



TYPE-APPROVAL CERTIFICATE

Communication concerning the:

- EC type-approval,
- ~~extension of EC type approval,~~
- ~~refusal of EC type approval,~~
- ~~withdrawal of EC 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 2017/656/EU ⁽¹⁾⁽²⁾ (of the European Parliament and of the Council) ⁽¹⁾

Type Approval No: **e24*2016/1628*2016/1628SHA1/P*0001*00**

Extension No: *N/A*

Reason for extension/refusal/withdrawal ⁽¹⁾:

- *N/A*

SECTION I

- | | | |
|-------|--|---|
| 1.1. | Make (trade name(s) of manufacturer): | <i>Zomax</i> |
| 1.2. | Commercial name(s) (if applicable): | <i>N/A</i> |
| 1.3. | Company name and address of manufacturer: | <i>Zhejiang Zomax Garden Machinery Co.,
Ltd. No.48, Aodihu Road, Taiping
District, Wenling City,
Zhejiang, China</i> |
| 1.4. | Name and address of manufacturer's authorised representative (if any): | <i>Brumar Garden Products S.r.l.
Loc. Valgera 110/B - 14100 ASTI (AT) –
ITALY</i> |
| 1.5. | Name(s) and address(es) of assembly/manufacture plant(s): | <i>See item 1.3 above.</i> |
| 1.7. | Category and sub-category of the engine type/engine family ⁽¹⁾⁽⁴⁾ : | <i>Category: NRSh
Sub-category: NRSh-v-1a</i> |
| 1.8. | Emissions durability period category: | <i>Not Applicable/Cat 1/Cat 2/Cat 3 ⁽¹⁾</i> |
| 1.9. | Emissions stage: | <i>V/ SPE</i> |
| 1.10. | Engine for snow throwers ⁽⁵⁾ : | <i>Yes/No ⁽¹⁾</i> |

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): | 24.06.2017 |
| 3. | Number(s) of test report(s): | 17-00630-CX-SHA-00 |

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: | <i>granted/extended/refused/withdrawn</i> ⁽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:



5th December, 2017

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
(E85)/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):
- 2.8.4. Lubricant added to fuel: *~~Yes/No~~ ⁽¹⁾
~~2T FD
40:1~~*
- 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⁾*

2.10.	Miscellaneous devices:	
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):	N/A
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.	Three-way catalyst combining oxidation and NOx reduction:	Yes/No ⁽¹⁾
2.11.9.	Other after-treatment devices (specify):	N/A
2.11.10.	Other devices or features that have a strong influence on emissions (specify):	N/A

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:	ZM1E45F	ZM1E43F		
3.1.2.	Engine type designation shown on engine mark: Yes/No ⁽¹⁾	Yes	Yes		
3.1.3.	Location of the manufacturer's statutory marking:	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01		
3.2.1.	Declared rated speed (rpm):	8500	8500		
3.2.1.2.	Declared rated net Power (kW):	1.9	1.7		
3.2.2.	Maximum power speed (rpm):	8500	8500		
3.2.2.2.	Maximum net power (kW):	1.9	1.7		
3.2.3.	Declared maximum torque speed (rpm):	6500	6500		
3.2.3.2.	Declared maximum torque (Nm):	2.3	2.1		
3.6.3.	Number of Cylinders:	1	1		
3.6.4.	Engine Displacement (cm ³):	49.8	45.6		
3.8.5.	Device for recycling crankcase gases: Yes/No ⁽¹⁾	No	No		
3.11.3.12.	Consumable reagent: Yes/No ⁽¹⁾	No	No		
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:	N/A	N/A		
3.11.3.13.	NOx sensor(s): Yes/No ⁽¹⁾	N/A	N/A		
3.11.3.14.	Oxygen sensor: Yes/No ⁽¹⁾	N/A	N/A		
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No ⁽¹⁾	N/A	N/A		

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:	-5.0	-5.0		
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):	<i>N/A</i>	<i>N/A</i>		
3.8.3.3.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa) (if applicable):	<i>N/A</i>	<i>N/A</i>		
3.9.3.	Maximum permissible exhaust gas backpressure at 100 % engine speed and at 100 % load (kPa):	6.0	6.0		
3.9.3.1	Location of measurement:	<i>Inlet of muffler</i>	<i>Inlet of muffler</i>		
3.11.1.2.	Maximum temperature drop from exhaust system or turbine outlet to first exhaust after-treatment system (deg. C) if stated:	<i>N/A</i>	<i>N/A</i>		
3.11.1.2.1.	Test conditions for measurement:	<i>N/A</i>	<i>N/A</i>		

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.	324.2	-*	-*	40.5	N/A	N/A	G3
NRTC Final test result with DF	-	-	-	-	-	-	-

* (*) *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: **797.73 g/kWh**

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.



Type Approval No: **e24*2016/1628*2016/1628SHA1/P*0001*00**

Extension No: *N/A*

Index to the Information Package

Date of issue:	<i>5th December, 2017</i>
Date of latest amendment:	<i>N/A</i>
Reason for extension/revision:	<i>N/A</i>
1. Additional conditions, and advisory notes on legal alternatives.	
2. Test report(s)	
- numbers(s):	<i>17-00630-CX-SHA-00</i>
- date of issue:	<i>24.06.2017</i>
- date of latest amendment:	<i>N/A</i>
3. Information document	
- number(s):	<i>ZM1E45F-ext.00</i>
- date of issue:	<i>31.03.2017</i>
- date of latest amendment:	<i>N/A</i>
Documentation:	<i>56 pages</i>



Type Approval No: e24*2016/1628*2016/1628SHA1/P*0001*00

Extension No: N/A

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. Report No.: 17-00630-CX-SHA-00
Manufacturer: Zhejiang Zomax Garden Machinery Co., Ltd.
Type: ZM1E45F

TECHNICAL REPORT

No.: 17-00630-CX-SHA-00

Test in accordance with the regulation of the European Parliament and the Council on requirements

relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery

2016/1628/EU

of 14.09.2016

and its Commission Delegated/Implementing Regulations

2017/654/EU

of 19.12.2016

2017/655/EU

of 19.12.2016


2017/656/EU

of 19.12.2016

Approvals granted up to now		
EC	Number of approval ---	Date ---

Techn. Report No.:	17-00630-CX-SHA-00	
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 2 of 13

1. General information

- 1.1. Make (trade name(s) of manufacturer) : 
- 1.2. Commercial name(s) (if applicable) : N/A
- 1.3. Company name and address of manufacturer : Zhejiang Zomax Garden Machinery Co., Ltd.
No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang, China
- 1.4. Name and address of manufacturer's authorised representative (if any) : Brumar Garden Products S.r.l.
Loc. Valgera 110/B - 14100 ASTI (AT) - ITALY
- 1.5. Name(s) and address(es) of assembly/manufacture plant(s) : Same as above 1.3
- 1.6. Name of technical service : TÜV SÜD Automotive GmbH
- 1.7. Address of technical service : TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch, Shanghai, P.R. China
- 1.8. Location of test : Nanjing depurate Catalyst Co., Ltd.
- 1.9. Date of test : 10.05.2017 - 08.06.2017
- 1.10. Test report number : 17-00630-CX-SHA-00
- 1.11. Information document reference number (if available) : ZM1E45F-ext.00
- 1.12. Test report type : Primary test/~~additional test~~/~~supplementary test~~
- 1.12.1. Description of the purpose of the test : New approval test

2. General engine information (test engine)

- 2.1. Engine type designation/engine family designation/FT : Parent engine: ZM1E45F
Engine within family: ZM1E43F
- 2.2. Engine identification number : 1E45F5H0401343
- 2.3. Engine Category and subcategory : Category: NRSh
Sub-category: NRSh-v-1a

Techn. Report No.:	17-00630-CX-SHA-00	
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 3 of 13

2.4. Worst Case Rationale : Test carried on parent engine, the one with largest displacement

3. Documentation and information Check list (primary test only)

3.1. Engine mapping documentation reference : G3 cycle, work on rated speed, no need engine mapping documentation

3.2. Deterioration factor determination documentation reference : See Annex 1

3.3. Infrequent regeneration factors determination documentation reference, where applicable : N/A

3.4. NO_x control diagnostic demonstration documentation reference, where applicable : N/A

3.5. Particulate control diagnostic demonstration documentation reference, where applicable : N/A

3.6. For engine types and engine families that use an Electronic Control Unit (ECU) as part of the emission control system anti-tampering declaration documentation reference : N/A

3.7. For engine types and engine families that use mechanical devices as part of the emission control system anti-tampering and adjustable parameters declaration and demonstration documentation reference : Tamper-proof carburetor, the adjusting screw is D-shaped, only possible to be adjusted by manufacturer by using the special screwdriver, and the screwdriver will not available on the market. If the user uses want to use other device to adjust it, the screw head will be destroyed.

