~~granted/extended/refused/withdrawn~~ ⁽¹⁾**
3. The approval is granted in accordance with Article 35 of Regulation (EU) 2016/1628 and the validity of the approval is thus limited to dd/mm/yyyy ⁽³⁾ **N/A**
4. Restrictions to validity ^{(3) (6)}: **N/A**
5. Exemptions applied ^{(3) (6)}: **N/A**

Place:

Dublin.

Date:

27th February, 2020.

Name and signature
(or visual representation of an
'advanced electronic signature'
according to Regulation (EU) No 910/2014, including data for verification):




Attachments:

Information package

Test report(s)

Where applicable, the name(s) and specimen(s) of the signature(s) of the person(s) authorised to sign statement Of conformity and a statement of their position in the company Where applicable, a completed specimen of a statement of conformity

NB:

If this model is used for EU type-approval of an engine as an exemption for new technologies or new concepts, pursuant to Article 35(4) of Regulation (EU) 2016/1628, the heading of the certificate shall read 'PROVISIONAL EU TYPE-APPROVAL CERTIFICATE VALID ONLY ON THE TERRITORY OF ... ⁽⁷⁾'.

Addendum

PART A — CHARACTERISTICS OF THE ~~ENGINE TYPE~~/ENGINE FAMILY ⁽¹⁾

2. Common design parameters of the ~~engine type~~/engine family ⁽¹⁾
- 2.1. Combustion Cycle: *four stroke cycle/two stroke cycle/rotary
other: (describe) ⁽¹⁾*
- 2.2. Ignition Type: *Compression ignition/spark ignition ⁽¹⁾*
- 2.3.1. Position of the cylinders in the block: *V/in-line/radial/other(Single) ⁽¹⁾*
- 2.6 Main Cooling medium: *Air/Water/Oil ⁽¹⁾*
- 2.7. Method of air aspiration: *naturally aspirated/pressurecharged/
pressure charged with charge cooler ⁽¹⁾*
- 2.8.1. Fuel Type(s): *Diesel (non-road gas-oil)/Ethanol for
dedicated compression ignition engines
(ED95)/Petrol (E10)/Ethanol(E85)/
(Natural gas/Biomethane)/Liquid
Petroleum Gas (LPG) ⁽¹⁾*
- 2.8.1.1. Sub Fuel type (Natural gas/Biomethane only): *Universal fuel—high calorific fuel (H-
gas) and low calorific fuel (L-gas)/
Restricted fuel—high calorific fuel (H-
gas)/Restricted fuel—low calorific fuel
(L-gas)/Fuel specific (LNG);*
- 2.8.2. Fuelling arrangement: *Liquid-fuel only/Gaseous-fuel only/Dual-
fuel type 1A/Dual-fuel type 1B/Dual-fuel
type 2A/Dual-fuel type 2B/Dual-fuel
type 3B ⁽¹⁾*
- 2.8.3. List of additional fuels compatible with use by the engine declared by the manufacturer in accordance with point 1 of Annex I to Delegated Regulation (EU) 2017/654 (provide reference to recognised standard or specification): *B20 biofuel per ASTM D7467
or EN16709:2015*
- 2.8.4. Lubricant added to fuel: *Yes/No ⁽¹⁾*
- 2.8.5. Fuel supply type: *Pump (high-pressure) line and injector/in
line pump or distributor pump/Unit
injector/Common rail/Carburettor/port
injector/direct injector/Mixing unit/
other(specify) ⁽¹⁾*
- 2.9. Engine management systems: *mechanical/electronic control strategy ⁽¹⁾*

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2.10.	Miscellaneous devices:	Yes/No ⁽¹⁾
2.10.1.	Exhaust gas recirculation (EGR):	Yes/No ⁽¹⁾
2.10.2.	Water injection:	Yes/No ⁽¹⁾
2.10.3.	Air injection:	Yes/No ⁽¹⁾
2.10.4.	Others (specify):	Yes (Crankcase Breather System: Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV))
2.11.	Exhaust after-treatment system:	Yes/No ⁽¹⁾
2.11.1.	Oxidation catalyst:	Yes/No ⁽¹⁾
2.11.2.	DeNOx system with selective reduction of NOx (addition of reducing agent):	Yes/No ⁽¹⁾
2.11.3.	Other DeNOx systems:	Yes/No ⁽¹⁾
2.11.4.	Three-way catalyst combining oxidation and NOx reduction:	Yes/No ⁽¹⁾
2.11.5.	Particulate after-treatment system with passive regeneration:	Yes/No ⁽¹⁾
2.11.6.	Particulate after-treatment system with active regeneration:	Yes/No ⁽¹⁾
2.11.7.	Other particulate after-treatment systems:	Yes/No ⁽¹⁾
2.11.8.	Other after-treatment devices (specify):	N/A
2.11.9.	Other devices or features that have a strong influence on emissions (specify):	N/A

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3. Essential characteristics of the engine type(s)

Item Number	Item Description	Parent Engine / Engine type	Engine types within the family (if applicable)
3.1.1.	Engine Type Designation:	5046/2200	*
3.1.2.	Engine type designation shown on engine mark: Yes/No ⁽¹⁾	Yes	*
3.1.3.	Location of the manufacturer's statutory marking:	<i>The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.</i>	*
3.2.1.	Declared rated speed (rpm):	2200	*
3.2.1.2.	Declared rated net Power (kW):	100	*
3.2.2.	Maximum power speed (rpm):	2100	*
3.2.2.2.	Maximum net power (kW):	100	*
3.2.3.	Declared maximum torque speed (rpm):	1500	*
3.2.3.2.	Declared maximum torque (Nm):	550	*
3.6.3.	Number of Cylinders:	4	*
3.6.4.	Engine total swept volume (cm ³):	3621	*
3.8.5.	Device for recycling crankcase gases: Yes /No ⁽¹⁾	Yes	*
3.11.3.12.	Consumable reagent: Yes /No ⁽¹⁾	Yes	*
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:	Aqueous Urea Solution (NH₃), 32.5	*
3.11.3.13.	NO _x sensor(s): Yes /No ⁽¹⁾	Yes	*
3.11.3.14.	Oxygen sensor: Yes /No ⁽¹⁾	No	*
3.11.4.7.	Fuel borne catalyst (FBC): Yes /No ⁽¹⁾	No	*

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Particular conditions to be respected in the installation of the engine on non-road mobile machinery:

Item Number	Item Description	Parent Engine / Engine type	Engine types within the family (if applicable)
3.8.1.1.	Maximum allowable intake depression at 100 % engine speed and at 100 % load (kPa) with clean air cleaner:	6.5	*
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):	55.0	*
3.8.3.3.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa) (if applicable):	10	*
3.9.3.	Maximum permissible exhaust gas backpressure at 100 % engine speed and at 100 % load (kPa):	35.1	*
3.9.3.1	Location of measurement:	Engine Out	*
3.11.1.2.	Maximum temperature drop from exhaust system or turbine outlet to first exhaust after-treatment system (deg. C) if stated:	Per A&I guide	*
3.11.1.2.1.	Test conditions for measurement:	Per A&I guide	*

**** For essential characteristics of the engine types with the engine family see information document NRE5V03.6HTA last dated 27.09.2019**

PART B — TEST RESULTS

3.8. Manufacturer intends to use ECU torque signal for in-service monitoring: **Yes/No ⁽¹⁾**

3.8.1. Dynamometer torque greater than or equal to $0,93 \times$ ECU torque: **Yes/No ⁽¹⁾**

3.8.2. ECU torque correction factor in case that dynamometer torque less than $0,93 \times$ ECU torque: **N/A**

11.1. Cycle emissions results

Emissions	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	HC+NOx (g/kWh)	PM (g/kWh)	PN #/kWh	Test Cycle ⁽⁸⁾
NRSC final result with DF.	0.050	0.010	0.12	0.13	0.0024	0.2	C1
NRTC Final test result with DF	0.133	0.009	0.16	0.17	0.0008	0.1	NRTC

(*) Optionally, as an alternative, any combination of values satisfying the equation $(HC + NOx) \times CO^{0,784} \leq 8,57$ as well as the following conditions: $CO \leq 20,6$ g/kWh and $(HC + NOx) \leq 2,7$ g/kWh

11.2. CO₂ result: **NRSC: 701.70 g/kWh
NRTC: 733.12 g/kWh**



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11.3. In service monitoring reference values ⁽⁹⁾

11.3.1. Reference work (kWh): **6.99**

11.3.2. Reference CO₂ mass (g): **6293.56**

Explanatory notes to Annex IV:

(Footnote markers, footnotes and explanatory notes not to be stated on the EU type-approval certificate)

⁽¹⁾ Strike out the unused options, or only show the used option(s).

⁽²⁾ Indicate only the latest amendment in case of an amendment of one or more Articles of Regulation (EU) 2016/1628, according to the amendment applied for the EU type-approval.

⁽³⁾ Delete this entry when not applicable.

⁽⁴⁾ Indicate the applicable option for the category and sub-category in accordance with entry 1.7 of the information document set out in Part A of Appendix 3 to Annex I.

⁽⁵⁾ Indicate whether the approval is for a NRS (< 19 kW) engine family consisting exclusively of engine types for snow throwers.

⁽⁶⁾ Applicable only for EU type-approval of an engine type or an engine family as an exemption for new technologies or new concepts, pursuant to Article 35 of Regulation (EU) 2016/1628.

⁽⁷⁾ Indicate the Member State.

⁽⁸⁾ Indicate the test cycle in accordance with the fifth column of the Tables set out in Annex IV to Regulation (EU) 2016/1628.

⁽⁹⁾ Only applicable to engines of sub-categories NRE-v-5 and NRE-v-6 tested on NRTC.

Index to the Information Package

Date of issue:	<i>2nd April, 2019</i>
Date of latest amendment:	<i>27th February, 2020.</i>
Reason for extension/revision:	<i>See “Reason for Extension or Revision” in manufacturer’s information document for details</i>

1. Additional conditions, and advisory notes on legal alternatives.

2. Test report(s)

- numbers(s):	<i>18-01030-CP-GBM-00 up to 02</i>
- date of issue:	<i>28.01.2019</i>
- date of latest amendment:	<i>02.10.2019</i>

3. Information document

- number(s):	<i>NRE5V03.6HTA_Regulation EU 2016_1628</i>
- date of issue:	<i>22.01.2019</i>
- date of latest amendment:	<i>03/02/2020</i>

Documentation:	<i>42 pages</i>
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Appendix: **Additional conditions, and advisory notes on legal alternatives**

A: Additional conditions:

1. The attached technical report, with any of its attachments, forms part of this Type Approval certificate.
2. Each type from series production shall be to the measurements specified in the attached drawings, and shall be manufactured only from the materials specified in the Approval documents.
3. Changes in the type are permitted only with the explicit permission of NSAI. Breaches of this requirement will lead to a withdrawal of the Type Approval, and in addition may be subject to criminal prosecution.
4. At regular intervals, any tests or associated checks prescribed by the applicable legislation to verify continued conformity with the approved type shall be carried out. The manufacturer shall demonstrate compliance with this by submitting to NSAI evidence of adequate arrangements and documented control plans for each type approved.
5. Any set of samples or test pieces showing evidence of non-conformity shall give rise to further sampling and testing and all steps shall be taken to restore conformity of production.
6. This Type Approval will expire when it is surrendered by the holder, or withdrawn by NSAI, or when the approved type no longer conforms to legal requirements. The recall of the Type Approval can be issued by NSAI when the conditions required for the issuing or continuation of the Type Approval are no longer current, or when the Approval holder is in breach of the duties attached to the Type Approval, or when it is established that the approved type no longer meets the requirements of traffic safety.
7. Changes in the company name, address or manufacturing site, as well as in any of the sales or other agents specified in the issuing of the approval must immediately be notified to NSAI.
8. The duties imposed by the issuing of this certificate are not transferable. The legal protection of third parties is not affected by this certificate.
9. When the manufacture or sale of the system, component or separate technical unit has not been started within one year of the date of issue of this certificate, then NSAI is to be informed. This requirement also applies when the manufacture or sale has been halted for more than one year, or when it ought to have been halted for more than one year. The initial commencement of manufacture or sale, or the resumption of manufacture or sale, shall then be notified to NSAI within one month of commencement or resumption.

B: Legal Options:

Any objection to the requirements set out in this certificate shall be made within one month of the date of issue. The objection shall be made, in writing, to NSAI in Dublin.

Techn. Bericht Nr. / Techn. Report no. 18-01030-CP-GBM-02
Hersteller / Manufacturer: Perkins Engines Company Ltd.
Motortyp / type of engine: 5046/2200
Familie / Family: NRE5V03.6HTA

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TECHNISCHER BERICHT TECHNICAL REPORT

Nr. / No.: 18-01030-CP-GBM-02

**Test Durchführung entsprechend der VO (EU) Nr. 2016/1628
Vom 14.09.2016**

**Mit Durchführungsverordnung VO (EU) Nr.
2017/654 (geändert durch EU/2018/989),
2017/655 (geändert durch EU/2018/987),
2017/656 (geändert durch EU/2018/988)**

**Test procedure according Directive (EC) Nr. 2016/1628
Dated 14.09.2016**

**With Commission Delegated Regulation No. (EU)
2017/654 (amended by EU/2018/989),
2017/655 (amended by EU/2018/987),
2017/656 (amended by EU/2018/988)**

über / relating to

Maßnahmen zur Bekämpfung der Emission von gasförmigen Schadstoffen und
Luftverunreinigenden Partikeln aus
Verbrennungsmotoren zum Antrieb für mobile Maschinen und Geräte.
*measures against the emission of gaseous and particulate pollutants from internal
combustion engines to be installed in non road mobile machinery.*

Genehmigungsstand / Approval status	
☐	Erteilung einer Typgenehmigung <i>Granting of a type approval</i>
☒	Nachtrag/Änderung zur Typgenehmigung Nr. e24*2016/1628*2018/989EV5/D*0229*01 <i>Extension/correction to type approval no.</i>

**0. Grund des Nachtrages:
Reason for extension:**

- Addition of software calibration numbers, Section 3.12.4.2 of Information Document,
- Correction of Information Document No. in Technical Report,
- Editorial changes.