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

3.8.1. Dynamometer torque greater than or equal to 0.93 × Electronic Control Unit (ECU) torque : Yes/No

Techn. Report No.: 17-00630-CX-SHA-00
Manufacturer: Zhejiang Zomax Garden Machinery Co., Ltd.
Type: ZM1E45F

Page 4 of 13

3.8.2. Electronic Control Unit (ECU) torque : N/A
correction factor in case that dynamometer
torque less than 0.93x Electronic Control
Unit (ECU) torque

4. Reference fuel(s) used for test (complete relevant subparagraph(s))

4.1. Liquid fuel for spark-ignition engines

4.1.1. Make : Anhui Super Beauty Chemical Science
Co., Ltd.
4.1.2. Type : E10
4.1.3. Octane number RON : 96.4
4.1.4. Octane number MON : 86.3
4.1.5. Ethanol content (%) : 9.9
4.1.6. Density at 15 Deg.C (kg/m³) : 746.2

4.2. Liquid fuel for compression-ignition engines

4.2.1. Make : N/A
4.2.2. Type : N/A
4.2.3. Cetane number : N/A
4.2.4. Fame content (%) : N/A
4.2.5. Density at 15 Deg.C (kg/m³) : N/A

4.3. Gaseous fuel – LPG

4.3.1. Make : N/A
4.3.2. Type : N/A
4.3.3. Reference fuel type : Fuel A/Fuel B
4.3.4. Octane number MON : N/A

4.4. Gaseous fuel- Methane/biomethane

4.4.1. Reference fuel type: G_R/G₂₃/G₂₅/G₂₀ : N/A

Techn. Report No.:	17-00630-CX-SHA-00	
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 5 of 13

4.4.2. Source of reference gas : ~~specific reference fuel/pipeline gas with admixture~~

4.4.3. For specific reference fuel

4.4.3.1 Make : N/A

.

4.4.3.2 Type : N/A

.

4.4.4. For pipeline gas with admixture

4.4.4.1 Admixture(s): : ~~Carbon dioxide/Ethane/Methane/
Nitrogen/Propane~~

.

4.4.4.2 The value of $S\lambda$ for the resulting fuel blend: : N/A

.

4.4.4.3 The Methane Number (MN) of the resulting fuel blend : N/A

.

4.5. *Dual fuel engine (in addition to relevant sections above)*

4.5.1. Gas energy ratio on test cycle : N/A

5. Lubricant

5.1. Make(s) : ZOMAX

5.2. Type(s) : 2T-FD

5.3. SAE viscosity : 5W/40

5.4. Lubricant and fuel are mixed : ~~yes~~/no

5.4.1. Percentage of oil in mixture : Oil/fuel ratio: 1/40

6. Engine Speed

6.1. 100% speed (rpm) : 8500

6.1.1. 100% speed determined by : ~~Declared rated speed/Declared MTS/Measured MTS~~

6.1.2. Adjusted MTS if applicable (rpm) : N/A

Techn. Report No.:	17-00630-CX-SHA-00	
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 6 of 13

- 6.2. Intermediate speed (rpm) : N/A
- 6.2.1. Intermediate speed determined by : ~~Declared intermediate speed/Measured intermediate speed/60% of 100% speed/75% of 100% speed /85% of 100% speed~~
- 6.3. Idle speed (rpm) : 3000±300

7. Engine Power

7.1. Engine driven equipment (if applicable)

7.1.1. ~~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 shown in Table 1:~~

Table 1

Auxiliary type and identifying details	Power absorbed at indicated speed (kW) (complete relevant columns)						
	Idle	63%	80%	91%	Inter-mediate	Max.-power	100%
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
Total (P_{t,i}) (kW):	-	-	-	-	-	-	-

7.1.2. ~~Power absorbed at indicated engine speeds by auxiliaries linked with operation of the machine that cannot be removed for the test (as specified by the manufacturer) to be shown in Table 2:~~

Table 2

Auxiliary type and identifying details	Power absorbed at indicated speed (kW) (complete relevant columns)						
	Idle	63%	80%	91%	Inter-mediate	Max.-power	100%
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
Total (P_{t,i}) (kW):	-	-	-	-	-	-	-

7.2. Engine net power to be stated in Table 3

Table 3

Condition	Power setting at indicated engine speed (kW) (complete relevant columns)		
	Intermediate	Max. power	100%
Maximum power measured at specified test speed ($P_{m,i}$) (kW)	N/A	N/A	1.9
Total auxiliary power from table 1 ($P_{f,i}$)	N/A	N/A	N/A
Total auxiliary power from table 2 ($P_{r,i}$)	N/A	N/A	N/A
Net engine power (kW) $P_i = P_{m,i} - P_{f,i} + P_{r,i}$	N/A	N/A	1.9

8. Conditions at test

8.1. f_a within range 0.93 to 1.07 : Yes/No

8.1.1. If f_a is not within specified range state : N/A

altitude of test facility and dry atmospheric pressure

8.2. Applicable intake air temperature range : 26.7 °C

20 to 30/0 to -5 (snow throwers only)/-5 to -15 (snowmobiles only)/20 to 35 (NRE greater than 560 kW only)

9. Information concerning the conduct of the NRSC test:

9.1 Cycle (mark cycle used with X)

Table 4

Cycle	C1	C2	D2	E2	E3	F	G1	G2	G3	H
Discrete mode	-	-	-	-	-	-	-	-	x	-
RMC	-	-	-	-	-	-	-	-	N/A	-

9.2. Dynamometer setting (kW)

Table 5

% Load at point or % of rated power (as applicable)	Dynamometer setting (kW) at indicated engine speed after adjustment for auxiliary power (complete relevant columns)					
	Idle	63%	80%	91%	Inter-mediate	100%
0%	-	-	-	-	-	0
5%	-	-	-	-	-	-
10%	-	-	-	-	-	-
25%	-	-	-	-	-	-
50%	-	-	-	-	-	-
75%	-	-	-	-	-	-
100%	-	-	-	-	-	1.93

9.3. NRSC Emission results

9.3.1. Deterioration Factor (DF): ~~calculated~~/assigned

9.3.2. Specify the DF values and the cycle weighted emission results in the following table

Note: In the event that a discrete mode NRSC is run where the K_{ru} or K_{rd} factors have been established for individual modes then a table showing each mode and the applied K_{ru} or K_{rd} should replace the shown table

Table 6

DF	CO	HC	NO _x	HC+NO _x	PM	PN
multi-add	1.00	-*	-*	1.14	N/A	N/A
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN #/kWh
Test result with /without regeneration	324.21	35.14	0.35	35.49	N/A	N/A

k_{ru}/k_{rd} mult/add	N/A	N/A	N/A	N/A	N/A	N/A
test result with IRAF	N/A	N/A	N/A	N/A	N/A	N/A
Final test result with DF	324.2	-*	-*	40.5	N/A	N/A

* No DF given in the regulations.

9.3.3. Cycle weighted CO₂ (g/kWh) : 797.73

9.3.4. Cycle weighted NH₃ (ppm) : N/A

9.4. ~~Additional control area test points (if applicable)~~

Table 7

Emissions at test point	Engine Speed	Load (%)	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN n/kWh
Test result 1	-	-	-	-	-	-	-	-
Test result 2	-	-	-	-	-	-	-	-
Test result 3	-	-	-	-	-	-	-	-

9.5. Sampling systems used for the NRSC test

9.5.1. Gaseous emissions : Sample system: HORIBA-CVS7100
Analyse system: HORIBA-7200D

9.5.2. PM : N/A

9.5.2.1 Method : single/multiple filter

9.5.3. Particle number : N/A

10. Information concerning the conduct of the NRTC test (if applicable)

Techn. Report No.:	17-00630-CX-SHA-00	Page 10 of 13
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	

10.1. ~~Cycle (mark cycle with X)~~

Table 8

NRTC	-
LSI-NRTC	-

10.2. ~~NRTC emission results~~

10.2.1. ~~Deterioration Factor (DF) : calculated/fixed~~

10.2.2. ~~DF values and the emissions results to be stated in Table 9 or in Table 10, as applicable (NRTC or LSI-NRTC):~~

Table 9: Table for NRTC

DF	CO	HC	NO _x	HC+NO _x	PM	PN
mult/add	-	-	-	-	-	-
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN #/kWh
Gold start	-	-	-	-	-	-
Hot start test result with/without regeneration	-	-	-	-	-	-
Weighted test result	-	-	-	-	-	-
k_{ru}/k_{rd} mult/add	-	-	-	-	-	-
Weighted test result with IRAF	-	-	-	-	-	-
Final test result with DF	-	-	-	-	-	-

Techn. Report No.: 17-00630-CX-SHA-00
Manufacturer: Zhejiang Zomax Garden Machinery Co., Ltd.
Type: ZM1E45F

Page 11 of 13

- 10.3.3 Hot cycle CO₂ (g/kWh) ÷
10.3.4. Cycle weighted NH₃ (ppm) ÷
10.3.5. Cycle work for hot start test (kWh) ÷
10.3.6. Cycle CO₂ for hot start test (g) ÷

Table 10: Table for NRTC-LSI

DF mult/add	CO	HC	NO _x	HC+NO _x	PM	PN
	-	-	-	-	-	-
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN #/kWh
test result with/without regeneration	-	-	-	-	-	-
k_{ref}/k_{ref} mult/add	-	-	-	-	-	-
Weighted test result with IRAF	-	-	-	-	-	-
Final test result with DF	-	-	-	-	-	-

- 10.3. Cycle CO₂ (g/kWh) ÷
10.4. Cycle NH₃ (ppm) ÷
10.4.1. Cycle work (kWh) ÷
10.4.2. Cycle CO₂ (g) ÷
10.5. Sampling system used for the NRTC test ÷
10.6. Gaseous emissions ÷
10.7. PM ÷
10.7.1. Method ÷ single/multiple filter
10.8. Particle number ÷