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I. Allgemeine Angaben
General data

- 0.1 Handelsmarke des Fahrzeugs:
Make of vehicle:
- 0.2 Fahrzeugtyp:
Type of vehicle: mobile Maschinen und Geräte
non road mobile machinery
- 0.3 Fahrzeugausführung:
Sort of vehicle: entsprechend EG/2016/1628
according directive EU/2016/1628
- 0.4 Testzyklus Typ:
Test cycle: NRSC Test und NRTC Test
nach Anhang XVII EU/2017/654

NRSC Test und NRTC Test
Acc. annex XVII of EU/2017/654
- 0.5 Name und Anschrift des Herstellers:
Name and address of the manufacturer: Perkins Engines Company Ltd.
Frank Perkins Way
Peterborough
PE1 – 5FQ / United Kingdom
- 0.5.1 Name und Anschrift des Vertreters des Herstellers:
Name and address of the manufacturer representative Caterpillar Energy Solutions GmbH
Attn: General Manager Research and Development
Carl-Benz-Strasse 1
68167 Mannheim
Germany
- 0.6 Bezugs-Nr. des Beschreibungsbogen:
Information document reference no.: **NRE5V03.6HTA_Regulation EU 2016_1628**
- Ausstellungsdatum:
Date of issue: 22.03.2019
- Änderungsdatum:
Amendment type: **03.02.2020**

Techn. Bericht Nr. / Techn. Report no. 18-01030-CP-GBM-02
Hersteller / Manufacturer: Perkins Engines Company Ltd.
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II. Prüfprotokoll Test report

Since the reasons mentioned in 1st page don't have any negative effect on previous test results, no new test had to be carried out. Former test results, which are mentioned in this Technical Report are still valid. Only editorial changes were applied.

1. Technische Daten des Prüfobjekts
Technical data of test-object
 - 1.1. Fahrzeugausführung (Code): ---
Sort of vehicle (code):
 - 1.2. Angaben über den Motor
Engine data
 - 1.2.1. Marke: Perkins Engines Company Ltd.
Make of engine (904J-E36TADDs), also branded as (Caterpillar C3.6)
 - 1.2.2. Klasse und Unterklasse des Motors: NRE-v-5
Engine category and subcategory:
 - 1.2.3. Typ / Ausführung: NRE5V03.6HTA (family)
Type / sort
 - 1.2.4. Stammmotor: 5046/2200
Parent engine:
 - 1.2.5. Nummer: J3622664
Number:
 - 1.2.6. Maximale Nutzleistung bei Drehzahl: 100 kW/ 2200 min⁻¹
Maximum net power at speed:
 - 1.2.7. Nennwert der Nutzleistung bei Drehzahl: 100 kW/ 2200 min⁻¹
Rated net power at speed:
 - 1.2.8. Maximales Drehmoment bei Drehzahl: 550 Nm/ 1500 min⁻¹
Maximum torque at speed:
 - 1.2.9. Zylinderzahl 4
Number of cylinders:
 - 1.2.10. Gesamthubraum: 3621 cm³
Total cylinder displacement:

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1.2.11.	Lage der Zylinder in Block <i>Position of the cylinder in the block:</i>	Reihe <i>in-line</i>
1.2.12.	Arbeitsweise: <i>Combustion cycle:</i>	Viertakt <i>four stroke</i>
1.2.13.	Art der Zündung: <i>Ignition type:</i>	Kompressionszündung <i>compression ignition</i>
1.2.14.	Luftansaugverfahren: <i>Method of aspiration:</i>	Turbo aufgeladener Motor <i>Turbocharged</i>
1.2.15.	Abgasnachbehandlung Exhaust-after-treatment:	DOC+DPF+SCR+AMOX (sporadische passive /aktive Regeneration) <i>DOC+DPF+SCR+AMOX (infrequent active and passive regeneration)</i>
1.2.16.	AGR: EGR:	Ja Yes
2.1.	Motorabbildungskurve: <i>Engine mapping:</i>	Siehe Anlage <i>see Attachment</i>
2.2.	Dokumentation zur Ermittlung der Verschlechterungsfaktoren: <i>Deterioration factor determination documentation reference:</i>	<i>see 'Deterioration Factor Determination for Perkins' attachment</i>
2.3.	Dokumentation zur Ermittlung der Regenerationsfaktoren (periodische Regeneration): <i>Regeneration factor determination documentation reference (infrequent regeneration):</i>	siehe Prüfergebnisse 7.1.4 <i>see test results 7.1.4</i>
2.4.	Prüfbericht <i>Test report</i> NO _x -Control Diagnostic: <i>NO_x-Control Diagnostic</i> Particulate-Control Diagnostic: <i>Particulate-Control Diagnostic</i>	 <i>see emission control strategy attachments</i> <i>see emission control strategy attachments</i>

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2.5. Vorkehrungen gegen Manipulation Anti-tampering devices

Motoren mit ECU: see emission control strategy
Engines with ECU: attachments

Motoren mit mech. Entfällt
Emissionsminderungseinrichtung not applicable
Engines with mechanical
Emission control

2.6. Hersteller verwendet Drehmomentsignal Ja
ECU zur ISM-Prüfung yes
Manufacturer uses ECU torque signal for
ISM-Testing

Gemessenes Drehmoment auf Ja
dem Prüfstand $\geq 0,93 \times$ Drehmomentsignal der yes
ECU
Dynamometer torque $\geq 0,93 \times$ ECU torque
signal

Drehmomentenkorrekturfaktor Entfällt
ECE torque correction factor not applicable

III. Prüfung / Test

Prüfeinrichtungen und Prüfbedingungen entsprechend Anhang VI der EG VO.
2017/654

Test installations and conditions are in accordance with annex VI of EC directive
no. 2017/654

- Ort: 1) Perkins Engines Company Ltd.
Location: Frank Perkins Way
Peterborough
PE1 – 5FQ / United Kingdom
2) Munich / Germany
- Datum der Prüfung: 05 - 08.11.2018 and 02.10.2019,
Date of Test: **2)10.02.2020 (document check)**
- Prüfungsbericht Nummer: **18-01030-CP-GBM-02**
Test report number:

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4. Prüfbedingungen Test conditions

4.1. Drücke bei Nenndrehzahl Pressures at nominal speed

4.1.1. Ansaugunterdruck: 6,4 kPa
Intake vacuum:

4.1.2. Abgasgegendruck: 35,9 kPa
Exhaust gas back pressure:

4.1.3. Ladeluftdruck: 165,1 kPa
Charge-air pressure: (After intercooler)

4.2. Prüfdrehzahlen bei NRSC Test Test speeds with NRSC

4.2.1. Leerlauf: 801 min⁻¹
Idling speed:

4.2.2. Zwischendrehzahl: 1500 min⁻¹
Intermediate speed:

4.2.3. Nenndrehzahl: 2200 min⁻¹
Rated speed:

4.2.4. Drehzahl bei Höchstleistung: 2200 min⁻¹
Speed at max. power:

4.3. Für die Prüfung verwendeter Bezugskraftstoff *Reference fuel used for test*

4.3.1. Cetanzahl / *Cetane* 54,8
(ASTM D-613)

4.3.2. Schwefelgehalt / *Sulphur content* 6,9 ppm

4.3.3. Dichte / *Density* 832,5 kg/m³

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4.4. Schmiermittel / Lubricant

4.4.1. Marke / Make Cat CJ-4

4.4.2. Typ / Type 10 W30

5. Motorleistung / Engine performance

5.1. Motordrehzahl / Engine speeds

Leerlauf / idle: 900 -110/+310 min⁻¹

Zwischendrehzahl / Intermediate: 1500 min⁻¹

Nenndrehzahl / Rated: 2200 min⁻¹

5.2. Vom Motor angetriebene Einrichtungen (falls vorhanden) Engine driven equipment (if applicable)

5.2.1. Die Leistung bei den angegebenen Motordrehzahlen, die von Hilfsaggregaten aufgenommen wird, die für die Funktion des Motors unerlässlich sind und für die Prüfungen nicht eingebaut werden können (laut Herstellerangaben) sind aufzuführen:

The power absorbed at indicated engine speeds by necessary auxiliaries for engine operation that cannot be fitted for the test (as specified by the manufacturer) to be stated:

Typ und Kennzeichen des Hilfsaggregats <i>Auxiliary type and identifying details</i>	Leistungsaufnahme des Nebenaggregats (kW) bei angegebener Drehzahl Power absorbed by auxiliary (kW) at indicated engine speed						
	Idle	63%	80%	91%	Inter- med.	Max. Power.	100%
	***	***	***	***	***	***	***
	***	***	***	***	***	***	***
	***	***	***	***	***	***	***
Total (Pf,i) (kW):	***	***	***	***	***	***	***

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- 5.2.2. Die Leistungsaufnahme bei den angegebenen Motordrehzahlen von Hilfsaggregaten, die die mit dem Betrieb der nicht für den Straßenverkehr bestimmten mobilen Maschine bzw. des Geräts in Verbindung stehen, mit dem Motor verbunden sind und für die Prüfungen nicht entfernt werden können (laut Herstellerangaben), sind aufzuführen

The power absorbed at indicated engine speeds by auxiliaries linked with the operation of the non-road mobile machinery that cannot be removed for the test (as specified by the manufacturer) to be stated:

Typ und Kennzeichen des Hilfsaggregats <i>Auxiliary type and identifying details</i>	Leistungsaufnahme des Nebenaggregats (kW) bei angegebener Drehzahl <i>Power absorbed by auxiliary (kW) at indicated engine speed</i>						
	Idle	63%	80%	91%	Inter-med.	Max. Power.	100%
	***	***	***	***	***	***	***
	***	***	***	***	***	***	***
	***	***	***	***	***	***	***
Total ($P_{r,i}$) (kW):	***	***	***	***	***	***	***

- 5.3. Nettomotorleistung
Engine net power:

Bedingung <i>Condition</i>	Nettomotorleistung (kW) bei angegebener Drehzahl <i>Engine net power (kW) at indicated engine speed</i>		
	Zwischendrehzahl <i>/ Intermediate</i>	Nenndrehzahl / <i>Rated</i>	100%
Bei der Prüfung gemessene Höchstleistung ($P_{m,i}$) (kW) <i>Maximum power measured on test ($P_{m,i}$) (kW)</i>	85	100	100
Leistung der Hilfsaggregate insgesamt aus Pkt. 5.2.1 ($P_{f,i}$)	0,0	0,0	0,0
Leistung der Hilfsaggregate insgesamt aus Pkt. 5.2.2 ($P_{r,i}$)	0,0	0,0	0,0
Nettomotorleistung Engine net power $P_i = P_{m,i} - P_{f,i} + P_{r,i}$	85	100	100

6. Bedingungen bei der Prüfung
Conditions at test

- 6.1. f_a im Bereich von 0,93 bis 1,07 Ja
 f_a within range 0,93 to 1,07 yes

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6.1.1. Falls f_a nicht innerhalb des vorgegebenen Bereich
If f_a not within specified range

Meereshöhe der Prüfeinrichtung (m) Entfällt
Altitude of test facility (m) not applicable

Trockener Luftdruck (kPa) Entfällt
Dry atmospheric pressure (kPa) not applicable

6.2. Zulässiger Temperaturbereich für die 20 ... 30
Einlassluft (°C)
Applicable intake air temperature range (°C)

7. Prüfergebnisse
Test results

Prüfergebnisse gemäß 2017/654 Anhang VII, Anlage 1 mit VO (EG) Nr. 2016/1628
Test Results according to 2017/654 EC annex VII, appendix 1, Directive (EC) Nr. 2016/1628

7.1. Ergebnis für **NRSC**-Emissionen
***NRSC** Emissions results*

7.1.1. Angewandter **NRSC** Prüfzyklus
*Applied **NRSC** test cycle*

Zyklus / Cycle	C1	C2	D2	E2	E3	F	G2	G3	H
Einzelphasen Prüfzyklus / <i>Discrete mode</i>									
Mehrphasenzyklus (RMC) <i>RMC</i>	x								

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7.1.2 Einstellung des Leistungsprüfstands (kW) Dynamometer setting (kW)

	Einstellung des Leistungsprüfstands (kW) bei angegebener Motordrehzahl nach Anpassung für die Leistungsaufnahme der Hilfsaggregate ¹⁾ <i>Dynamometer setting (kW) at indicated engine speed after adjustment for auxiliary power ¹⁾</i>	
% Teillast % load	Zwischendrehzahl Intermediate	Nenndrehzahl Rated
10	8,5	10
25	21,2	25
50	42,5	50
75	63,8	75
100	85,0	100

¹⁾ Die Einstellung des Leistungsprüfstands wird mithilfe des Verfahrens in Anhang VI Nummer 7.7.1.3 der Delegierten Verordnung (EU) 2017/654 bestimmt. Die Leistungsaufnahme von Hilfsaggregaten wird mithilfe der Gesamtwerte aus Abschnitt 7.1. und 7.2. bestimmt.

The dynamometer setting shall be determined using the procedure set out in point 7.7.1.3 of Annex VI to Delegated Regulation (EU) 2017/654. The auxiliary power in that point shall be determined using the total values set of section 7.1. and 7.2.