11. Final emission result

11.1 Cycle emissions results

Table 11

Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+NO _x (g/kWh)	PM (g/kWh)	PN #/kWh	Test Cycle(1)
NRSC final result with DF ⁽²⁾ .	324.2	-*	-*	40.5	N/A	N/A	G3
NRTC Final test result with DF ⁽³⁾	-	-	-	-	-	-	-

Emission limits

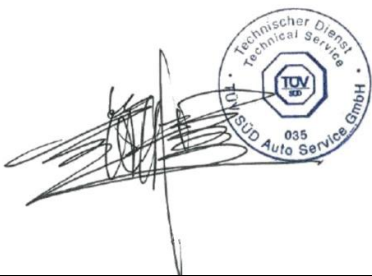
	CO	HC	NO _x	HC+NO _x	PM	PN
NRSh-v-1a	805	-	-	50	-	-
NRSh-v-1b	603	-	-	72	-	-
NRS-vr-1a	610	-	-	10	-	-
NRS-vr-1b	610	-	-	8	-	-
NRS-vi-1a	610	-	-	10	-	-
NRS-vi-1b	610	-	-	8	-	-
NRS-v-2a	610	-	-	8	-	-
NRS-v-2b	4,40(*)	-	-	2,70(*)	-	-
NRS-v-3	4,40(*)	-	-	2,70(*)	-	-

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

11.2 CO₂ result (g/kWh)⁽⁴⁾ : 797.73

(4) For an engine type or engine family tested on the NRTC and NRSC indicate the emission values given in the CO₂ section 10.3.3. (NRTC). For an engine only tested in an NRSC indicate the emission values given in the CO₂ column section 9.3.3.

Techn. Report No.:	17-00630-CX-SHA-00	
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 13 of 13

<p>CONCLUSION</p>	<p>The information folder as mentioned above 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".</p> <p>The test report may be reproduced and published in full and by the client only. It can be reproduced partially with the written permission of the test laboratory only.</p>
	<p>Signature:</p>
	<p>Name: Zhao, Chongmin Position: Expert Date: 24.06.2017</p>
	

Genehmigungsbehörde/ Approval authority	Land/Country	Registriernummer/ Registration-number	Aktueller Benennungsumfang/ Actual scope list
Kraftfahrt-Bundesamt (KBA)	Deutschland/ Germany	KBA-P 00100-10	www.kba.de
Vehicle Certification Agency (VCA)	Vereintes Königreich/ United Kingdom	VCA-TS-006	http://ec.europa.eu/enterprise/sectors/automotive/approval-authorities-technical-services/technical-services/index_en.htm
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	http://www.vsc.org.tw/English/Default.aspx

Techn. Report No.:	17-00630-CX-SHA-00	Annex 1
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 1 of 2

Determination of deterioration factor

ZM1E45F parent engine (engine No: 1E45F5H0401343)

	New stabilized engine	engine after 50 aging cycle	DF
CO	324.21 g/kWh	296.66 g/kWh	1.00
HC	35.14 g/kWh	39.71 g/kWh	-*
NO _x	0.35 g/kWh	0.62 g/kWh	-*
HC + NO _x	35.49 g/kWh	40.33 g/kWh	1.14

* No DF given in the regulations.

Aging cycle (started at 13.05.2017)

发动机耐久试验记录表

浙江中马园林测试中心

发动机型号 engine type	ZM1E45F		发动机编号 engine SN	1E45F5H0401343			测试单位 Durability test	浙江中马园林机器股份有限公司 Zhejiang Zomax Garden Machinery Co., Ltd.		试验台架 test equipment No:	QC600-3KW		试验 run by	周志荣 zhouzhihong 应宏斌 yinghongbin
燃油 gasoline	95#		润滑油 lubricant	2T FD			混合比 mixture ratio	40:1		燃油密度 mixed oil density	0.745		审核 check by	付业龙 fuyelou
耐久日期 Durability data	时间 time	累计耐久 运行时间 Durability hours	转速 Engine speed	扭矩 torque	功率 power	负荷 Load percent	耗油量 Fuel flow	燃油耗率 Fuel flow rate	火花塞 垫圈温度 T temperature of spark plug washer	大气 压力 Air pressure	环境 温度 Ambient temperature	相对 湿度 Relative humidity	备注 remark	
yyyy-mm-dd	hh:mm	hh:mm	r/min	Nm	kW	%	kg/h	g/kWh	°C	kPa	°C	%		
2017/5/13	9:00	0:00	8504	2.21	1.97	100	0.988	502.0	250	101.2	23.0	62.0	磨合10小时后排放初测后开始耐久试验。	
	10:00	1:00	8504	2.21	1.97	100	0.999	507.6	250	101.5	22.0	64.0		
	11:00	2:00	8505	2.21	1.97	100	0.999	507.6	250	101.4	22.0	64.0		
	12:00	3:00	8505	2.21	1.97	100	0.998	507.1	251	101.5	20.0	63.0		
	13:00	4:00	8507	2.20	1.96	100	0.998	509.3	251	101.5	20.0	62.0		
	14:00	5:00	8507	2.20	1.96	100	0.997	508.7	251	101.5	21.0	62.0		
	15:00	6:00	8510	2.20	1.96	100	0.980	499.9	251	101.6	22.0	61.0		
	16:00	7:00	8507	2.18	1.94	100	0.985	507.2	251	101.6	22.0	61.0		
	17:00	8:00	8505	2.18	1.94	100	0.987	508.4	251	101.6	22.0	61.0		
	18:00	9:00	8503	2.17	1.93	100	0.985	509.8	251	101.6	21.0	61.0		
	19:00	10:00	8501	2.18	1.94	100	0.986	508.1	251	101.6	21.0	61.0	发动机运行正常,停机5min.检查发动机的连接紧固件。	
	20:00	11:00	8504	2.18	1.94	100	0.984	506.9	253	101.6	20.0	61.0		
	21:00	12:00	8507	2.16	1.92	100	0.979	508.8	253	101.6	19.0	60.0		
	22:00	13:00	8503	2.16	1.92	100	0.978	508.5	252	101.6	18.0	60.0		
	23:00	14:00	8507	2.16	1.92	100	0.981	509.8	254	101.6	17.0	60.0		
2017/5/14	0:00	15:00	8511	2.16	1.93	100	0.982	510.1	254	101.6	16.0	62.0		
	1:00	16:00	8512	2.16	1.93	100	0.975	506.4	255	101.6	14.5	62.0		
	2:00	17:00	8510	2.16	1.92	100	0.972	503.0	256	101.6	14.0	68.0		
	3:00	18:00	8513	2.17	1.93	100	0.975	504.0	256	101.6	16.0	68.0		
	4:00	19:00	8522	2.17	1.94	100	0.975	503.5	257	101.6	17.0	68.0		
	5:00	20:00	8520	2.16	1.93	100	0.975	506.0	257	101.7	18.0	68.0		



Techn. Report No.:	17-00630-CX-SHA-00	Annex 1
Manufacturer:	Zhejiang Zomax Garden Machinery Co., Ltd.	
Type:	ZM1E45F	Page 2 of 2

	6:00	21:00	0515	2.15	1.92	100	0.973	507.6	257	101.7	19.0	68.0	发动机运行正常, 停机15min, 清洗火花塞、清理空滤器、检查连接紧固件。
	7:00	22:00	0519	2.15	1.92	100	0.972	506.8	256	101.7	20.0	65.0	
	8:00	23:00	0517	2.15	1.92	100	0.972	506.9	258	101.7	21.0	64.0	
	9:00	24:00	0512	2.15	1.92	100	0.971	506.7	259	101.7	22.0	62.0	
	10:00	25:00	0512	2.15	1.92	100	0.970	506.1	259	101.7	22.0	62.0	磨合10小时累计运行25小时测得结果, 耐久试验进程一半, 发动机正常, 等待做排放试验。
2017/5/17	9:00	26:00	0510	2.15	1.92	100	0.970	506.3	259	101.6	23.0	60.0	
	10:00	27:00	0510	2.14	1.91	100	0.972	509.7	259	101.5	23.5	58.0	
	11:00	28:00	0511	2.14	1.91	100	0.972	509.6	260	101.5	24.0	58.0	
	12:00	29:00	0513	2.14	1.91	100	0.975	511.1	259	101.5	24.0	56.0	
	13:00	30:00	0512	2.13	1.90	100	0.975	513.5	260	101.5	23.0	56.0	发动机运行正常, 停机5min, 检查发动机的连接紧固件。
	14:00	31:00	0507	2.13	1.90	100	0.973	512.8	262	101.5	22.0	56.0	
	15:00	32:00	0507	2.13	1.90	100	0.972	512.2	262	101.5	21.0	54.0	
	16:00	33:00	0506	2.13	1.90	100	0.972	512.3	262	101.5	21.0	54.0	
	17:00	34:00	0512	2.14	1.91	100	0.965	505.9	263	101.5	20.0	54.0	
	18:00	35:00	0513	2.14	1.91	100	0.965	505.8	262	101.5	19.0	53.0	
	19:00	36:00	0517	2.12	1.89	100	0.968	511.9	264	101.5	19.0	52.0	
	20:00	37:00	0513	2.12	1.89	100	0.965	510.6	264	101.5	17.0	50.0	
	21:00	38:00	0512	2.12	1.89	100	0.963	509.6	264	101.5	18.0	48.0	
	22:00	39:00	0512	2.12	1.89	100	0.964	510.1	265	101.5	18.0	52.0	
	23:00	40:00	0511	2.12	1.89	100	0.962	509.1	264	101.5	18.0	56.0	发动机运行正常, 停机5min, 检查发动机的连接紧固件。
2017/5/18	0:00	41:00	0507	2.10	1.87	100	0.960	513.2	265	101.5	17.0	57.0	
	1:00	42:00	0507	2.12	1.89	100	0.961	508.8	266	101.5	16.0	58.0	
	2:00	43:00	0505	2.13	1.90	100	0.956	503.9	266	101.5	15.0	58.0	
	3:00	44:00	0504	2.11	1.88	100	0.954	507.7	265	101.5	15.0	60.0	
	4:00	45:00	0501	2.12	1.89	100	0.953	505.0	267	101.5	14.0	62.0	
	5:00	46:00	0501	2.10	1.87	100	0.953	509.8	265	101.5	15.0	62.0	
	6:00	47:00	0501	2.10	1.87	100	0.954	510.3	264	101.5	16.0	64.0	
	7:00	48:00	0502	2.09	1.86	100	0.957	514.3	265	101.5	18.0	63.0	
	8:00	49:00	0503	2.09	1.86	100	0.957	514.2	266	101.5	20.0	62.0	
	9:00	50:00	0507	2.09	1.86	100	0.953	511.8	265	101.6	23.0	61.0	磨合10小时累计运行50小时测得结果, 耐久试验进程完成, 发动机正常, 等待做排放试验。