7.1.3. Verschlechterungsfaktor (DF): ermittelt im Dauerlauf
Deterioration Factor (DF): determined by durability test

7.1.4. IRAF:Bestimmung / IRAF determination

Emissionen Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN (#/kWh) (x 10¹²)
Prüfergebnis ohne Regeneration Test result without regeneration	0,0601	0,0331	0,0908	0,1239	0,0001	0,0479
Prüfergebnis mit Regeneration Test result with regeneration	0,0819	0,3868	2,3259	2,7128	0,0470	1,3662
Zyklen Anzahl zwis. regen. Cycles between regeneration	117	117	117	117	117	117*
Zyklen Anzahl mit regen Cycles with regeneration	2	2	2	2	2	2*
IRAF Korrektur IRAF adjustment (additive)	0,0004	0,0059	0,0376	0,0435	0,0008	0,0222
Gewichtete Emission Weighted emission	0,0605	0,0390	0,1284	0,1674	0,0008	0,0700
Leistungsklasse des Stamm Motors / Net power (P)	56 KW ≤ P < 130 KW					

* = value is not multiplied with 10¹²

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7.1.5. Die nach Zyklus **NRSC** gewichteten Ergebnisse der Emissionensprüfung
The cycle weighted emissions results NRSC

Emissionen Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN (#/kWh) (x 10¹²)
Prüfergebnis ohne Regeneration Test result without regeneration	0,0000	0,0009	0,0778	0,0787	0,0006	0,2068
DF additiv additiv	0,0500	0,0030	0,0000	0,0030	0,0010	0,0000
k_{ru}/k_{rd} multiplikativ multiplicative	-	-	-	-	-	-
IRAF Korrektur IRAF adjustment	0,0004	0,0059	0,0376	0,0435	0,0008	0,0222
Prüfergebnis mit IRAFs ^{*)} Test result with IRAFs	0,0004	0,0068	0,1154	0,1222	0,0014	0,2290
Prüfergebnisse mit DF und KI Test result with DF and KI	0,050	0,010	0,12	0,13	0,0024	0,2
Grenzwerte Stufe V Limit values Stage V	5,00	0,19	0,4	-	0,015	1
Leistungsklasse des Stamm Motors / Net power (P)	56 KW ≤ P < 130 KW					

^{*)} IRAF = Anpassungsfaktor für die sporadische Regeneration
IRAF = infrequent regeneration adjustment factors

7.1.6. Nach Zyklus gewichtetes CO₂ (g/kWh): 701,70
Cycle weighted CO₂ (g/kWh):

7.1.7. Nach Zyklus gewichtetes NH₃ (ppm): 0,398
Cycle weighted NH₃ (ppm):

7.2. Informationen zur Durchführung der **NRTC**-Prüfung
Informationen concerning the conduct of the *NRTC test*

7.2.1. Angewendte Vergänglich Prüfzyklus
Applied transient test cycle

NRTC	x
LSI-NRTC	

7.2.2. Verschlechterungsfaktor (DF): calculated/fixed
Deterioration Factor (DF):

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7.2.3. Die nach NRTC Zyklus gewichteten Ergebnisse der Emissionsprüfung *The NRTC cycle weighted emissions results*

Emissionen <i>Emissions</i>	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN (#/kWh) (x 10 ¹²)
Ergebnis der Prüfung mit Kaltstart <i>Cold start test result</i>	0,1100	0,0060	0,4820	0,4880	0,0006	0,1562
Ergebnis der Prüfung mit Warmstart ohne Regeneration <i>Hot start test result without regeneration</i>	0,0460	0,0030	0,0790	0,0820	0,0000	0,1151
Gewichtetes Prüfergebnis <i>Weighted test result</i>	0,0524	0,0033	0,1193	0,1226	0,00006	0,11921
k _{ru} /k _{rd} (DF) additiv <i>k_{ru}/k_{rd} (DF) additive</i>	0,08	0,000	0,000	0,000	0,000	0,0
k _{ru} /k _{rd} (DF) multiplikativ <i>k_{ru}/k_{rd} (DF) multiplicative</i>	-	-	-	-	-	-
IRAF Korrektur <i>IRAF adjustment</i>	0,0004	0,0059	0,0376	0,0435	0,0008	0,0222
Prüfergebnis mit IRAFs *) <i>Test result with IRAFs</i>	0,0528	0,0092	0,1569	0,1661	0,0008	0,1414
Abschließendes Prüfergebnis mit DF und IRAF <i>Final test result incl IRAF and DF</i>	0,133	0,009	0,16	0,17	0,0008	0,1
Grenzwerte Stufe V <i>Limit values Stage V</i>	5,00	0,19	0,4	-	0,015	1
Leistungsklasse des Stamm Motors <i>Net power (P)</i>	56 KW ≤ P < 130 KW					

*) IRAF = Anpassungsfaktor für die sporadische Regeneration
IRAF = infrequent regeneration adjustment factors

7.2.4. Hot cycle CO₂ (g/kWh): 733,12

7.2.5. Nach Zyklus gewichtetes NH₃ (ppm):
Cycle average NH₃ (ppm):

Cold NRTC	Hot NRTC	Limit
0,15 ppm	0,19 ppm	10 ppm

7.2.6. Zyklusarbeit für Warmstartprüfung (kWh) 12,3134
Cycle work for hot start test (kWh)

7.2.7. CO₂ im Zyklus für Warmstartprüfung (g) 9027,20
Cycle CO₂ for hot start test (g)

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7.3 Für die Prüfung verwendetes Probenamesystem:
Sampling system used for the test:

7.3.1 Gasförmige Emissionen: Rohgas-Probenahme
Gaseous Emissions: *raw gas sampling*

7.3.2 PM: Teilstrom-Probennahme
PM: partial flow sampling

Methode: Einfachfilter
Method: single filter

Partikelanzahl: Teilstrom-Probenahme
Particle number: partial flow sampling

7.4. Endergebnis der Emissionsprüfung
Final emission results

Emissionen <i>Emissions</i>	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN (#/kWh) (x 1012)	Zyklus Cycle
NRSC abschließendes Prüfergebnis mit DF und KI <i>NRSC final test result with DF and KI</i>	0,050	0,010	0,12	0,13	0,0024	0,2	C1
NRTC abschließendes Prüfergebnis mit DF und KI <i>NRTC final test result with DF and KI</i>	0,133	0,009	0,16	0,17	0,0008	0,1	NRTC
Grenzwerte <i>Limit values</i>	5,00	0,19	0,40	-	0,015	1	

7.4.1 CO₂ result: 733,12

7.4.2. In service monitoring reference values

7.4.2.1 Reference work (kWh): 12,3134

7.4.2.2 Reference CO₂ mass (g): 9027,20

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Zusätzliche Prüfpunkte für den Kontrollbereich
Additional points for the control area

Emission at control point	Engine speed (rpm)	Torque (Nm)	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN (#/kWh) x 10 ¹²
Result 1	1514	465	0,000	0,000	0,028	0,028	0,00112	0,1037
Result 2	1500	407	0,000	0,000	0,024	0,024	0,00084	0,2816
Result 3	1500	271	0,000	0,000	0,013	0,013	0,00054	0,4389

The engine family does not exceed the applicable emission limit values by a factor of 2 when tested as per annex V.

7.5. Bemerkungen: none
Remarks:

III. Anlagen
Enclosures

1. Beschreibungsbogen Nr. NRE5V03.6HTA_Regulation EU 2016_1628 einschließlich Anlagen
Information Document no. NRE5V03.6HTA_Regulation EU 2016_1628 including Enclosures

Die unter Ziffer III.1 angegebene Beschreibungsmappe und der darin beschriebene Typ entsprechen der genannten Prüfgrundlage. Der ungünstigste Fall wurde entsprechend Prozessbeschreibung „Erstellung von Gutachten“ bestimmt.

Der Prüfbericht darf nur vom Auftraggeber und nur in vollem Wortlaut vervielfältigt und weitergegeben werden. Eine auszugsweise Vervielfältigung und Veröffentlichung des Prüfberichtes ist nur nach schriftlicher Genehmigung des Prüflaboratoriums zulässig

The information folder as mentioned under No. III.1 and the type described therein are in compliance with the test specification mentioned above. The worst-case was selected in accordance with document "Preparation of Test Reports".

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Benannt als Technischer Dienst durch:
designated as Technical Service by:

Genehmigungsbehörde/ Approval authority	Land/Country	Registriernummer/ Registration-number
Kraftfahrt-Bundesamt (KBA)	Deutschland/ Germany	KBA-P 00100-10
Vehicle Certification Agency (VCA)	Vereintes Königreich/ United Kingdom	VCA-TS-006
Approval Authority of the Netherlands (RDW)	Niederlande/ The Netherlands	RDWT-082-xx
National Standards Authority of Ireland (NSAI)	Irland/ Ireland	Technical Service Number: 49
Vehicle Safety Certification Center (VSCC)	Taiwan/ Taiwan	DE04-06-2
Société Nationale de Certification et d'Homologation s.à r.l.	Luxemburg Luxembourg	B27180

Munich, 10.02.2020



Ramazan Köse / Expert

Application for approval of:

Engine Family	NRE5V03.6HTA
Engine Code	As information document
Directive No.	(EU) 2016/1628
Issue no. of Submission	3
Reason for Extension or Revision	Addition of Software Calibration numbers, Section 3.12.4.2

Extension History

Issue 2: Corrected Miscellaneous devices, section 2.10.
 Corrected bore centre to centre dimension in section 2.3.2.
 Addition of OCV option 2.10.4.
 Corrected declared rated speed in section 3.2.1.
 Corrected maximum power speed, section 3.2.2.
 Corrected minimum temperature, section 3.7.1.3.
 Corrected maximum temperature, section 3.7.1.4.
 Corrected pressure charger description, section 3.8.2.2.
 Corrected pressure value, section 3.8.3.3.
 Corrected intake throttle valve, section 3.8.4.
 Addition of after-treatment part numbers as per sections 3.11.3.1. & 3.11.4.2.
 Corrected operating temperature range, section 3.11.3.11.
 Addition of Software Calibration numbers, Section 3.12.4.2
 Corrected declared values in section 3.12.5.2.
 Addition of new child rating 6333/2200.
 Addition of Open Breather option supporting document
 Updates to the following supporting Documents: DF Report v3.0, NCD Document v4, PCD Document v1.6, Tamper Prevention Document v5.0, Inducement Document v2.0, BECS/AECS Document v2.0

Issue 1: New Submission

Appendix 3

Information document

PART A

1 GENERAL INFORMATION

1.1.	Make (trade name(s) of manufacturer):	Perkins Engines Co Ltd, also branded as Caterpillar
1.2.	Commercial name(s) (if applicable):	904J-E36TADDS (Perkins), C3.6 (Caterpillar)
1.3.	Company name and address of manufacturer:	Perkins Engines Co Ltd Frank Perkins Way Peterborough PE1 5FQ United Kingdom
1.4.	Name and address of manufacturer's authorised representative (if any):	Caterpillar Energy Solutions GmbH Attn: General Manager Research and Development Carl-Benz-Strasse 1 68167 Mannheim Germany
1.5.	Name(s) and address(es) of assembly/manufacture plant(s):	Perkins Engines Co Ltd Frank Perkins Way Peterborough PE1 5FQ United Kingdom
1.6.	Engine type designation/engine family designation/ET:	NRE5V03.6HTA
1.7.	Category and sub-category of the engine type/engine family:	NRE-v-5
1.8.	Emissions durability period category:	Not Applicable
1.9.	Emissions stage:	V
1.10.	In case of NRS <19 kW only, engine family consisting exclusively of engine types for snow throwers: Yes/No	NO
1.11.	Reference power is:	rated net power
1.12.	Primary NRSC test cycle:	C1
1.12.1.	In case of variable speed IWP category only, Additional propulsion test cycle:	Not applied
1.12.2.	In case of IWP category only, additional auxiliary NRSC test cycle:	Not applied
1.13.	Transient test cycle:	NRTC
1.14.	Restrictions on use (if applicable):	

PART B**2 COMMON DESIGN PARAMETERS OF ENGINE FAMILY (1)**

2.1.	Combustion Cycle:	four stroke cycle
2.2.	Ignition Type:	Compression ignition
2.3.	Configuration of the cylinders	
2.3.1.	Position of the cylinders in the block:	in-line
2.3.2.	Bore centre to centre dimension (mm):	108
2.4.	Combustion chamber type/design	
2.4.1.	Open chamber/divided chamber/other(specify)	Open chamber
2.4.2.	Valve and porting configuration:	cross-flow, 2 inlet, 2 exhaust
2.4.3.	Number of valves per cylinder:	4
2.5.	Range of swept volume per cylinder (cm3):	N/A
2.6.	Main Cooling medium:	Water
2.7.	Method of air aspiration:	pressure charged with charge cooler
2.8.	Fuel	
2.8.1.	Fuel Type:	Diesel (non-road gas-oil)
2.8.1.1.	Sub Fuel type (Natural gas/Biomethane only):	
2.8.2.	Fuelling arrangement:	Liquid-fuel only
2.8.3.	list of additional fuels, fuel mixtures or emulsions suitable for use by the engine, as declared by the manufacturer in accordance with point 1.2.3 of Annex I to Delegated Regulation (EU) 2017/654 (provide reference to recognised standard or specification):	B20 biofuel per ASTM D7467 or EN16709:2015
2.8.4.	Lubricant added to fuel:	NO
2.8.4.1.	Specification:	N/A
2.8.4.2.	Ratio of fuel to oil:	N/A
2.8.5.	Fuel supply type:	Common rail
2.9.	Engine management systems:	electronic control strategy (2)
2.10.	Miscellaneous devices: (if yes provide a schematic diagram of the location and order of the devices)	YES
2.10.1.	Exhaust gas recirculation (EGR): Yes/No (if yes, complete section 3.10.1 and provide a schematic diagram of the location and order of the devices)	YES
2.10.2.	Water injection: (if yes, complete section 3.10.2 and provide a schematic diagram of the location and order of the devices)	NO
2.10.3.	Air injection: (if yes, complete section 3.10.3 and provide a schematic diagram of the location and order of the devices)	NO

2.10.4.	Others	YES
	Others: Yes/No (if yes, complete section 3.10.4 and provide a schematic diagram of the location and order of the devices)	Crankcase Breather System: Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)
2.11.	Exhaust after-treatment system: (if yes provide a schematic diagram of the location and order of the devices)	YES
2.11.1.	Oxidation catalyst: (if yes, complete section 3.11.2)	YES
2.11.2.	DeNOx system with selective reduction of NOx (addition of reducing agent): (if yes, complete section 3.11.3)	YES
2.11.3.	Other DeNOx systems: (if yes, complete section 3.11.3)	NO
2.11.4.	Three-way catalyst combining oxidation and NOx reduction: (if yes, complete section 3.11.3)	NO
2.11.5.	Particulate after-treatment system with passive regeneration: (if yes, complete section 3.11.4)	YES
2.11.5.1.	Wall-flow/non-wall-flow	Wall-flow
2.11.6.	Particulate after-treatment system with active regeneration: (if yes, complete section 3.11.4)	YES
2.11.6.1.	Wall-flow/non-wall-flow	Wall-flow
2.11.7.	Other particulate after-treatment systems: (if yes, complete section 3.11.4)	NO
2.11.8.	Other after-treatment devices (specify): (if yes, complete section 3.11.5)	No
2.11.9.	Other devices or features that have a strong influence on emissions: Yes/No (if yes, complete section 3.11.7);	N/A