PARTIAL MODEL INFORMATION DOCUMENT

No.: ZM1E45F-ext.00



Zhejiang Zomax Garden Machinery Co., Ltd.

ENGINE TYPE : ZM1E45F

SUBJECT : NRMM EMISSION

LEGAL BASIS : 2016/1628/EU

Date : 2017-03-31 [YYYY-MM-DD]

Approval : Huang xinyue

Position : Technical Manager

Huang Xinyue


AMENDMENT

Version	Approval No.	Modification / Correction	Date
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

CONTENT

1.	General information	3
2.	Common design parameters of engine family.....	4
3.	Essential characteristics of the engine type(s)	6
Attachment 1	Photographs of the engines	23
Attachment 2	Drawings of the engines.....	25
Attachment 3	Manufacturer's declaration on compliance with Regulation (EU) 2016/1628	36
Attachment 4	Manufacturer's statement on compliance with the exhaust emission limits when use fuels other than the reference fuels	37
Attachment 5	Overview of the emission control strategy for electronically controlled engines	37
Attachment 6	The functional operational characteristics of the NOx control measures and inducement system	37
Attachment 7	The functional operational characteristics of the particulate control measures	37
Attachment 8	Manufacturer's declaration, and supporting test reports or data, on deterioration factors	38
Attachment 9	Manufacturer's declaration, and supporting test reports or data, of the infrequent regeneration adjustment factors	39
Attachment 10	The physical connector required to receive the torque signal from the engine Electronic control Unit (ECU) during the in-service monitoring test	39
Attachment 11	Manufacturer's declaration and supporting data on tampering prevention for emission control systems	40
Attachment 12	List of scheduled for emission-related maintenance requirements	41

Part A**1. General information**

- 1.1. Make (trade name(s) of manufacturer) : 
- 1.2. Commercial name(s) (if applicable) : N/A
- 1.3. Company name and address of manufacturer : Zhejiang Zomax Garden Machinery Co., Ltd.
No.48, Aodihu Road, Taiping District, Wenling City,
Zhejiang, China
- 1.4. Name and address of manufacturer's authorised representative (if any) : Brumar Garden Products S.r.l.
Loc. Valgera 110/B - 14100 ASTI (AT) - ITALY
- 1.5. Name(s) and address(es) of assembly/manufacture plant(s) : Same as above 1.3
- 1.6. Engine type designation/engine family designation/FT : Parent engine: ZM1E45F
Commercial names: N/A
Engine within family: ZM1E43F
Commercial names: N/A
- 1.7. Category and sub-category of the engine type/engine family : Category: NRSh
Sub-category: NRSh-v-1a
- 1.8. Emissions durability period category : ~~Not Applicable/~~
Cat 1 (Consumer products)/
~~Cat 2 (Semi-professional products)/~~
~~Cat 3 (Professional products)~~
- 1.9. Emissions stage : ~~V/Special Purpose Engine (SPE)~~
- 1.10. In case of NRS <19 kW only, engine family consisting exclusively of engine types for snow throwers : ~~Yes/No~~
- 1.11. Reference power is : ~~rated net power/~~maximum net power
- 1.12. Primary NRSC test cycle : ~~C1/C2/D2/E2/E3/F/G1/G2/G3/H~~
- 1.12.1. In case of variable speed IWP category only, Additional propulsion test cycle : ~~Not applicable/E2/E3~~
- 1.12.2. In case of IWP category only, additional auxiliary NRSC test cycle : ~~Not applicable/D2/C4~~
- 1.13. Transient test cycle : ~~Not applicable/NRTC/LSI-NRTC~~
- 1.14. Restrictions on use (if applicable) : N/A

Part B**2. Common design parameters of engine family**

- 2.1. Combustion Cycle : ~~four stroke cycle~~/two stroke cycle/~~rotary~~/other (specify)
- 2.2. Ignition Type : ~~Compression ignition~~/spark ignition
- 2.3. Configuration of the cylinders**
- 2.3.1. Position of the cylinders in the block : Single/~~in line~~/~~opposed~~/radial/other(specify)
- 2.3.2. Bore centre to centre dimension (mm) : N/A
- 2.4. Combustion chamber type/design**
- 2.4.1. Open chamber/divided chamber/other(specify) : Open chamber
- 2.4.2. Valve and porting configuration : Refer to drawing No. ZM1E45F-02 and ZM1E43F-02
- 2.4.3. Number of valves per cylinder : One port in and one port out
- 2.5. Range of individual cylinder displacement (cm³) : See item 3.6.4. in Part C
- 2.6. Main Cooling medium : Air/~~Water~~/~~Oil~~
- 2.7. Method of air aspiration : naturally aspirated/~~pressure charged~~/~~pressure charged with charge cooler~~
- 2.8. Fuel**
- 2.8.1. Fuel Type : ~~Diesel (non-road gas-oil)~~/Ethanol for dedicated ~~compression ignition engines (ED95)~~/Petrol (E10)/Ethanol (E85)/Natural gas/Biomethane/Liquid Petroleum Gas (LPG)
- 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
- 2.8.3. List of additional fuels, fuel mixtures or emulsions compatible with use by the engine declared by the manufacturer in accordance with point 1.4 of Annex I to Delegated Regulation (EU) 2017/654 (provide reference to recognised standard or specification) : N/A
- 2.8.4. Lubricant added to fuel : Yes/No
- 2.8.4.1. Specification : 2T FD
- 2.8.4.2. Ratio of fuel to oil : 40:1
- 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) :
- 2.9. Engine management systems : mechanical/~~electronic control strategy~~⁽²⁾

No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang,

New approval

China

Issue Date: 2017-03-31

2.10. Miscellaneous devices

- 2.10.1. Exhaust gas recirculation: Yes/No : No
(if yes, complete section 3.10.1. and provide a schematic diagram of the location and order of the devices)
- 2.10.2. Water injection: Yes/No : No
(if yes, complete section 3.10.2. and provide a schematic diagram of the location and order of the devices)
- 2.10.3. Air injection: Yes/No : No
(if yes, complete section 3.10.3. and provide a schematic diagram of the location and order of the devices)
- 2.10.4. H2 injection: Yes/No : No
(if yes, provide a schematic diagram of the location and order of the devices)
- 2.10.5. Others (specify and provide a schematic diagram of the location and order of the devices) : N/A
- 2.11. Exhaust after-treatment system : Yes/No**
(if yes provide a schematic diagram of the location and order of the devices)
- 2.11.1. Oxidation catalyst : ~~Yes/No~~
(if yes, complete section 3.11.2.)
- 2.11.2. DeNOx system with selective reduction of NOx (addition of reducing agent) : ~~Yes/No~~
(if yes, complete section 3.11.3.)
- 2.11.3. Other DeNOx systems : ~~Yes/No~~
(if yes, complete section 3.11.3.)
- 2.11.4. Three-way catalyst combining oxidation and NOx reduction : ~~Yes/No~~
(if yes, complete section 3.11.3.)
- 2.11.5. Particulate trap with passive regeneration : ~~Yes/No~~
(if yes, complete section 3.11.4.)
- 2.11.6. Particulate trap with active regeneration : ~~Yes/No~~
(if yes, complete section 3.11.4.)
- 2.11.7. Other particulate traps : ~~Yes/No~~
(if yes, complete section 3.11.4.)
- 2.11.8. Other after-treatment devices (specify) : ~~Yes/No~~
(if yes, complete section 3.11.5.)
- 2.11.9. Other devices or features that have a strong influence on emissions (specify) : N/A

Zhejiang Zomax Garden Machinery Co., Ltd.