PART C

3. ESSENTIAL CHARACTERISTICS OF THE ENGINE TYPE(S)

Item Number	Item Description	Parent engine/engine type	Engine types within the engine family				
			Type 2	Type 3	Type 4	Type 5	Type 6
3.1	Engine Identification						
3.1.1.	Engine type designation	5046/2200	5044/2200	4792/2400	4790/2400	4788/2400	4798/2400
3.1.2.	Engine type designation shown on engine marking: yes/no	yes	yes	yes	yes	yes	yes
3.1.3.	Location of the statutory marking:	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.
3.1.4.	Method of attachment of the statutory marking:	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing
3.1.5.	Drawings of the location of the engine identification number (complete example with dimensions):	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.2.	Performance Parameters						
3.2.1.	Declared rated speed (rpm):	2200	2200	2400	2400	2400	2400
3.2.1.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other en- gines, at rated net power:	103.3 ±5%	91.1 ±5%	88.24 ±5%	83.7 ±5%	79.9 ±5%	79.9 ±5%
3.2.1.2.	Declared rated net power (kW):	100	95	90	85.9	82	82
3.2.2.	Maximum power speed(rpm):	2100	2100	2200	2200	2000	1800
3.2.2.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other en- gines, at maximum net power:	103.3 ±5%	91.1 ±5%	88.24 ±5%	83.7 ±5%	79.9 ±5%	101.2 ±5%
3.2.2.2.	Maximum net power (kW):	100	95	90	85.9	82	85.4
3.2.3.	Declared maximum torque speed (rpm):	1500	1500	1500	1500	1500	1500
3.2.3.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other en- gines, at maximum torque speed:	119.3 ±5%	115.6 ±5%	110 ±5%	110 ±5%	100 ±5%	110 ±5%
3.2.3.2.	Declared maximum torque (Nm):	550	530	500	500	450	500
3.2.4.	Declared 100 % test speed:	2200	2200	2400	2400	2400	2400
3.2.5.	Declared Intermediate test speed:	1500	1500	1500	1500	1500	1500
3.2.6.	Idle speed (rpm)	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310
3.2.7.	Maximum no load speed (rpm):	2420+5/-5rpm	2420+5/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm
3.2.8.	Declared minimum torque (Nm)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
3.3.	Run-in procedure						
3.3.1.	Run in time:	60 hours	N/A	N/A	N/A	N/A	N/A
3.3.2.	Run-in cycle:	See Attachment	N/A	N/A	N/A	N/A	N/A
3.4.	Engine test						
3.4.1.	Specific fixture required: Yes/No	NA	NA	NA	NA	NA	NA
3.4.1.1.	Description, including photographs and/or drawings, of the system for mounting the engine on the test bench including the power transmission shaft for connection to the dynamometer:	See Attachment	N/A	N/A	N/A	N/A	N/A
3.4.2.	Exhaust mixing chamber permitted by manufacturer: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.4.2.1.	Exhaust mixing chamber description, photograph and/or drawing:	N/A	N/A	N/A	N/A	N/A	N/A
3.4.3.	Manufacturers chosen NRSC: RMC/Discrete mode	RMC	N/A	N/A	N/A	N/A	N/A
3.4.4.	Additional NRSC: E2/D2/C1	N/A	N/A	N/A	N/A	N/A	N/A
3.4.5.	Number of pre-conditioning cycles prior to transient test	4	N/A	N/A	N/A	N/A	N/A
3.4.6.	Pre-conditioning for RMC NRSC: Steady-state operation/RMC:	RMC	N/A	N/A	N/A	N/A	N/A
3.4.6.1	In case of RMC, number of pre-conditioning RMC prior to RMC NRSC test	2	N/A	N/A	N/A	N/A	N/A
3.5.	Lubrication system						
3.5.1.	Lubricant temperature						
3.5.1.1.	Minimum (deg. C):	-40	-40	-40	-40	-40	-40
3.5.1.2.	Maximum (deg. C):	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135

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3.6.	Combustion Cylinder						
3.6.1.	Bore (mm):	98	98	98	98	98	98
3.6.2.	Stroke (mm):	120	120	120	120	120	120
3.6.3.	Number of cylinders:	4	4	4	4	4	4
3.6.4.	Engine total swept volume (cm3):	3621	3621	3621	3621	3621	3621
3.6.5.	Swept volume per cylinder as % of parent engine:	100	100	100	100	100	100
3.6.6.	Volumetric compression ratio:	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51
3.6.7.	Combustion system description:	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl
3.6.8.	Drawings of combustion chamber and piston crown:	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
3.6.9.	Minimum cross sectional area of inlet and outlet ports (mm2):	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7
3.6.10.	<i>Valve timing</i>						
3.6.10.1.	Maximum lift and angles of opening and closing in relation to dead centre or equivalent data:						
	Maximum lift: Inlet (mm)	8.7	8.7	8.7	8.7	8.7	8.7
	Maximum lift: Exhaust (mm)	8.6	8.6	8.6	8.6	8.6	8.6
	Inlet valve opening (deg BTDC)	10 BTDC	10 BTDC	10 BTDC	10 BTDC	10 BTDC	10 BTDC
	Inlet valve closing (deg ABDC)	30 ABDC	30 ABDC	30 ABDC	30 ABDC	30 ABDC	30 ABDC
	Exhaust valve opening (deg BBDC)	45 BBDC	45 BBDC	45 BBDC	45 BBDC	45 BBDC	45 BBDC
	Exhaust valve closing (deg ATDC)	20 ATDC	20 ATDC	20 ATDC	20 ATDC	20 ATDC	20 ATDC
3.6.10.2.	Reference and/or setting range:	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)
3.6.10.3.	Variable valve timing system: Yes/No	No	No	No	No	No	No
3.6.10.3.1.	Type: continuous/(on/off)	N/A	N/A	N/A	N/A	N/A	N/A
3.6.10.3.2.	Cam phase shift angle:	N/A	N/A	N/A	N/A	N/A	N/A
3.6.11.	<i>Porting configuration</i>						
3.6.11.1.	position, size and number:	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust
	Inlet (mm2)	26.7	26.7	26.7	26.7	26.7	26.7
	Exhaust (mm2)	25.6	25.6	25.6	25.6	25.6	25.6
3.7.	Cooling system						
3.7.1.	<i>Liquid cooling</i>						
3.7.1.1.	Nature of liquid:	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water
3.7.1.2.	Circulating pumps: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.7.1.2.1.	type(s):	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump
3.7.1.2.2.	Drive ratio(s):	1.85:1	1.85:1	1.85:1	1.85:1	1.85:1	1.85:1
3.7.1.3.	Minimum coolant temperature at outlet (deg. C):	-40	-40	-40	-40	-40	-40
3.7.1.4.	Maximum coolant temperature at outlet (deg. C):	112	112	112	112	112	112
3.7.2.	<i>Air cooling</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.	fan: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.1.	type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.2.	Drive ratio(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.2.	Maximum temperature at reference point (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.2.1.	Reference point location	N/A	N/A	N/A	N/A	N/A	N/A

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3.8.	Aspiration						
3.8.1.	Maximum allowable intake depression at 100 % engine speed and at 100 % load (kPa)	6.5	6.5	6.5	6.5	6.5	6.5
3.8.1.1.	With clean air cleaner:	5	5	5	5	5	5
3.8.1.2.	With dirty air cleaner:	8	8	8	8	8	8
3.8.1.3.	Location, of measurement:	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet
3.8.2.	Pressure charger(s): Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.2.1.	Type(s):	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424
3.8.2.2.	Description and schematic diagram of the system (e.g. maximum charge pressure, waste gate, VGT, Twin turbo, etc.):	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate
3.8.3.	Charge air cooler: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.3.1.	Type: air-air/air-water/other(specify)	Air - Air	Air - Air	Air - Air	Air - Air	Air - Air	Air - Air
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):	55	55	55	55	55	55
3.8.3.3.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa):	10	10	10	10	10	10
3.8.4.	Intake throttle valve: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.5.	Device for recycling crankcase gases: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.5.1.	If yes, description and drawings:	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.8.5.2.	If no, compliance with paragraph 6.10 of Annex VI to Delegated Regulation (EU) 2017/654: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.8.6.	<i>Inlet path</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.6.1.	Description of inlet path, (with drawings, photographs and/or part numbers):						
3.8.7.	<i>Air filter</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.7.1.	Type:						
3.8.8.	<i>Intake air-silencer</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.1.1.	Type:						
3.9.	Exhaust system						
3.9.1.	Description of the exhaust system (with drawings, photos and/or part numbers as required):	N/A	N/A	N/A	N/A	N/A	N/A
3.9.2.	Maximum exhaust temperature (deg. C):	680	680	680	680	680	680
3.9.3.	Maximum permissible exhaust backpressure at 100 % engine speed and at 100 % load (kPa):	35.1	35.1	35.1	33.5	32.1	32.1
3.9.3.1.	Location of measurement:	Engine Out	Engine Out	Engine Out	Engine Out	Engine Out	Engine Out
3.9.4.	Exhaust backpressure at loading level specified by manufacturer for variable restriction after-treatment at start of test (kPa):	35.1	35.1	35.1	33.5	32.1	32.1
3.9.4.1.	Location and speed/load conditions:	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed
3.9.5.	Exhaust throttle valve: Yes/No	NO	NO	NO	NO	NO	NO
3.10.	Miscellaneous devices: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.10.1.	<i>Exhaust gas recirculation (EGR)</i>	Yes	Yes	Yes	Yes	Yes	Yes
3.10.1.1.	Characteristics: cooled/uncooled, high pressure/low pressure/other (specify):	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.
3.10.2.	<i>Water injection</i>						
3.10.2.1.	Operation principle:	N/A	N/A	N/A	N/A	N/A	N/A
3.10.3.	<i>Air injection</i>						
3.10.3.1.	Operation principle:	N/A	N/A	N/A	N/A	N/A	N/A
3.10.4.	<i>Others</i>						
3.10.4.1	Types	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Crankcase Breather System: Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)

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3.11.	Exhaust after-treatment system						
3.11.1.	<i>Location</i>						
3.11.1.1.	Place(s) and maximum/minimum distance(s) from engine to first after- treatment device:	After turbo	After turbo	After turbo	After turbo	After turbo	After turbo
	Minimum distance	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted
	Maximum distance	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint
3.11.1.2.	Maximum temperature drop from exhaust or turbine outlet to first after- treatment device (deg. C) if stated:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.2.1.	Test conditions for measurement:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.3.	Minimum temperature at inlet to first after-treatment device (deg. C), if stated:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.3.1.	Test conditions for measurement:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.2.	<i>Oxidation catalyst</i>						
3.11.2.1.	Number of catalytic converters and elements:	1	1	1	1	1	1
3.11.2.2.	Dimensions and volume of the catalytic converter(s):	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters
3.11.2.3.	Total charge of precious metals (g):	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N
3.11.2.4.	Relative concentration of each compound:	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N
3.11.2.5.	Substrate (structure and material):	Monolith	Monolith	Monolith	Monolith	Monolith	Monolith
3.11.2.6.	Cell density (cells/sqcm):	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5
3.11.2.7.	Type of casing for the catalytic converter(s):	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can
3.11.3.	<i>Catalytic exhaust after-treatment system for NOx or three way catalyst</i>						
3.11.3.1.	Type:	SCR, SCR, AMOX	SCR, SCR, AMOX	SCR, SCR, AMOX	SCR, SCR, AMOX	SCR, SCR, AMOX	SCR, SCR, AMOX
		5255697 5255698	5255697 5255698	5255697 5255698	5255697 5255698	5255697 5255698	5255697 5255698
		5363492 5365693	5363492 5365693	5363492 5365693	5363492 5365693	5363492 5365693	5363492 5365693
		5462132 5462133	5462132 5462133	5462132 5462133	5462132 5462133	5462132 5462133	5462132 5462133
		5462134 5462135	5462134 5462135	5462134 5462135	5462134 5462135	5462134 5462135	5462134 5462135
		5607518 5607519	5607518 5607519	5607518 5607519	5607518 5607519	5607518 5607519	5607518 5607519
		5607520 5607521	5607520 5607521	5607520 5607521	5607520 5607521	5607520 5607521	5607520 5607521
		5664401 5664403	5664401 5664403	5664401 5664403	5664401 5664403	5664401 5664403	5664401 5664403
		5664404 5734214	5664404 5734214	5664404 5734214	5664404 5734214	5664404 5734214	5664404 5734214
		5750688	5750688	5750688	5750688	5750688	5750688
3.11.3.2.	Number of catalytic converters and elements:	3	3	3	3	3	3
3.11.3.3.	Type of catalytic action:	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)	SCR Reduction of Nitrogen of oxides using Ammonia (NH3)
		AMOX minimisation of NH3 slip	AMOX minimisation of NH3 slip	AMOX minimisation of NH3 slip	AMOX minimisation of NH3 slip	AMOX minimisation of NH3 slip	AMOX minimisation of NH3 slip
3.11.3.4.	Dimensions and volume of the catalytic converter(s):	SCR1 190.5mm x 116.1mm / 3.3 liters	SCR1 190.5mm x 116.1mm / 3.3 liters	SCR1 190.5mm x 116.1mm / 3.3 liters	SCR1 190.5mm x 116.1mm / 3.3 liters	SCR1 190.5mm x 116.1mm / 3.3 liters	SCR1 190.5mm x 116.1mm / 3.3 liters
		SCR2 190.5mm x 58.9mm / 1.7 Liters	SCR2 190.5mm x 58.9mm / 1.7 Liters	SCR2 190.5mm x 58.9mm / 1.7 Liters	SCR2 190.5mm x 58.9mm / 1.7 Liters	SCR2 190.5mm x 58.9mm / 1.7 Liters	SCR2 190.5mm x 58.9mm / 1.7 Liters
		AMOX 190.5mm x 57.2mm / 1.6 Liters	AMOX 190.5mm x 57.2mm / 1.6 Liters	AMOX 190.5mm x 57.2mm / 1.6 Liters	AMOX 190.5mm x 57.2mm / 1.6 Liters	AMOX 190.5mm x 57.2mm / 1.6 Liters	AMOX 190.5mm x 57.2mm / 1.6 Liters
3.11.3.5.	Total charge of precious metals:	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R
		SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y
		AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y
3.11.3.6.	Relative concentration of each compound:	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R	SCR1 1E Spec - 1E4717R
		SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y	SCR2 1E Spec - 1E4052Y
		AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y	AMOX 1E Spec - 1E4052Y
3.11.3.7.	Substrate (structure and material):	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic
3.11.3.8.	Cell density:	SCR1 93	SCR1 93	SCR1 93	SCR1 93	SCR1 93	SCR1 93
		SCR2 93	SCR2 93	SCR2 93	SCR2 93	SCR2 93	SCR2 93
		AMOX 93	AMOX 93	AMOX 93	AMOX 93	AMOX 93	AMOX 93
3.11.3.9.	Type of casing for the catalytic converter(s):	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can
3.11.3.10.	Method of regeneration:	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event