No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang,

China

Information document: ZM1E45F-ext.00

New approval

Issue Date: 2017-03-31

Part C

3. Essential characteristics of the engine type(s)

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.1	Engine Identification					
3.1.1.	Engine type designation			X	ZM1E45F	ZM1E43F
3.1.2.	Engine type designation shown on engine marking:			X	Yes	Yes
3.1.3.	Location of the statutory marking:			X	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01
3.1.4.	Method of attachment of the statutory marking:			X	Stamp marker or fixed plated riveting on the crankcase	Stamp marker or fixed plated riveting on the crankcase
3.1.5.	Drawings of the location of the engine identification number (complete example with dimensions):			X	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01	Refer to drawing No. ZM1E45F-01 / ZM1E43F-01
3.2.	Performance Parameters					
3.2.1.	Declared rated speed (rpm):	X			8500	8500
3.2.1.1.	Fuel delivery/stroke (mm ³) for diesel engine, fuel flow (g/h) for other engines, at rated net power:			X	873	790
3.2.1.2.	Declared rated net power (kW):	X			1.9	1.7
3.2.2.	Maximum power speed(rpm):			X	Same as 3.2.1.	Same as 3.2.1.
3.2.2.1.	Fuel delivery/stroke (mm ³) for diesel engine, fuel flow (g/h) for other engines, at maximum net power:			X	Same as 3.2.1.1.	Same as 3.2.1.1.
3.2.2.2.	Maximum net power (kW):	X		X	Same as 3.2.1.2.	Same as 3.2.1.2.
3.2.3.	Declared maximum torque speed (rpm):	X			6500	6500

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.2.3.1.	Fuel delivery/stroke (mm ³) for diesel engine, fuel flow (g/h) for other engines, at maximum torque speed:			X	617	502
3.2.3.2.	Declared maximum torque (Nm):	X			2.3	2.1
3.2.4.	Declared 100% test speed:	X			8500	8500
3.2.5.	Declared Intermediate test speed:	X			N/A	N/A
3.2.6.	Idle speed (rpm)	X			3000±300	3000±300
3.2.7.	Maximum no load speed (rpm):	X			N/A	N/A
3.2.8.	Declared minimum torque (Nm)	X			N/A	N/A
3.3.	Run-in procedure				N/A	N/A
3.3.1.	Run in time:	X			N/A	N/A
3.3.2.	Run-in cycle:	X			N/A	N/A
3.4.	Engine test					
3.4.1.	Specific fixture required: Yes/No	X			Yes	Yes
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:	X			Refer to Attachment 1	Refer to Attachment 1
3.4.2.	Exhaust mixing chamber permitted by manufacturer: Yes/No	X			No	No
3.4.2.1.	exhaust mixing chamber description, photograph and/or drawing:	X			N/A	N/A
3.4.3.	Manufacturers chosen NRSC: RMC/Discrete mode	X			N/A	N/A
3.4.4.	Additional NRSC: E2/D2/C1	X			N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.4.5.	Number of pre-conditioning cycles prior to transient test	X			N/A	N/A
3.4.6.	Number of pre-conditioning RMC prior to RMC NRSC test	X			N/A	N/A
3.5.	Lubrication system					
3.5.1.	<i>Lubricant temperature</i>					
3.5.1.1.	Minimum (deg. C):	X			N/A	N/A
3.5.1.2.	Maximum (deg. C):	X			N/A	N/A
3.6.	Combustion Cylinder					
3.6.1.	Bore(mm):			X	45	43
3.6.2.	Stroke(mm):			X	31	31
3.6.3.	Number of cylinders:			X	1	1
3.6.4.	Engine displacement (cm ³):			X	49.8	45.6
3.6.5.	Cylinder displacement as % of parent engine:			X	100%	91.6%
3.6.6.	Volumetric compression ratio:			X	(8±0.2) :1	(7.6±0.2) :1
3.6.7.	Combustion system description:			X	N/A	N/A
3.6.8.	Drawings of combustion chamber and piston crown:			X	Refer to drawing no. ZM1E45F-02 / ZM1E43F-02 & ZM1E45F-03 / ZM1E43F-03	Refer to drawing no. ZM1E45F-02 / ZM1E43F-02 & ZM1E45F-03 / ZM1E43F-03
3.6.9.	Minimum cross sectional area of inlet and outlet ports (mm ²):			X	Inlet 300 mm ² , Outlet 264 mm ²	Inlet 300 mm ² , Outlet 264 mm ²
3.6.10.	<i>Valve timing</i>					

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.6.10.1.	Maximum lift and angles of opening and closing in relation to dead centre or equivalent data:			X	Refer to drawing No. ZM1E45F-05 / ZM1E43F-05	Refer to drawing No. ZM1E45F-05 / ZM1E43F-05
3.6.10.2.	Reference and/or setting range:			X	N/A	N/A
3.6.10.3.	Variable valve timing system: Yes/No			X	No	No
3.6.10.3.1.	Type: continuous/(on/off)			X	N/A	N/A
3.6.10.3.2.	Cam phase shift angle:			X	N/A	N/A
3.6.11.	Porting configuration					
3.6.11.1.	position, size and number:			X	Refer to drawing No. ZM1E45F-02 & ZM1E43F-02	Refer to drawing No. ZM1E45F-02 & ZM1E43F-02
3.7.	Cooling system					
3.7.1.	<i>Liquid cooling</i>					
3.7.1.1.	Nature of liquid:			X	N/A	N/A
3.7.1.2.	Circulating pumps: Yes/No			X	No	No
3.7.1.2.1.	type(s):			X	N/A	N/A
3.7.1.2.2.	Drive ratio(s):			X	N/A	N/A
3.7.1.3.	Minimum coolant temperature at outlet (deg. C):	X			N/A	N/A
3.7.1.4.	Maximum coolant temperature at outlet (deg. C):	X			N/A	N/A
3.7.2.	<i>Air cooling</i>					
3.7.2.1.	fan: Yes/No			X	Yes	Yes
3.7.2.1.0.	Make:			X	XINYA	XINYA
3.7.2.1.1.	type(s):			X	centrifugal	centrifugal
3.7.2.1.2.	Drive ratio(s):			X	1:1	1:1

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.7.2.2.	Maximum temperature at reference point (deg. C):			X	284	271
3.7.2.2.1.	Reference point location			X	Spark plug washer	Spark plug washer
3.8.	Aspiration					
3.8.1.	Maximum allowable intake depression at 100% engine speed and at 100% load (kPa)	X	X		-5.0	-5.0
3.8.1.1.	With clean air cleaner:	X	X		N/A	N/A
3.8.1.2.	With dirty air cleaner:	X	X		N/A	N/A
3.8.1.3.	Location, of measurement:	X	X		N/A	N/A
3.8.2.	Pressure charger(s): Yes/No			X	No	No
3.8.2.0.	Make:			X	N/A	N/A
3.8.2.1.	Type(s):			X	N/A	N/A
3.8.2.2.	Description and schematic diagram of the system (e.g. maximum charge pressure,-waste gate, VGT, Twin turbo, etc.):			X	N/A	N/A
3.8.3.	Charge air cooler: Yes/No			X	No	No
3.8.3.1.	Type: air-air/air-water/other(specify)			X	N/A	N/A
3.8.3.2.	Maximum charge air cooler outlet temperature at 100% speed and 100% load (deg. C):	X	X		N/A	N/A
3.8.3.4.	Maximum allowable pressure drop across charge cooler at 100% engine speed and at 100% load (kPa):	X	X		N/A	N/A
3.8.4.	Intake throttle valve: Yes/No			X	Yes	Yes
3.8.5.	Device for recycling crankcase gases: Yes/No			X	No	No
3.8.5.1.	If yes, description and drawings:			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.8.5.2.	If no, compliance with paragraph 6.10 of Annex VI to Delegated Regulation (EU) 2017/654: Yes/No	X			N/A	N/A
3.8.6.	<i>Inlet path</i>					
3.8.6.1.	Description of inlet path, (with drawings, photographs and/or part numbers):			X	Refer to drawing No. ZM1E45F-08 / ZM1E43F-08	Refer to drawing No. ZM1E45F-08 / ZM1E43F-08
3.8.7.	Air filter			X	Yes	Yes
3.8.7.0.	Make:			X	ZOMAX	ZOMAX
3.8.7.1.	Type:			X	Nylon mesh	Nylon mesh
3.8.8.	Intake air-silencer				N/A	N/A
3.8.1.0.	Make:			X	N/A	N/A
3.8.1.1.	Type:			X	N/A	N/A
3.9.	Exhaust system					
3.9.1.	Description of the exhaust system (with drawings, photos and/or part numbers as required):			X	Refer to drawing No. ZM1E45F-07 / ZM1E43F-07	Refer to drawing No. ZM1E45F-07 / ZM1E43F-07
3.9.2.	Maximum exhaust temperature (deg. C):	X			724	697
3.9.3.	Maximum permissible exhaust backpressure at 100% engine speed and at 100% load (kPa):	X	X		6.0	6.0
3.9.3.1.	Location of measurement:	X	X		Inner of muffler	Inner of muffler
3.9.4.	Exhaust backpressure at loading level specified by manufacturer for variable restriction after-treatment at start of test (kPa):	X			N/A	N/A
3.9.4.1.	Location and speed/load conditions:	X			N/A	N/A
3.9.5.	Exhaust throttle valve: Yes/No			X	No	No