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3.11.3.10.1.	Infrequent regeneration: Yes/No:	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.11.	Normal operating temperature range (deg. C):	254 - 550	254 - 550	254 - 550	254 - 550	254 - 550	254 - 550
3.11.3.12.	Consumable reagent: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5
3.11.3.12.2.	Lowest concentration of the active ingredient present in the reagent that does not activate warning system (CDmin) (%vol):	35	35	35	35	35	35
3.11.3.12.3.	Normal operational temperature range of reagent:	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K
3.11.3.12.4.	International standard:	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1
3.11.3.13.	NOx sensor(s): Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.13.1.	Type:	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118
3.11.3.13.2.	Location(s)	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.11.3.14.	Oxygen sensor(s): Yes/No	No	No	No	No	No	No
3.11.3.14.1.	Type:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.3.14.2.	Location(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.	<i>Particulate after-treatment system</i>						
3.11.4.1.	Type of filtration: wall-flow/ non-wall-flow/other (specify)	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.
3.11.4.2.	Type:	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211
3.11.4.3.	Dimensions and capacity of the particulate after-treatment system:	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters
3.11.4.4.	Location place(s) and maximum and minimum distance(s) from engine:	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC
	Minimum distance from engine	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC
	Maximum distance from engine	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC
3.11.4.5.	Method or system of regeneration, description and/or drawing:	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.
3.11.4.5.1.	Infrequent regeneration: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.4.5.2.	Minimum exhaust gas temperature for initiating regeneration procedure (deg. C):	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400
3.11.4.6.	Catalytic coating: Yes/No	No	No	No	No	No	No
3.11.4.6.1.	Type of catalytic action:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.8.	Normal operating temperature range (deg. C):	147 - 600	147 - 600	147 - 600	147 - 600	147 - 600	147 - 600
3.11.4.9.	Normal operating pressure range (kPa)	Max 40	Max 35.1	Max 35.1	Max 33.5	Max 32.1	Max 32.1
3.11.4.10.	Storage capacity soot/ash [g]:	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g
3.11.4.11.	Oxygen sensor(s): Yes/No	No	No	No	No	No	No
3.11.4.11.1.	Type:	No	No	No	No	No	No
3.11.4.11.2.	Location(s):	No	No	No	No	No	No
3.11.5.	<i>Other after-treatment devices</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.11.5.1.	Description and operation:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.6.	<i>Infrequent Regeneration</i>						
3.11.6.1.	Number of cycles with regeneration	2	2	2	2	2	2
3.11.6.2.	Number of cycles without regeneration	117	117	117	117	117	117
3.11.7	<i>Other device(s) or feature(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.11.7.1	Type(s)	N/A	N/A	N/A	N/A	N/A	N/A

		5046/2200	5044/2200	4792/2400	4790/2400	4788/2400	4798/2400
3.12.	Fuel feed for liquid-fuelled CI or, where applicable, dual-fuel engines						
3.12.1.	<i>Feed pump</i>						
3.12.1.1.	Pressure (kPa) or characteristic diagram:	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa
3.12.2.	<i>Injection system</i>						
3.12.2.1.	<i>Pump</i>						
3.12.2.1.1.	Type(s):	5538165	5538165	5538165	5538165	5538165	5538165
3.12.2.1.2.	Rated pump speed (rpm):	1100	1100	1200	1200	1200	1200
3.12.2.1.3.	mm3 per stroke or cycle at full injection at rated pump speed:	103.3 ±5%	91.1 ±5%	88.24 ±5%	83.7 ±5%	79.9 ±5%	79.9 ±5%
3.12.2.1.4.	Torque peak pump speed (rpm):	750	750	750	750	750	750
3.12.2.1.5.	mm3 per stroke or cycle at full injection at torque peak pump speed	119.3 ±5%	115.6 ±5%	110 ±5%	110 ±5%	100 ±5%	110 ±5%
3.12.2.1.6.	Characteristic diagram:	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.
3.12.2.1.7.	Method used: on engine/on pump bench	on engine	on engine	on engine	on engine	on engine	on engine
3.12.2.2.	<i>Injection timing</i>						
3.12.2.2.1.	Injection timing curve:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.12.2.2.2.	Static Timing:	7.9°	7.8°	7.6°	8.7°	8.1°	8.1°
3.12.2.3.	<i>Injection piping</i>						
3.12.2.3.1.	Length(s) (mm):	215	215	215	215	215	215
3.12.2.3.2.	Internal diameter (mm):	3	3	3	3	3	3
3.12.2.4.	Common rail: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.12.2.4.1.	Type:	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection
3.12.3.	<i>Injector(s)</i>						
3.12.3.1.	Type(s):	5538167	5538167	5538167	5538167	5538167	5538167
3.12.3.2.	Opening pressure (kPa):	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa
3.12.4.	ECU: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.12.4.1.	Type(s):	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled
3.12.4.2.	Software calibration number(s):	AV410, AV412, AV416, AV417, AV418, AV419, AV460, AV462, AV900, AV465	AV409, AV417, AV453, AV462, AV464	AV405, AV412, AV415AV416, AV417, AV418, AV419, AV421, AV450, AV457, AV459, AV460, AV462, AV463, AV465	AV404, AV412, AV414, AV415, AV417, AV418, AV419, AV455, AV457	AV403, AV413, AV414, AV415, AV421, AV465	AV408, AV416, AV453, AV455, AV458, AV462, AV464
3.12.4.3.	Communication standard(s) for access to data stream information: ISO 27145 with ISO 15765-4 (CAN-based)/ISO 27145 with ISO 13400 (TCP/ IP-based)/SAE J1939-73	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939
3.12.5.	<i>Governor</i>						
3.12.5.1.	Type(s):	Electronic Control	Electronic Control	Electronic Control	Electronic Control	Electronic Control	Electronic Control
3.12.5.2.	Speed at which cut-off starts under full load:	2200 -205/+5	2200 -205/+5	2400 -405/+5	2400 -405/+5	2400 -405/+5	2400 -405/+5
3.12.5.3.	Maximum no-load speed:	2420+5/-5rpm	2420+5/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm
3.12.5.4.	Idle speed:	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310
3.12.6.	Cold-start system: Yes/No	YES	YES	YES	YES	YES	YES
3.12.6.1.	Type(s):	Glowplugs	Glowplugs	Glowplugs	Glowplugs	Glowplugs	Glowplugs
3.12.6.2.	Description:	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)
3.12.7.	<i>Fuel temperature at the inlet to the fuel injection pump</i>						
3.12.7.1.	Minimum (deg. C):	-40	-40	-40	-40	-40	-40
3.12.7.2.	Maximum (deg. C):	80	80	80	80	80	80
3.13.	Fuel feed for liquid fuel spark ignition engine	N/A	N/A	N/A	N/A	N/A	N/A
3.13.1.	<i>Carburettor</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.	<i>Port fuel injection:</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.1.	single-point / multi-point	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.2.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.3.	<i>Direct injection:</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.	<i>Fuel temperature at location specified by manufacturer</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.1.	Location:	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.2.	Minimum (deg. C)	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.3.	Maximum (deg. C)	N/A	N/A	N/A	N/A	N/A	N/A

		5046/2200	5044/2200	4792/2400	4790/2400	4788/2400	4798/2400
3.14.	Fuel feed for gaseous fuel engines or where applicable, dual fuel en- gines (in the case of systems laid out in a different manner, supply equivalent information)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.1.	Fuel: LPG /NG-H/NG-L /NG-HL/LNG/Fuel specific LNG	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.	Pressure regulator(s)/vaporiser(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.1.	Type(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.2.	Number of pressure reduction stages	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.3.	Pressure in final stage minimum and maximum. (kPa)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.4.	Number of main adjustment points:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.5.	Number of idle adjustment points:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.	Fuelling system: mixing unit/gas injection/liquid injection/direct injection	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.1.	Mixture strength regulation	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.1.1.	System description and/or diagram and drawings:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.	<i>Mixing unit</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.1.	Number:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.2.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.3.	Location:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.4.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.	<i>Inlet manifold injection</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.1.	Injection: single-point/multi-point	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.2.	Injection: continuous/simultaneously timed/ sequentially timed	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.	Injection equipment	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.2.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.4.	Supply pump	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.4.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.5.	Injector(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.5.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.	<i>Direct injection</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.	Injection pump/pressure regulator	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.2.	Injection timing (specify):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.	Injector(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.2.	Opening pressure or characteristic diagram:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.	<i>Electronic Control Unit (ECU)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.2.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.3.	Software calibration number(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.	<i>Approvals of engines for several fuel compositions</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.1.	Self-adaptive feature: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.2.	Calibration for a specific gas composition: NG-H/NG-L/NG-HL/ LNG/Fuel specific LNG	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.3.	Transformation for a specific gas composition: NG-HT/NG-LT/NG-HLT	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.	<i>Fuel temperature pressure regulator final stage</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.1.	Minimum (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.2.	Maximum (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.	Ignition system	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.	<i>Ignition coil(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.2.	Number:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.	<i>Spark plug(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.2.	Gap setting:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.3.	<i>Magneto</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.	Ignition timing control: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.1.	Static advance with respect to top dead centre (crank angle degrees):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.2.	Advance curve or map:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.3.	Electronic control: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
Explanatory notes to Appendix 3:							
(Footnote markers, footnotes and explanatory notes not to be stated on the information document)							
(1) As defined in Annex II to Delegated Regulation (EU) 2017/654.							
(2) Refer to section 2.4.13 in Annex IX (engine family definition).							

PART C

3. ESSENTIAL CHARACTERISTICS OF THE ENGINE TYPE

Item Number	Item Description	Engine types within the engine family					
		Type 7	Type 8	Type 9	Type 10	Type 11	Type 12
3.1	Engine Identification						
3.1.1.	Engine type designation	4794/2400	4784/2400	4774/2400	4796/2400	4836/2200	6333/2200
3.1.2.	Engine type designation shown on engine marking: yes/no	yes	yes	yes	yes	yes	yes
3.1.3.	Location of the statutory marking:	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.	The serial number is engraved onto an aluminium plate which is located on the right hand side of the cylinder block, it is held in place by 2 rivets. The serial number is electronically issued in sequence at the beginning of the engine assembly process.
3.1.4.	Method of attachment of the statutory marking:	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing	The EU Certificate number is shown on a plastic self adhesive label fitted to the flywheel housing
3.1.5.	Drawings of the location of the engine identification number (complete example with dimensions):	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.2.	Performance Parameters						
3.2.1.	Declared rated speed (rpm):	2400	2400	2400	2400	2200	2200
3.2.1.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other engines, at rated net power:	72.9 ±5%	72.9 ±5%	69.1 ±5%	69.1 ±5%	68.5 ±5%	104 ±5%
3.2.1.2.	Declared rated net power (kW):	74.4	74.4	70	70	65.9	100
3.2.2.	Maximum power speed(rpm):	1850	2200	2200	1850	1800	2200
3.2.2.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other engines, at maximum net power:	96.7 ±5%	72.9 ±5%	69.1 ±5%	96.7 ±5%	68.5 ±5%	104 ±5%
3.2.2.2.	Maximum net power (kW):	82	74.4	70	82	82	100
3.2.3.	Declared maximum torque speed (rpm):	1500	1500	1500	1500	1500	1500
3.2.3.1.	Fuel delivery/stroke (mm3) for diesel engine, fuel flow (g/h) for other engines, at maximum torque speed:	100 ±5%	96 ±5%	92 ±5%	100 ±5%	100 ±5%	116.5 ±5%
3.2.3.2.	Declared maximum torque (Nm):	450	430	410	450	450	530
3.2.4.	Declared 100 % test speed:	2400	2400	2400	2400	2200	2200
3.2.5.	Declared Intermediate test speed:	1500	1500	1500	1500	1500	1500
3.2.6.	Idle speed (rpm)	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310
3.2.7.	Maximum no load speed (rpm):	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+5/-5rpm	2420+5/-5rpm
3.2.8.	Declared minimum torque (Nm)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
3.3.	Run-in procedure						
3.3.1.	Run in time:	N/A	N/A	N/A	N/A	N/A	N/A
3.3.2.	Run-in cycle:	N/A	N/A	N/A	N/A	N/A	N/A
3.4.	Engine test						
3.4.1.	Specific fixture required: Yes/No	NA	NA	NA	NA	NA	NA
3.4.1.1.	Description, including photographs and/or drawings, of the system for mounting the engine on the test bench including the power transmission shaft for connection to the dynamometer:	N/A	N/A	N/A	N/A	N/A	N/A
3.4.2.	Exhaust mixing chamber permitted by manufacturer: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.4.2.1.	Exhaust mixing chamber description, photograph and/or drawing:	N/A	N/A	N/A	N/A	N/A	N/A
3.4.3.	Manufacturers chosen NRSC: RMC/Discrete mode	N/A	N/A	N/A	N/A	N/A	N/A
3.4.4.	Additional NRSC: E2/D2/C1	N/A	N/A	N/A	N/A	N/A	N/A
3.4.5.	Number of pre-conditioning cycles prior to transient test	N/A	N/A	N/A	N/A	N/A	N/A
3.4.6.	Pre-conditioning for RMC NRSC: Steady-state operation/RMC:	N/A	N/A	N/A	N/A	N/A	N/A
3.4.6.1	In case of RMC, number of pre-conditioning RMC prior to RMC NRSC test	N/A	N/A	N/A	N/A	N/A	N/A
3.5.	Lubrication system						
3.5.1.	Lubricant temperature						
3.5.1.1.	Minimum (deg. C):	-40	-40	-40	-40	-40	-40
3.5.1.2.	Maximum (deg. C):	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135	125 continuous / 135