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.10.	Miscellaneous devices: Yes/No				No	No
3.10.1.	<i>Exhaust gas recirculation (EGR)</i>				N/A	N/A
3.10.1.1.	Characteristics: cooled/uncooled, high pressure/low pressure/other (specify):				N/A	N/A
3.10.2.	<i>Water injection</i>				N/A	N/A
3.10.2.1.	Operation principle:			X	N/A	N/A
3.10.3.	H ₂ injection	X			N/A	N/A
3.11.	Exhaust after-treatment system					
3.11.1.	<i>Location</i>		X		Immediately behind emission port, Integrated with exhaust tube and muffler	Immediately behind emission port, Integrated with exhaust tube and muffler
3.11.1.1.	Place(s) and maximum/minimum distance(s) from engine to first after-treatment device:		X		30mm	30mm
3.11.1.2.	Maximum temperature drop from exhaust or turbine outlet to first after-treatment device (deg. C) if stated:	X	X		N/A	N/A
3.11.1.2.1.	Test conditions for measurement:	X	X		N/A	N/A
3.11.1.3.	Minimum temperature at inlet to first after-treatment device at 100% load and speed (deg. C), if stated:	X	X		N/A	N/A
3.11.2.	Oxidation catalyst					
3.11.2.1.	Number of catalytic converters and elements:			X	1	1
3.11.2.2.	Dimensions and volume of the catalytic converter(s):			X	40*20*18mm,14.4cm ³	40*20*18mm,14.4cm ³
3.11.2.3.	Total charge of precious metals:			X	35.6mg	35.6mg
3.11.2.4.	Relative concentration of each compound:			X	Pt/Pd/Rh=4/10/1	Pt/Pd/Rh=4/10/1

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.11.2.5.	Substrate (structure and material):			X	Fe	Fe
3.11.2.6.	Cell density:			X	70g/ft ³	70g/ft ³
3.11.2.7.	Type of casing for the catalytic converter(s):			X	0Cr25AL5	0Cr25AL5
3.11.3.	<i>Catalytic exhaust gas after treatment system for NO_x or three way catalyst</i>				N/A	N/A
3.11.3.0.	Make:			X	N/A	N/A
3.11.3.1.	Type:			X	N/A	N/A
3.11.3.2.	Number of catalytic converters and elements:			X	N/A	N/A
3.11.3.3.	Type of catalytic action:			X	N/A	N/A
3.11.3.4.	Dimensions and volume of the catalytic converter(s):			X	N/A	N/A
3.11.3.5.	Total charge of precious metals:			X	N/A	N/A
3.11.3.6.	Relative concentration of each compound:			X	N/A	N/A
3.11.3.7.	Substrate (structure and material):			X	N/A	N/A
3.11.3.8.	Cell density:			X	N/A	N/A
3.11.3.9.	Type of casing for the catalytic converter(s):			X	N/A	N/A
3.11.3.10.	Method of regeneration:	X		X	N/A	N/A
3.11.3.10.1.	Infrequent regeneration: Yes/No:	X			N/A	N/A
3.11.3.11.	Normal operating temperature range (deg. C):	X	X		N/A	N/A
3.11.3.12.	Consumable reagent: Yes/No			X	N/A	N/A
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.11.3.12.2.	Lowest concentration of the active ingredient present in the reagent that does not activate warning system (CD _{min}) (%vol):			X	N/A	N/A
3.11.3.12.3.	Normal operational temperature range of reagent:		X		N/A	N/A
3.11.3.12.4.	International standard:		X	X	N/A	N/A
3.11.3.13.	NO _x sensor(s): Yes/No			X	N/A	N/A
3.11.3.13.0.	Make:			X	N/A	N/A
3.11.3.13.1.	Type:			X	N/A	N/A
3.11.3.13.2.	Location(s)			X	N/A	N/A
3.11.3.14.	Oxygen sensor(s): Yes/No			X	N/A	N/A
3.11.3.14.0.	Make:			X	N/A	N/A
3.11.3.14.1.	Type:			X	N/A	N/A
3.11.3.14.2.	Location(s):			X	N/A	N/A
3.11.4.	<i>Particulate trap</i>				N/A	N/A
3.11.4.1.	Type of filtration: through flow/partial flow/wall flow/other (specify)			X	N/A	N/A
3.11.4.2'.	Make:			X	N/A	N/A
3.11.4.2.	Type:			X	N/A	N/A
3.11.4.3.	Dimensions and capacity of the particulate trap:			X	N/A	N/A
3.11.4.4.	Location place(s) and maximum and minimum distance(s) from engine:		X		N/A	N/A
3.11.4.5.	Method or system of regeneration, description and/or drawing:			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.11.4.5.1.	Infrequent regeneration: Yes/No			X	N/A	N/A
3.11.4.5.2.	Minimum exhaust gas temperature for initiating regeneration procedure (deg. C):			X	N/A	N/A
3.11.4.6.	Catalytic coating: Yes/No			X	N/A	N/A
3.11.4.6.1.	Type of catalytic action:			X	N/A	N/A
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No			X	N/A	N/A
3.11.4.8.	Normal operating temperature range (deg. C):			X	N/A	N/A
3.11.4.9.	Normal operating pressure range (kPa)			X	N/A	N/A
3.11.4.10.	Storage capacity soot/ash [g]:			X	N/A	N/A
3.11.5.	<i>Other systems</i>				N/A	N/A
3.11.5.1.	Description and operation:			X	N/A	N/A
3.11.6.	Infrequent Regeneration				N/A	N/A
3.11.6.1.	Number of cycles with regeneration	X			N/A	N/A
3.11.6.2.	Number of cycles without regeneration	X			N/A	N/A
3.12.	Fuel feed for liquid-fuelled CI or, where applicable, dual-fuel engines					
3.12.1.	<i>Feed pump</i>				N/A	N/A
3.12.1.1.	Pressure (kPa) or characteristic diagram:			X	N/A	N/A
3.12.2.	<i>Injection system</i>				N/A	N/A
3.12.2.1.	Pump				N/A	N/A
3.12.2.1.0.	Make:			X	N/A	N/A
3.12.2.1.1.	Type(s):			X	N/A	N/A
3.12.2.1.2.	Rated pump speed (rpm):			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.12.2.1.3.	mm ³ per stroke or cycle at full injection at rated pump speed:			X	N/A	N/A
3.12.2.1.4.	Torque peak pump speed (rpm):			X	N/A	N/A
3.12.2.1.5.	mm ³ per stroke or cycle at full injection at torque peak pump speed			X	N/A	N/A
3.12.2.1.6.	Characteristic diagram:			X	N/A	N/A
3.12.2.1.7.	Method used: on engine/on pump bench			X	N/A	N/A
3.12.2.2.	Injection timing				N/A	N/A
3.12.2.2.1.	Injection timing curve:			X	N/A	N/A
3.12.2.2.2.	Static Timing:			X	N/A	N/A
3.12.2.3.	Injection piping				N/A	N/A
3.12.2.3.1.	Length(s) (mm):			X	N/A	N/A
3.12.2.3.2.	Internal diameter (mm):			X	N/A	N/A
3.12.2.4.	Common rail: Yes/No			X	N/A	N/A
3.12.2.4.0.	Make:			X	N/A	N/A
3.12.2.4.1.	Type:			X	N/A	N/A
3.12.3.	<i>Injector(s)</i>				N/A	N/A
3.12.2.0.	Make:			X	N/A	N/A
3.12.3.1.	Type(s):			X	N/A	N/A
3.12.3.2.	Opening pressure (kPa):			X	N/A	N/A
3.12.4.	<i>Electronic control unit (ECU): Yes/No</i>			X	N/A	N/A
3.12.4.0.	Make:			X	N/A	N/A
3.12.4.1.	Type(s):			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.12.4.2.	Software calibration number(s):			X	N/A	N/A
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	X		X	N/A	N/A
3.12.5.	<i>Governor</i>				N/A	N/A
3.12.5.0.	Make:			X	N/A	N/A
3.12.5.1.	Type(s):			X	N/A	N/A
3.12.5.2.	Speed at which cut-off starts under full load:			X	N/A	N/A
3.12.5.3.	Maximum no-load speed:			X	N/A	N/A
3.12.5.4.	Idle speed:			X	N/A	N/A
3.12.6.	<i>Cold-start system: Yes/No</i>			X	N/A	N/A
3.12.6.0.	Make:			X	N/A	N/A
3.12.6.1.	Type(s):			X	N/A	N/A
3.12.6.2.	Description:			X	N/A	N/A
3.12.7.	Fuel temperature at the inlet to the fuel injection pump				N/A	N/A
3.12.7.1.	Minimum (deg. C):	X			N/A	N/A
3.12.7.2.	Maximum (deg. C):	X			N/A	N/A
3.13.	Fuel feed for liquid fuel spark ignition engine					
3.13.1.	<i>Carburettor</i>				Refer to drawing No. ZM1E45F-04 / ZM1E43F-04	Refer to drawing No. ZM1E45F-04 / ZM1E43F-04
3.13.1.0.	Make:			X	ZOMAX / WALBRO	ZOMAX / WALBRO