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3.6.	Combustion Cylinder						
3.6.1.	Bore (mm):	98	98	98	98	98	98
3.6.2.	Stroke (mm):	120	120	120	120	120	120
3.6.3.	Number of cylinders:	4	4	4	4	4	4
3.6.4.	Engine total swept volume (cm3):	3621	3621	3621	3621	3621	3621
3.6.5.	Swept volume per cylinder as % of parent engine:	100	100	100	100	100	100
3.6.6.	Volumetric compression ratio:	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51	16.77:1 +0.55/-0.51
3.6.7.	Combustion system description:	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl	Electronic controlled high pressure multi shot injection, central injector, multi hole, re entrant combustion bowl
3.6.8.	Drawings of combustion chamber and piston crown:	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
3.6.9.	Minimum cross sectional area of inlet and outlet ports (mm2):	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7	555.7 / 510.7
3.6.10.	<i>Valve timing</i>						
3.6.10.1.	Maximum lift and angles of opening and closing in relation to dead centre or equivalent data:						
	Maximum lift: Inlet (mm)	8.7	8.7	8.7	8.7	8.7	8.7
	Maximum lift: Exhaust (mm)	8.6	8.6	8.6	8.6	8.6	8.6
	Inlet valve opening (deg BTDC)	10 BTDC	10 BTDC	10 BTDC	10 BTDC	10 BTDC	10 BTDC
	Inlet valve closing (deg ABDC)	30 ABDC	30 ABDC	30 ABDC	30 ABDC	30 ABDC	30 ABDC
	Exhaust valve opening (deg BBDC)	45 BBDC	45 BBDC	45 BBDC	45 BBDC	45 BBDC	45 BBDC
	Exhaust valve closing (deg ATDC)	20 ATDC	20 ATDC	20 ATDC	20 ATDC	20 ATDC	20 ATDC
3.6.10.2.	Reference and/or setting range:	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)	No setting range (HLA in rocker arm)
3.6.10.3.	Variable valve timing system: Yes/No	No	No	No	No	No	No
3.6.10.3.1.	Type: continuous/(on/off)	N/A	N/A	N/A	N/A	N/A	N/A
3.6.10.3.2.	Cam phase shift angle:	N/A	N/A	N/A	N/A	N/A	N/A
3.6.11.	<i>Porting configuration</i>						
3.6.11.1.	position, size and number:	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust	cross-flow, 2 inlet, 2 exhaust
	Inlet (mm2)	26.7	26.7	26.7	26.7	26.7	26.7
	Exhaust (mm2)	25.6	25.6	25.6	25.6	25.6	25.6
3.7.	Cooling system						
3.7.1.	<i>Liquid cooling</i>						
3.7.1.1.	Nature of liquid:	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water	50:50 mixture - Ethylene glycol / propylene glycol and water
3.7.1.2.	Circulating pumps: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.7.1.2.1.	type(s):	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump	Single integrated belt driven centrifugal pump
3.7.1.2.2.	Drive ratio(s):	1.85:1	1.85:1	1.85:1	1.85:1	1.85:1	1.85:1
3.7.1.3.	Minimum coolant temperature at outlet (deg. C):	-40	-40	-40	-40	-40	-40
3.7.1.4.	Maximum coolant temperature at outlet (deg. C):	112	112	112	112	112	112
3.7.2.	<i>Air cooling</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.	fan: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.1.	type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.1.2.	Drive ratio(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.2.	Maximum temperature at reference point (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.7.2.2.1.	Reference point location	N/A	N/A	N/A	N/A	N/A	N/A

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3.8.	Aspiration						
3.8.1.	Maximum allowable intake depression at 100 % engine speed and at 100 % load (kPa)	6.5	6.5	6.5	6.5	6.5	6.5
3.8.1.1.	With clean air cleaner:	5	5	5	5	5	5
3.8.1.2.	With dirty air cleaner:	8	8	8	8	8	8
3.8.1.3.	Location, of measurement:	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet	Between air cleaner outlet and turbocharger inlet
3.8.2.	Pressure charger(s): Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.2.1.	Type(s):	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369547 5369548 5369549 5369550 5726422 5726424	5369549 5369550 5726422 5726424
3.8.2.2.	Description and schematic diagram of the system (e.g. maximum charge pressure, waste gate, VGT, Twin turbo, etc.):	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate	Single Turbocharged Wastegate
3.8.3.	Charge air cooler: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.3.1.	Type: air-air/air-water/other(specify)	Air - Air	Air - Air	Air - Air	Air - Air	Air - Air	Air - Air
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):	55	55	55	55	55	55
3.8.3.3.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa):	10	10	10	10	10	10
3.8.4.	Intake throttle valve: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.5.	Device for recycling crankcase gases: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.8.5.1.	If yes, description and drawings:	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.8.5.2.	If no, compliance with paragraph 6.10 of Annex VI to Delegated Regulation (EU) 2017/654: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.8.6.	<i>Inlet path</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.6.1.	Description of inlet path, (with drawings, photographs and/or part numbers):						
3.8.7.	<i>Air filter</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.7.1.	Type:						
3.8.8.	<i>Intake air-silencer</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.8.1.1.	Type:						
3.9.	Exhaust system						
3.9.1.	Description of the exhaust system (with drawings, photos and/or part numbers as required):	N/A	N/A	N/A	N/A	N/A	N/A
3.9.2.	Maximum exhaust temperature (deg. C):	680	680	680	680	680	680
3.9.3.	Maximum permissible exhaust backpressure at 100 % engine speed and at 100 % load (kPa):	29.4	29.4	27.7	27.7	35	35.1
3.9.3.1.	Location of measurement:	Engine Out	Engine Out	Engine Out	Engine Out	Engine Out	Engine Out
3.9.4.	Exhaust backpressure at loading level specified by manufacturer for variable restriction after-treatment at start of test (kPa):	29.4	29.4	27.7	27.7	35	35.1
3.9.4.1.	Location and speed/load conditions:	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed	Between engine and aftertreatment at full load rated speed
3.9.5.	Exhaust throttle valve: Yes/No	NO	NO	NO	NO	NO	NO
3.10.	Miscellaneous devices: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.10.1.	<i>Exhaust gas recirculation (EGR)</i>	Yes	Yes	Yes	Yes	Yes	Yes
3.10.1.1.	Characteristics: cooled/uncooled, high pressure/low pressure/other (specify):	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.	Water cooled EGR. High pressure loop. EGR valve is on the inlet side of the EGR cooler.
3.10.2.	<i>Water injection</i>						
3.10.2.1.	Operation principle:	N/A	N/A	N/A	N/A	N/A	N/A
3.10.3.	<i>Air injection</i>						
3.10.3.1.	Operation principle:	N/A	N/A	N/A	N/A	N/A	N/A
3.10.4.	<i>Others</i>						
3.10.4.1.	Types	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)	Closed Circuit Ventilation (CCV) or Open Circuit Ventilation (OCV)

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3.11.	Exhaust after-treatment system						
3.11.1.	<i>Location</i>						
3.11.1.1.	Place(s) and maximum/minimum distance(s) from engine to first after- treatment device:	After turbo	After turbo	After turbo	After turbo	After turbo	After turbo
	Minimum distance	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted	0.15m - engine mounted
	Maximum distance	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint	Defined by exhaust temperature loss constraint
3.11.1.2.	Maximum temperature drop from exhaust or turbine outlet to first after- treatment device (deg. C) if stated:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.2.1.	Test conditions for measurement:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.3.	Minimum temperature at inlet to first after-treatment device (deg. C), if stated:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.1.3.1.	Test conditions for measurement:	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide	Per A&I guide
3.11.2.	<i>Oxidation catalyst</i>						
3.11.2.1.	Number of catalytic converters and elements:	1	1	1	1	1	1
3.11.2.2.	Dimensions and volume of the catalytic converter(s):	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters	DOC 190.5mm x 127.0mm / 3.6 liters
3.11.2.3.	Total charge of precious metals (g):	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N
3.11.2.4.	Relative concentration of each compound:	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N	DOC 1E4717N
3.11.2.5.	Substrate (structure and material):	Monolith	Monolith	Monolith	Monolith	Monolith	Monolith
3.11.2.6.	Cell density (cells/sqcm):	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5	DOC 46.5
3.11.2.7.	Type of casing for the catalytic converter(s):	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can
3.11.3.	<i>Catalytic exhaust after-treatment system for NOx or three way catalyst</i>						
3.11.3.1.	Type:	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688	SCR, SCR, AMOX 5255697 5255698 5363492 5365693 5462132 5462133 5462134 5462135 5607518 5607519 5607520 5607521 5664401 5664403 5664404 5734214 5750688
3.11.3.2.	Number of catalytic converters and elements:	3	3	3	3	3	3
3.11.3.3.	Type of catalytic action:	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip	SCR Reduction of Nitrogen of oxides using Ammonia (NH3) AMOX minimisation of NH3 slip
3.11.3.4.	Dimensions and volume of the catalytic converter(s):	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters	SCR1 190.5mm x 116.1mm / 3.3 liters SCR2 190.5mm x 58.9mm / 1.7 Liters AMOX 190.5mm x 57.2mm / 1.6 Liters
3.11.3.5.	Total charge of precious metals:	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y
3.11.3.6.	Relative concentration of each compound:	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y	SCR1 1E Spec - 1E4717R SCR2 1E Spec - 1E4052Y AMOX 1E Spec - 1E4052Y
3.11.3.7.	Substrate (structure and material):	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic	Monolith Ceramic
3.11.3.8.	Cell density:	SCR1 93 SCR2 93 AMOX 93	SCR1 93 SCR2 93 AMOX 93	SCR1 93 SCR2 93 AMOX 93	SCR1 93 SCR2 93 AMOX 93	SCR1 93 SCR2 93 AMOX 93	SCR1 93 SCR2 93 AMOX 93
3.11.3.9.	Type of casing for the catalytic converter(s):	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can	Stainless Steel Can
3.11.3.10.	Method of regeneration:	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event	In Cylinder dosing used to remove Sulphur on an infrequent use only when required event

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3.11.3.10.1.	Infrequent regeneration: Yes/No:	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.11.	Normal operating temperature range (deg. C):	254 - 550	254 - 550	254 - 550	254 - 550	254 - 550	254 - 550
3.11.3.12.	Consumable reagent: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5	Aqueous Urea Solution (NH3), 32.5
3.11.3.12.2.	Lowest concentration of the active ingredient present in the reagent that does not activate warning system (CDmin) (%vol):	35	35	35	35	35	28
3.11.3.12.3.	Normal operational temperature range of reagent:	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K	220 - 400 K
3.11.3.12.4.	International standard:	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1	ISO22241-1
3.11.3.13.	NOx sensor(s): Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.3.13.1.	Type:	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118	4415127 4415128 4415129 4415130 5390117 5390118
3.11.3.13.2.	Location(s)	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment	See Attachment
3.11.3.14.	Oxygen sensor(s): Yes/No	No	No	No	No	No	N/A
3.11.3.14.1.	Type:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.3.14.2.	Location(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.	<i>Particulate after-treatment system</i>						
3.11.4.1.	Type of filtration: wall-flow/ non-wall-flow/other (specify)	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.	Ceramic wall flow DPF with passive and active regeneration.
3.11.4.2.	Type:	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211	5255695 5255696 5363476 5481220 5481221 5481222 5481223 5607514 5607515 5607517 5734211 5741141 5767366 5767367 5901121 5905211
3.11.4.3.	Dimensions and capacity of the particulate after-treatment system:	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters	190.5mm x 165.1mm / 4.7 Liters
3.11.4.4.	Location place(s) and maximum and minimum distance(s) from engine:	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC	In same can, immediately after DOC
	Minimum distance from engine	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC
	Maximum distance from engine	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC	Defined by DOC
3.11.4.5.	Method or system of regeneration, description and/or drawing:	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.	High soot load in the DPF is detected using a delta pressure measurement. If required the soot level is reduced by using the inlet throttle and an alternative engine calibration mode to elevate the exhaust temperature. At very high soot loads, in-cylinder HC dosing is triggered to drive rapid high temperature regeneration of the DPF.
3.11.4.5.1.	Infrequent regeneration: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.11.4.5.2.	Minimum exhaust gas temperature for initiating regeneration procedure (deg. C):	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400	Depends on SV, 250 - 400
3.11.4.6.	Catalytic coating: Yes/No	No	No	No	No	No	No
3.11.4.6.1.	Type of catalytic action:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.11.4.8.	Normal operating temperature range (deg. C):	147 - 600	147 - 600	147 - 600	147 - 600	147 - 600	147 - 600
3.11.4.9.	Normal operating pressure range (kPa)	Max 29.4	Max 29.4	Max 27.7	Max 27.7	35 Max	24.1 - 40
3.11.4.10.	Storage capacity soot/ash [g]:	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g	Soot - 28 g Ash - 242g
3.11.4.11.	Oxygen sensor(s): Yes/No	No	No	No	No	No	N/A
3.11.4.11.1.	Type:	No	No	No	No	No	N/A
3.11.4.11.2.	Location(s):	No	No	No	No	No	N/A
3.11.5.	<i>Other after-treatment devices</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.11.5.1.	Description and operation:	N/A	N/A	N/A	N/A	N/A	N/A
3.11.6.	<i>Infrequent Regeneration</i>						
3.11.6.1.	Number of cycles with regeneration	2	2	2	2	2	2
3.11.6.2.	Number of cycles without regeneration	117	117	117	117	117	117
3.11.7	<i>Other device(s) or feature(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.11.7.1	Type(s)	N/A	N/A	N/A	N/A	N/A	N/A