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.13.1.1.	Type(s):			X	MP16B46 / MP16BZ46 / WT907 / WT966 / WT-1197	MP16B46 / MP16BZ46 / WT907 / WT966 / WT-1197
3.13.2.	<i>Port fuel injection:</i>				N/A	N/A
3.13.2.1.	single-point / multi-point			X	N/A	N/A
3.13.2.2.	Make:			X	N/A	N/A
3.13.2.2.	Type(s):			X	N/A	N/A
3.13.3.	<i>Direct injection:</i>				N/A	N/A
3.13.3.0.	Make:			X	N/A	N/A
3.13.3.1.	Type(s):			X	N/A	N/A
3.13.4.	<i>Fuel temperature at location specified by manufacturer</i>				N/A	N/A
3.13.4.1.	Location:	X			N/A	N/A
3.13.4.2.	Minimum (deg. C)	X			N/A	N/A
3.13.4.3.	Maximum (deg. C)	X			N/A	N/A
3.14.	Fuel feed for gaseous fuel engines or where applicable, dual fuel engines (in the case of systems laid out in a different manner, supply equivalent information)				N/A	N/A
3.14.1.	<i>Fuel: LPG /NG-H/NG-L /NG-HL/LNG/Fuel specific LNG</i>	X		X	N/A	N/A
3.14.2.	<i>Pressure regulator(s) or vaporiser/pressure regulator(s)</i>				N/A	N/A
3.14.2.0.	Make:			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.14.2.1.	Type(s)			X	N/A	N/A
3.14.2.2.	Number of pressure reduction stages			X	N/A	N/A
3.14.2.3.	Pressure in final stage minimum and maximum. (kPa)			X	N/A	N/A
3.14.2.4.	Number of main adjustment points:			X	N/A	N/A
3.14.2.5.	Number of idle adjustment points:			X	N/A	N/A
3.14.3.	<i>Fuelling system: mixing unit/gas injection/liquid injection/direct injection</i>			X	N/A	N/A
3.14.3.1.	Mixture strength regulation				N/A	N/A
3.14.3.1.1.	System description and/or diagram and drawings:			X	N/A	N/A
3.14.4.	<i>Mixing unit</i>				N/A	N/A
3.14.4.1.	Number:			X	N/A	N/A
3.14.4.2'	Make:			X	N/A	N/A
3.14.4.2.	Type(s):			X	N/A	N/A
3.14.4.3.	Location:			X	N/A	N/A
3.14.4.4.	Adjustment possibilities:			X	N/A	N/A
3.14.5.	<i>Inlet manifold injection</i>				N/A	N/A
3.14.5.1.	Injection: single-point/multi-point			X	N/A	N/A
3.14.5.2.	Injection: continuous/simultaneously timed/ sequentially timed			X	N/A	N/A
3.14.5.3.	Injection equipment				N/A	N/A
3.14.5.3.0.	Make:			X	N/A	N/A
3.14.5.3.1.	Type(s):			X	N/A	N/A
3.14.5.3.2.	Adjustment possibilities:			X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.14.5.4.	Supply pump				N/A	N/A
3.14.5.4.0.	Make:			X	N/A	N/A
3.14.5.4.1.	Type(s):			X	N/A	N/A
3.14.5.5.	Injector(s)				N/A	N/A
3.14.5.5.0.	Make:			X	N/A	N/A
3.14.5.5.1.	Type(s):			X	N/A	N/A
3.14.6.	<i>Direct injection</i>				N/A	N/A
3.14.6.1.	Injection pump/pressure regulator			X	N/A	N/A
3.14.6.1.0.	Make:			X	N/A	N/A
3.14.6.1.1.	Type(s):			X	N/A	N/A
3.14.6.1.2.	Injection timing (specify):			X	N/A	N/A
3.14.6.2.	Injector(s)				N/A	N/A
3.14.6.2.0.	Make:			X	N/A	N/A
3.14.6.2.1.	Type(s):			X	N/A	N/A
3.14.6.2.2.	Opening pressure or characteristic diagram :			X	N/A	N/A
3.14.7.	<i>Electronic Control Unit (ECU)</i>				N/A	N/A
3.14.7.0.	Make:			X	N/A	N/A
3.14.7.1.	Type(s):			X	N/A	N/A
3.14.7.2.	Adjustment possibilities:			X	N/A	N/A
3.14.7.3.	Software calibration number(s):			X	N/A	N/A
3.14.8.	<i>Approvals of engines for several fuel compositions</i>				N/A	N/A
3.14.8.1.	Self-adaptive feature: Yes/No	X	X	X	N/A	N/A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.14.8.2.	Calibration for a specific gas composition: NG-H/NG-L/NG-HL/ LNG/Fuel specific LNG	X	X	X	N/A	N/A
3.14.8.3.	Transformation for a specific gas composition: NG-HT/NG-LT/NG-HLT	X	X	X	N/A	N/A
3.14.9.	<i>Fuel temperature pressure regulator final stage</i>				N/A	N/A
3.14.9.1.	Minimum (deg. C):	X			N/A	N/A
3.14.9.2.	Maximum (deg. C):	X			N/A	N/A
3.15.	Ignition system					
3.15.1.	<i>Ignition coil(s)</i>					
3.15.1.0.	Make:			X	XINYA	XINYA
3.15.1.1.	Type(s):			X	CDI	CDI
3.15.1.2.	Number:			X	1	1
3.15.2.	<i>Spark plug(s)</i>					
3.15.2.0.	Make:			X	BOSCH/ CHAMPION	BOSCH/ CHAMPION
3.15.2.1.	Type(s):			X	L8RTF, RCJ6Y	L8RTF, RCJ6Y
3.15.2.2.	Gap setting:			X	0.6-0.8mm	0.6-0.8mm
3.15.3.	<i>Magneto</i>			X	N/A	N/A
3.15.3.0.	Make:			X	XINYA	XINYA
3.15.3.1.	Type(s):			X	flywheel-type	flywheel-type
3.15.4.	<i>Ignition timing control: Yes/No</i>			X	Yes	Yes
3.15.4.1.	Static advance with respect to top dead centre (crank angle degrees):			X	26°±2°	26°±2°

Zhejiang Zomax Garden Machinery Co., Ltd.

No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang,

China

Information document: ZM1E45F-ext.00

New approval

Issue Date: 2017-03-31

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)
3.15.4.2.	Advance curve or map:			X	Refer to drawing No. ZM1E45F-06 / ZM1E43F-06	Refer to drawing No. ZM1E45F-06 / ZM1E43F-06
3.15.4.3.	Electronic control: Yes/No			X	No	No

Attachment 1 Photographs of the engines





Attachment 2 Drawings of the engines

EC approval no.

Position of engine no.