		4794/2400	4784/2400	4774/2400	4796/2400	4836/2200	6333/2200
3.12.	Fuel feed for liquid-fuelled CI or, where applicable, dual-fuel engines						
3.12.1.	<i>Feed pump</i>						
3.12.1.1.	Pressure (kPa) or characteristic diagram:	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa	Controlled up to a maximum of 80kPa
3.12.2.	<i>Injection system</i>						
3.12.2.1.	<i>Pump</i>						
3.12.2.1.1.	Type(s):	5538165	5538165	5538165	5538165	5538165	5538165
3.12.2.1.2.	Rated pump speed (rpm):	1200	1200	1200	1200	1100	1100
3.12.2.1.3.	mm3 per stroke or cycle at full injection at rated pump speed:	72.9 ±5%	72.9 ±5%	69.1 ±5%	69.1 ±5%	68.5 ±5%	104 ±5%
3.12.2.1.4.	Torque peak pump speed (rpm):	750	750	750	750	750	750
3.12.2.1.5.	mm3 per stroke or cycle at full injection at torque peak pump speed	100 ±5%	96 ±5%	92 ±5%	100 ±5%	100 ±5%	116.5 ±5%
3.12.2.1.6.	Characteristic diagram:	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.	see 3.12.2.1.1. to 3.12.2.1.5.
3.12.2.1.7.	Method used: on engine/on pump bench	on engine	on engine	on engine	on engine	on engine	on engine
3.12.2.2.	<i>Injection timing</i>						
3.12.2.2.1.	Injection timing curve:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.12.2.2.2.	Static Timing:	6.9°	6.9°	6.3°	6.3°	7.3°	7.9°
3.12.2.3.	<i>Injection piping</i>						
3.12.2.3.1.	Length(s) (mm):	215	215	215	215	215	215
3.12.2.3.2.	Internal diameter (mm):	3	3	3	3	3	3
3.12.2.4.	Common rail: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.12.2.4.1.	Type:	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection	Direct Diesel Injection
3.12.3.	<i>Injector(s)</i>						
3.12.3.1.	Type(s):	5538167	5538167	5538167	5538167	5538167	5538167
3.12.3.2.	Opening pressure (kPa):	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa	Electronically controlled up to a maximum of 200000kPa
3.12.4.	ECU: Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
3.12.4.1.	Type(s):	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled	A6E11 air cooled
3.12.4.2.	Software calibration number(s):	AV406, AV412, AV416, AV452, AV453, AV455, AV457, AV458, AV459, AV460, AV462, AV463, AV464	AV402, AV413, AV414, AV415, AV418, AV419, AV421, AV465	AV401, AV413, AV414, AV455	AV407	AV453, AV464	AV412, AV420, AV421
3.12.4.3.	Communication standard(s) for access to data stream information: ISO 27145 with ISO 15765-4 (CAN-based)/ISO 27145 with ISO 13400 (TCP/ IP-based)/SAE J1939-73	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939	CAN SAE J1939
3.12.5.	<i>Governor</i>						
3.12.5.1.	Type(s):	Electronic Control	Electronic Control	Electronic Control	Electronic Control	Electronic Control	Electronic Control
3.12.5.2.	Speed at which cut-off starts under full load:	2400 -205/+5	2400 -405/+5	2400 -405/+5	2400 -205/+5	2200±5rpm	2200±5rpm
3.12.5.3.	Maximum no-load speed:	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+225/-5rpm	2420+5/-5rpm	2420+5/-5rpm
3.12.5.4.	Idle speed:	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310	900-110/+310
3.12.6.	Cold-start system: Yes/No	YES	YES	YES	YES	YES	YES
3.12.6.1.	Type(s):	Glowplugs	Glowplugs	Glowplugs	Glowplugs	Glowplugs	Glowplugs
3.12.6.2.	Description:	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)	Optional glowplugs for ambient temperature down top -25°C (fitted by Perkins as customer option), ether for temperatures below - 25°C (dealer fitted onto machine)
3.12.7.	<i>Fuel temperature at the inlet to the fuel injection pump</i>						
3.12.7.1.	Minimum (deg. C):	-40	-40	-40	-40	-40	-40
3.12.7.2.	Maximum (deg. C):	80	80	80	80	80	80
3.13.	Fuel feed for liquid fuel spark ignition engine	N/A	N/A	N/A	N/A	N/A	N/A
3.13.1.	<i>Carburettor</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.	<i>Port fuel injection:</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.1.	single-point / multi-point	N/A	N/A	N/A	N/A	N/A	N/A
3.13.2.2.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.3.	<i>Direct injection:</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.	<i>Fuel temperature at location specified by manufacturer</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.1.	Location:	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.2.	Minimum (deg. C)	N/A	N/A	N/A	N/A	N/A	N/A
3.13.4.3.	Maximum (deg. C)	N/A	N/A	N/A	N/A	N/A	N/A

		4794/2400	4784/2400	4774/2400	4796/2400	4836/2200	6333/2200
3.14.	Fuel feed for gaseous fuel engines or where applicable, dual fuel en- gines (in the case of systems laid out in a different manner, supply equivalent information)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.1.	Fuel: LPG /NG-H/NG-L /NG-HL/LNG/Fuel specific LNG	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.	Pressure regulator(s)/vaporiser(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.1.	Type(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.2.	Number of pressure reduction stages	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.3.	Pressure in final stage minimum and maximum. (kPa)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.4.	Number of main adjustment points:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.2.5.	Number of idle adjustment points:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.	Fuelling system: mixing unit/gas injection/liquid injection/direct injection	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.1.	Mixture strength regulation	N/A	N/A	N/A	N/A	N/A	N/A
3.14.3.1.1.	System description and/or diagram and drawings:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.	<i>Mixing unit</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.1.	Number:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.2.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.3.	Location:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.4.4.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.	<i>Inlet manifold injection</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.1.	Injection: single-point/multi-point	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.2.	Injection: continuous/simultaneously timed/ sequentially timed	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.	Injection equipment	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.3.2.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.4.	Supply pump	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.4.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.5.	Injector(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.5.5.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.	<i>Direct injection</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.	Injection pump/pressure regulator	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.1.2.	Injection timing (specify):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.	Injector(s)	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.6.2.2.	Opening pressure or characteristic diagram:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.	<i>Electronic Control Unit (ECU)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.2.	Adjustment possibilities:	N/A	N/A	N/A	N/A	N/A	N/A
3.14.7.3.	Software calibration number(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.	<i>Approvals of engines for several fuel compositions</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.1.	Self-adaptive feature: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.2.	Calibration for a specific gas composition: NG-H/NG-L/NG-HL/ LNG/Fuel specific LNG	N/A	N/A	N/A	N/A	N/A	N/A
3.14.8.3.	Transformation for a specific gas composition: NG-HT/NG-LT/NG-HLT	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.	<i>Fuel temperature pressure regulator final stage</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.1.	Minimum (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.14.9.2.	Maximum (deg. C):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.	Ignition system	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.	<i>Ignition coil(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.1.2.	Number:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.	<i>Spark plug(s)</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.2.2.	Gap setting:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.3.	<i>Magneto</i>	N/A	N/A	N/A	N/A	N/A	N/A
3.15.3.1.	Type(s):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.	Ignition timing control: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.1.	Static advance with respect to top dead centre (crank angle degrees):	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.2.	Advance curve or map:	N/A	N/A	N/A	N/A	N/A	N/A
3.15.4.3.	Electronic control: Yes/No	N/A	N/A	N/A	N/A	N/A	N/A
<i>Explanatory notes to Appendix 3:</i>							
<i>(Footnote markers, footnotes and explanatory notes not to be stated on the m</i>							
(1) As defined in Annex II to Delegated Regulation (EU) 2017/654.							
(2) Refer to section 2.4.13 in Annex IX (engine family definition).							

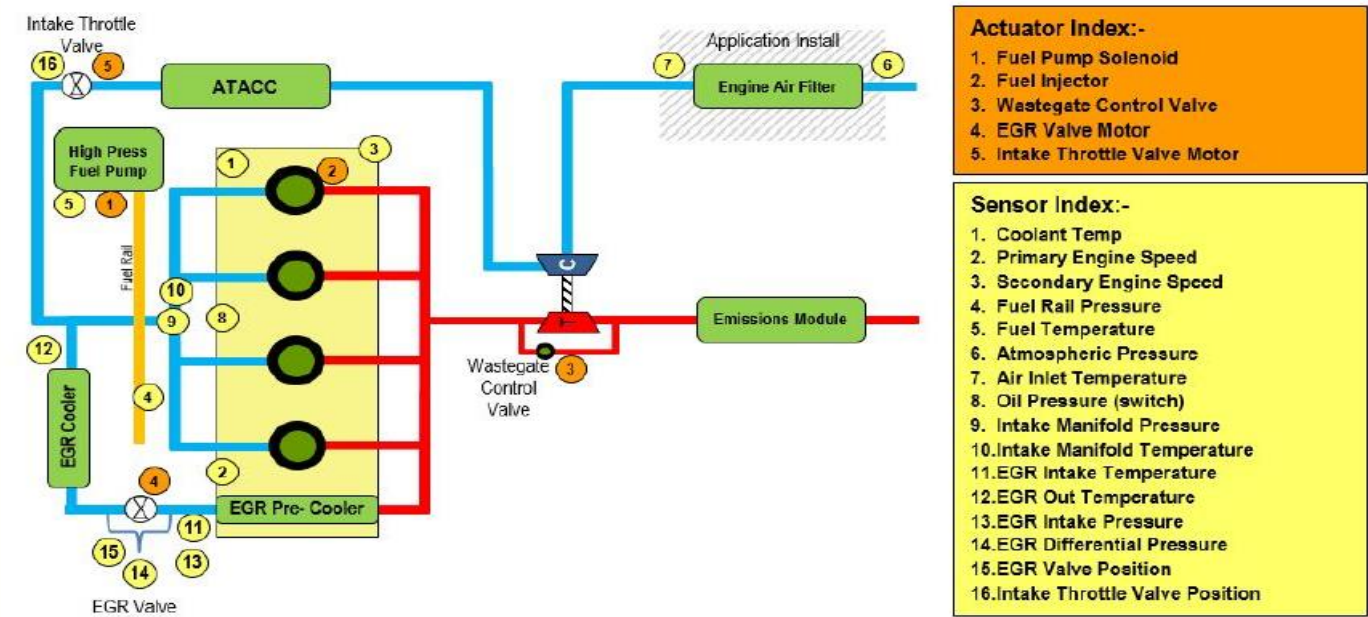
Information Document for (EU) 2016/1628

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<u>Attachment</u>	<u>Reference No</u>	<u>Description</u>
A	2.10.1.	Engine Schematics
B	2.10.4., 3.8.5.1., 3.10.4.1.	Device for recycling Crankcase Gases / Breather System
C	2.11.	Exhaust After-treatment System Schematics
D	3.1.5	Location of the Engine Identification Number
E	3.3.2	Run In Procedure
F	3.6.8	Drawing of Combustion Chamber and Piston Crown
G	3.8.2.2	Pressure Charging System
H		PCD and NCD Demonstration Test Data

A2.10.1.Engine Schematics

904J-E36TADDS Engine Schematic



B2.10, 2.10.4.

Device for recycling Crankcase Gases

Crankcase Breather System Schematics

Crankcase Ventilation (CCV)

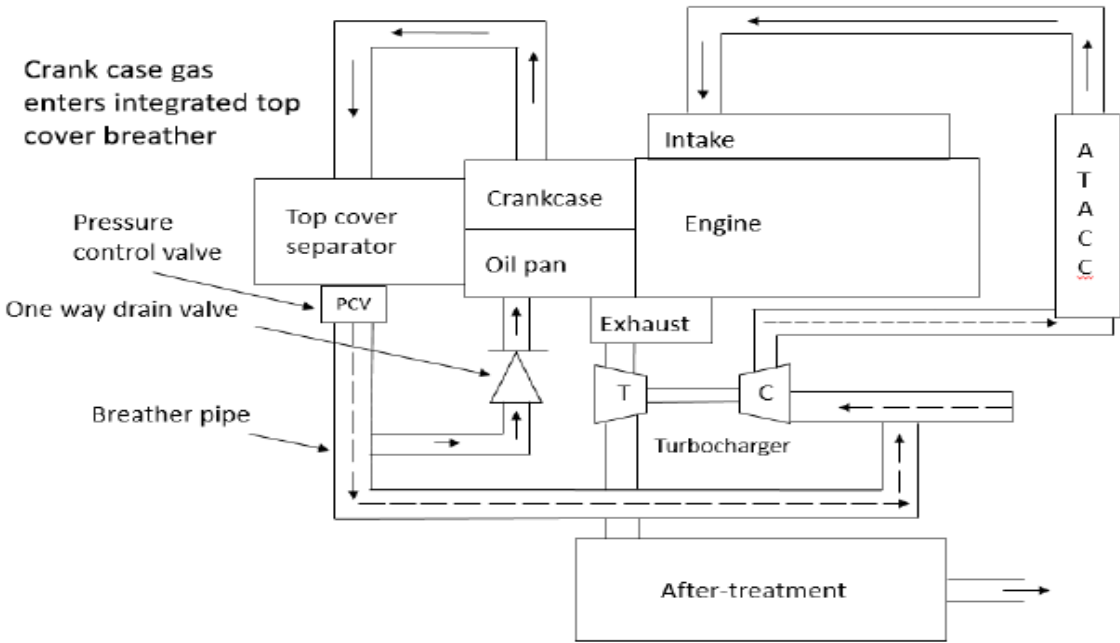


Figure 1 - Closed Circuit Breather Illustration

Crankcase Ventilation (OCV)

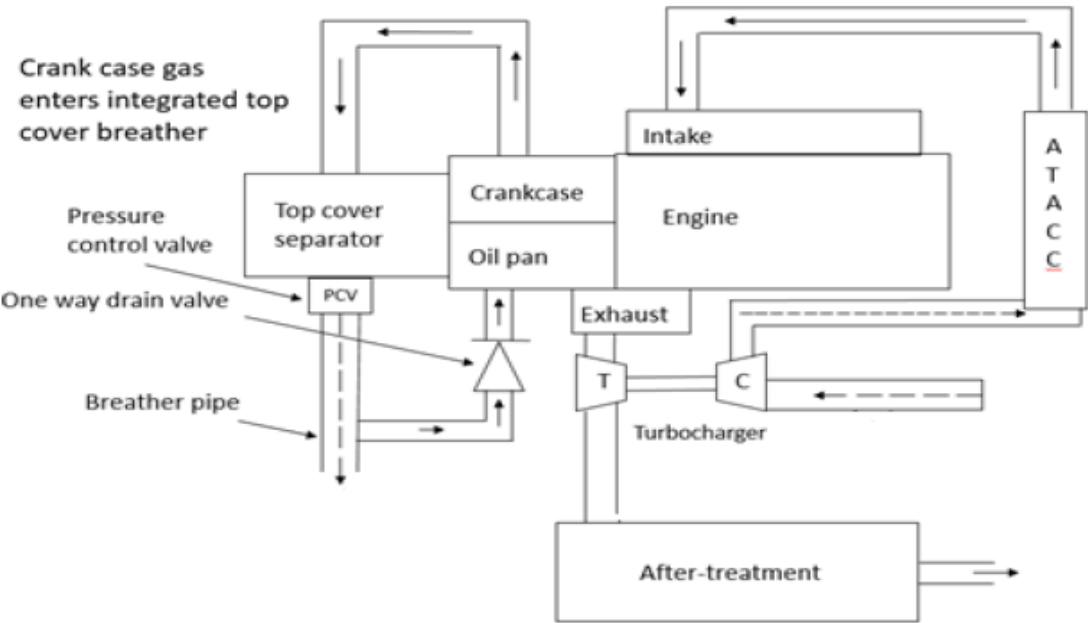
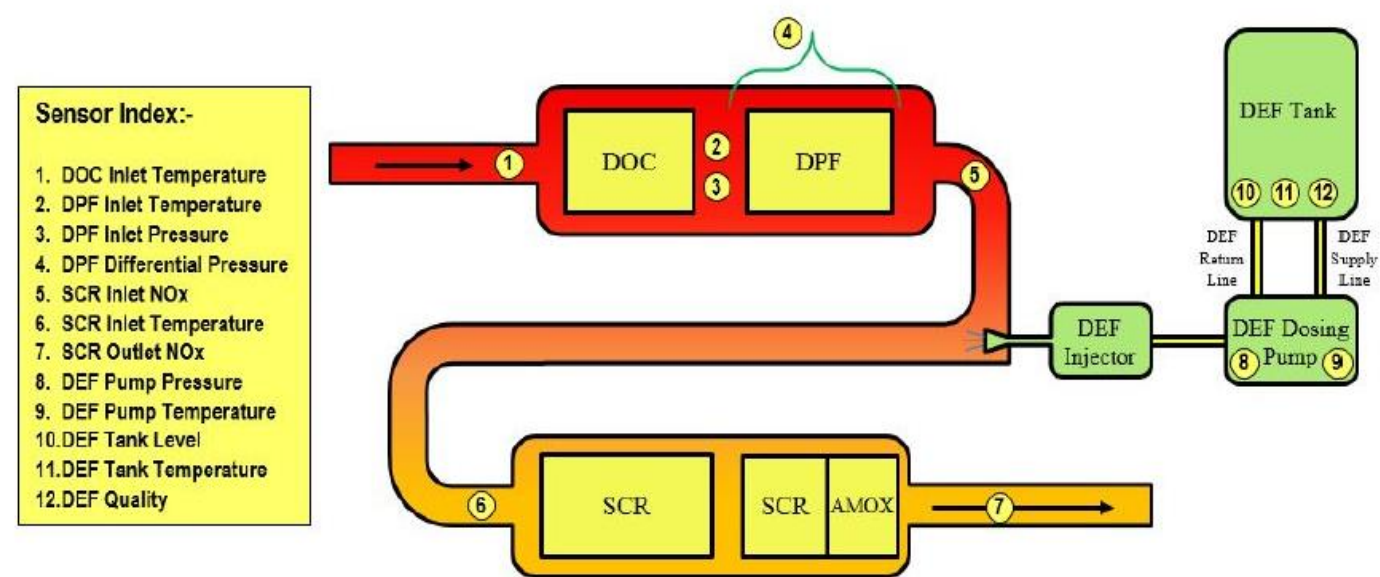


Figure 2 – Open Circuit Breather Illustration

C2.11.

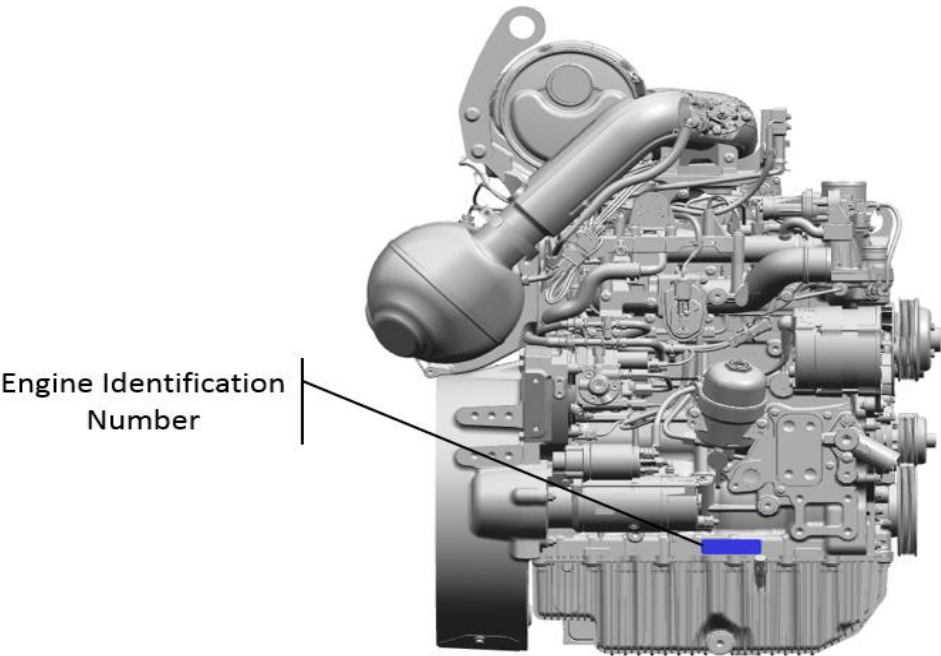
Exhaust After-treatment System Schematics

904J-E36TADDS Aftertreatment Schematic

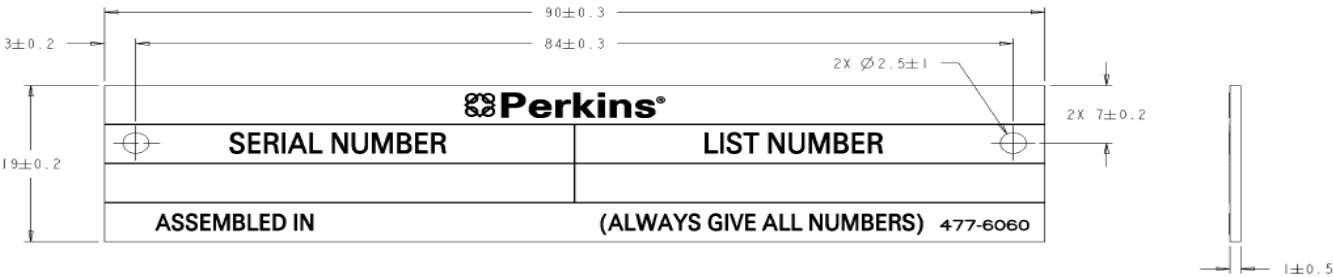


D3.1.5Location of the Engine Identification Number

Location of the Engine Identification Number



Right side view of 904J-E36 Engine



E

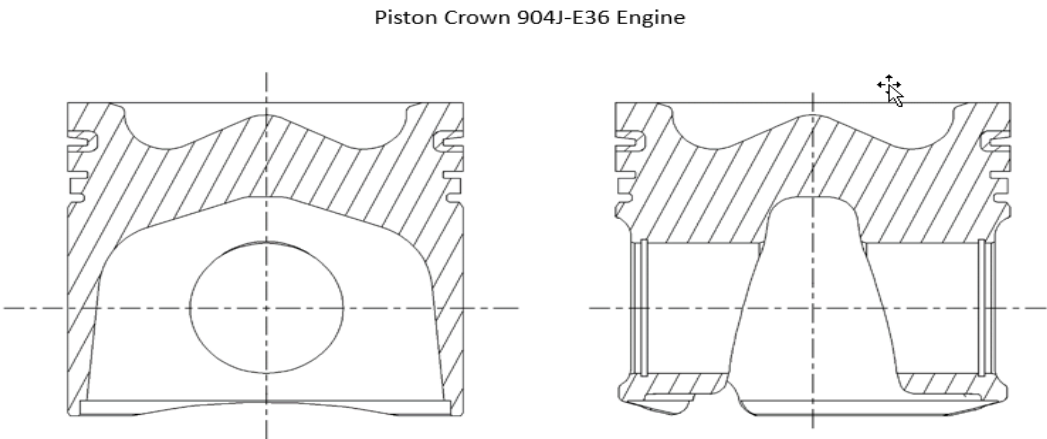
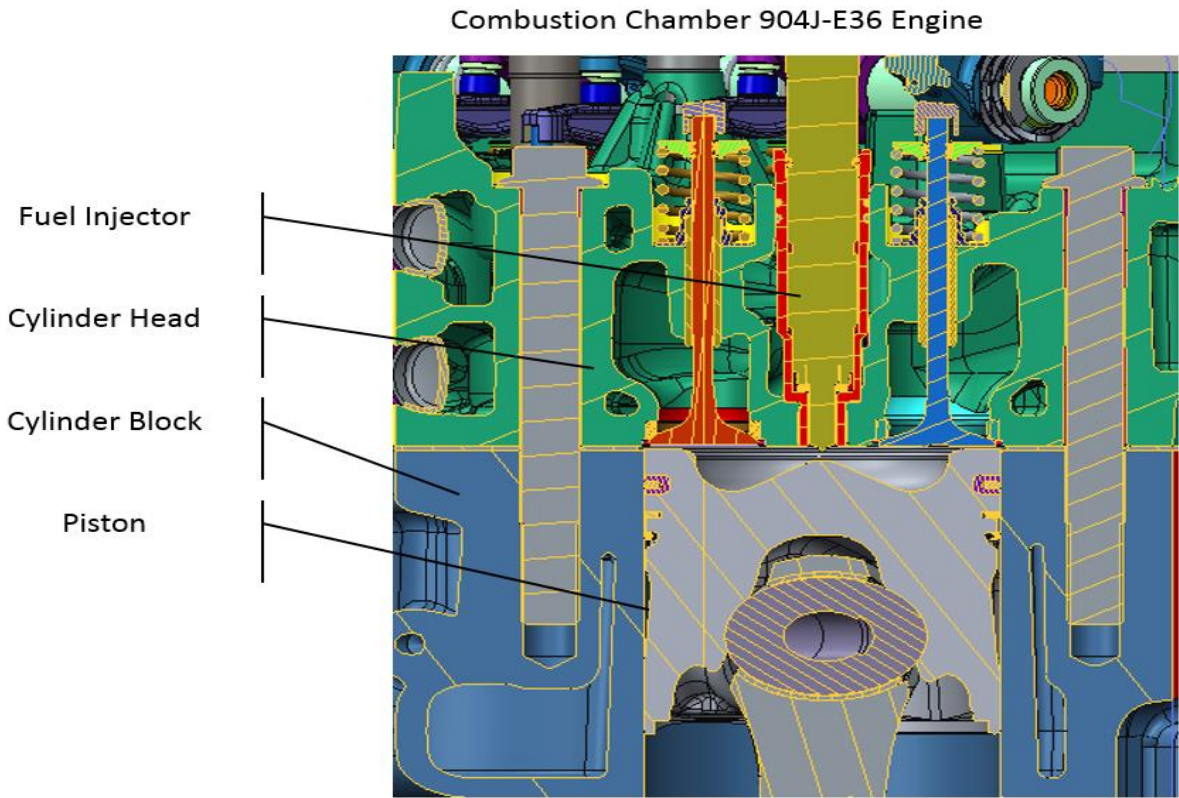
3.3.2

Run In Procedure

	Engine Speed (rpm)	Engine Load (Nm)	Notes
Step 1	800	0	
Step 2	1200	55	
Step 3	1440	77	
Step 4	1680	99	
Step 5	1920	121	
Step 6	2160	143	
Step 7	2280	165	
Step 8	2400	187	
Step 9	800	0	Repeat steps 9 - 12 until 60 engine hours have been reached
Step 10	2640	0	
Step 11	2400	220	
Step 12	1440	355	

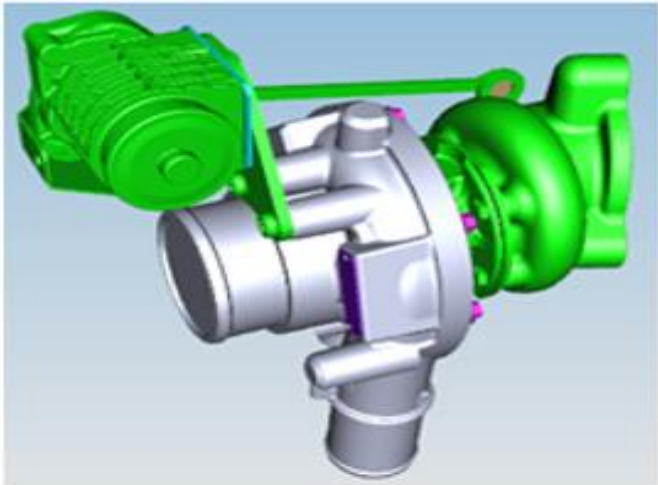
F3.6.8

Drawing of Combustion Chamber and Piston Crown

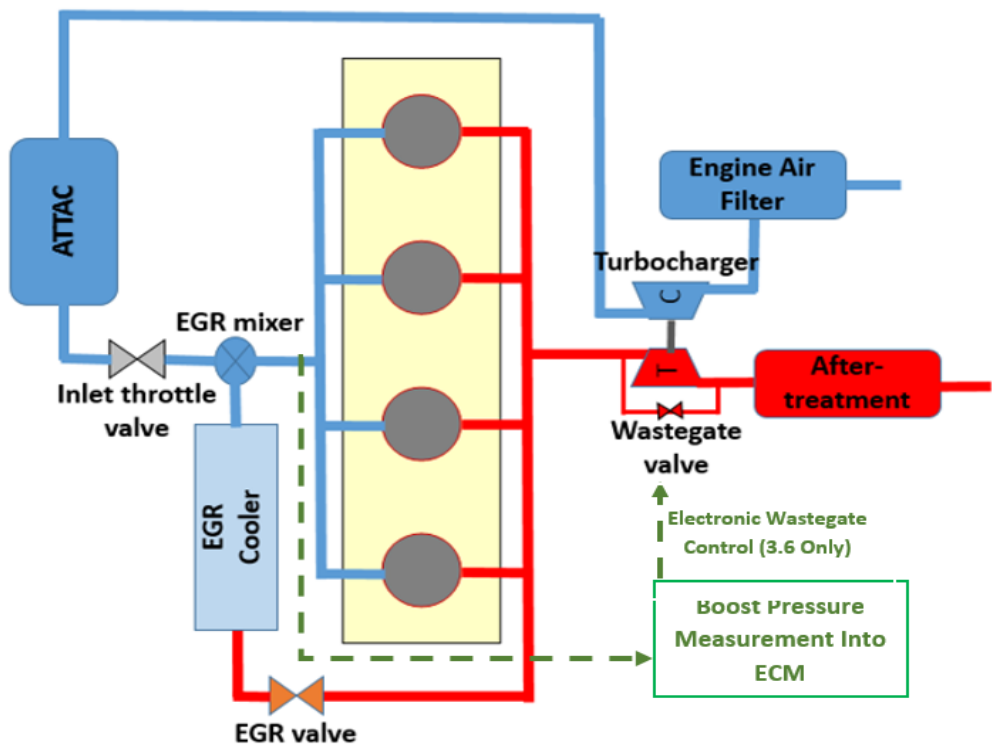


G3.8.2.2

Pressure Charging System



3.6 - Electronic
Wastegate Control



H PCD and NCD Demonstration Data

For NCD and PCD demonstration data, Please refer to the following documents provided in the information pack:

Perkins Stage V Non-Road Particulate Control Diagnostic (PCD) System Information
9. Appendix - Demonstration Data

Perkins Stage V Non-Road NOx Control Diagnostic (NCD) System Information
8. Appendix - demonstration Data