Engine code:
ZMC1E45F170600001

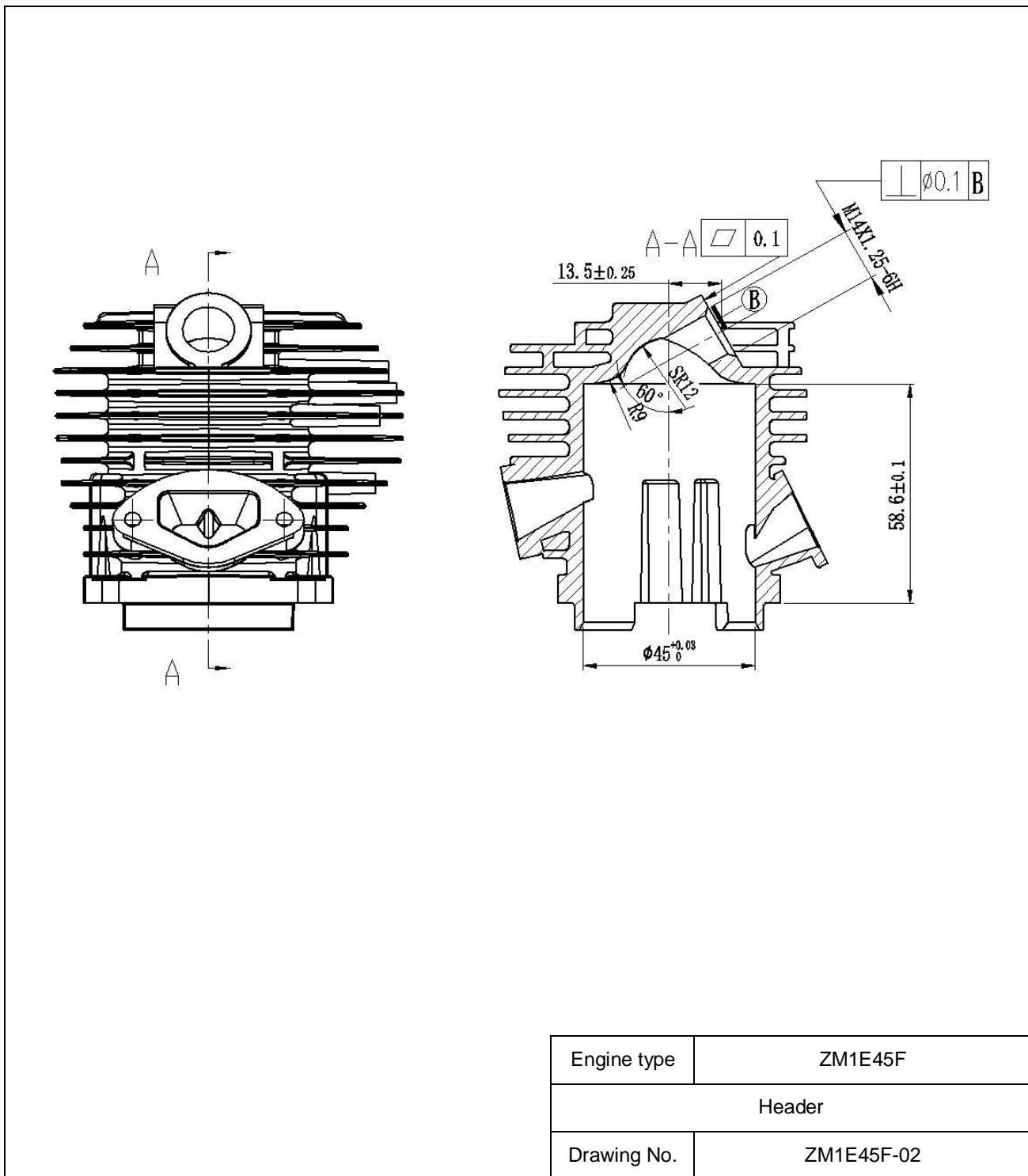
Engine code:
ZMC1E43F170600001

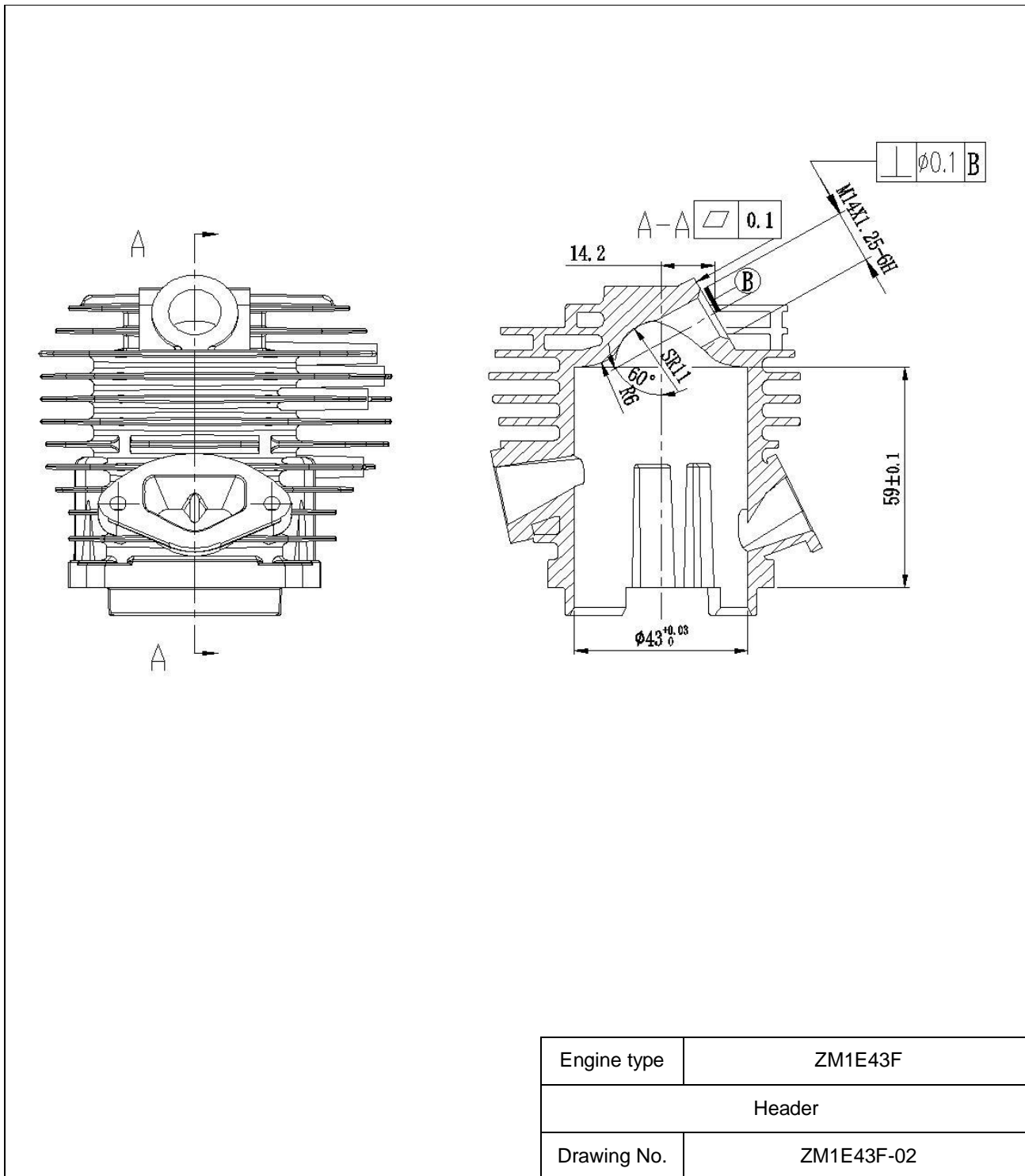
字体和发动机号高度皆为1.8mm

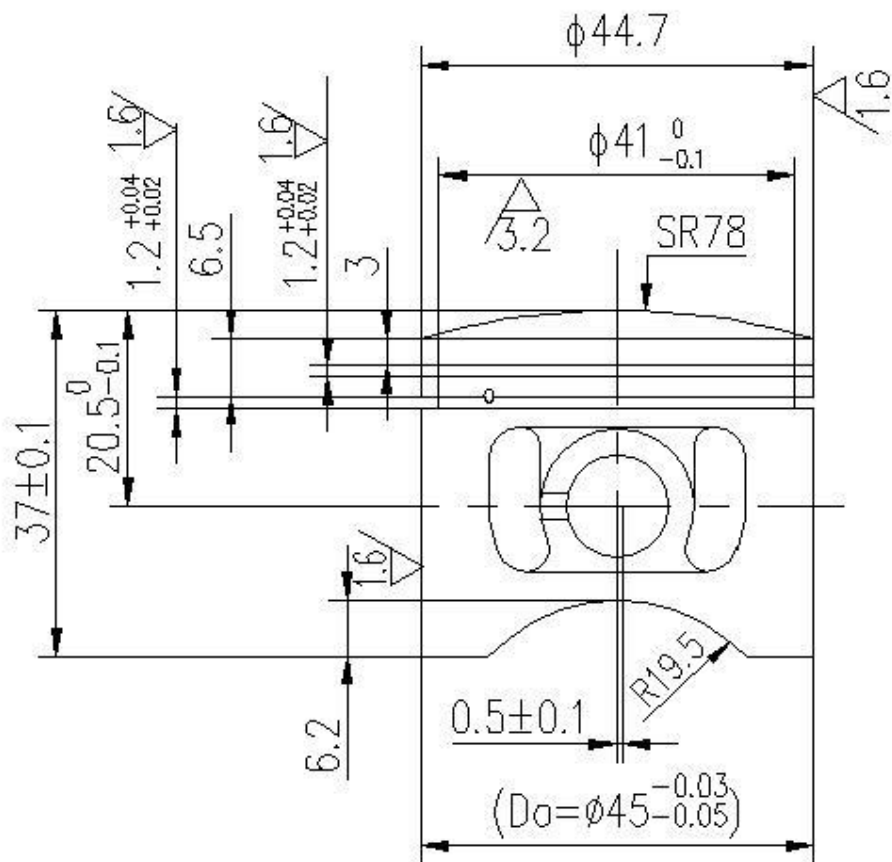
ZOMAX	ZM1E45F
Rated power:	1.9 KW
Rated speed:	8500 r/min
Displacement:	49.8 cc
EC Approval No. e24*2016/1628*2017/RRRXXX/X*XXX*00 V	
Zhejiang Zomax Garden Machinery CO.,LTD	
No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang Province 317500, P.R. China.	

ZOMAX	ZM1E43F
Rated power:	1.7 KW
Rated speed:	8500 r/min
Displacement:	45.6 cc
EC Approval No. e24*2016/1628*2017/RRRXXX/X*XXX*00 V	
Zhejiang Zomax Garden Machinery CO.,LTD	
No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang Province 317500, P.R. China.	

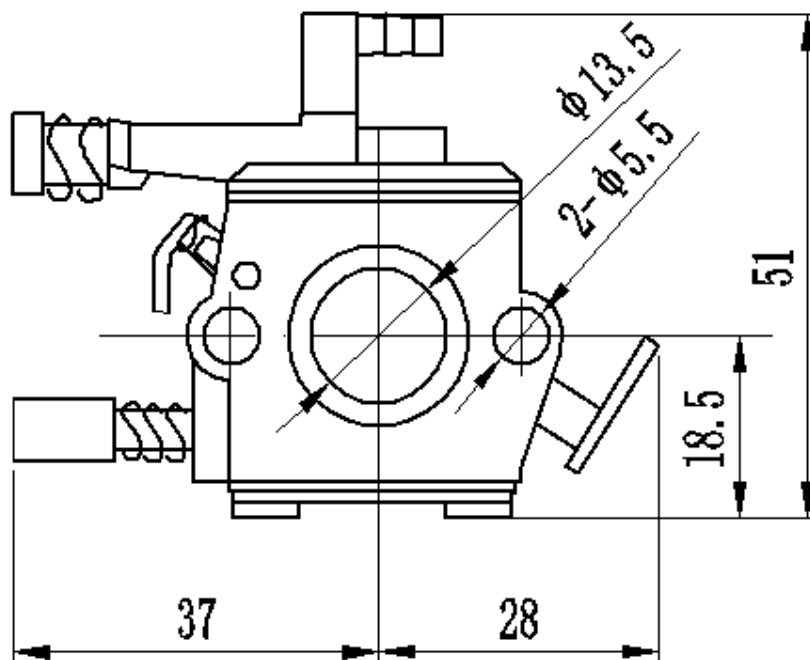
Engine type	ZM1E45F / ZM1E43F
Position of engine No. and EC approval No.	
Drawing No.	ZM1E45F-01 / ZM1E43F-01



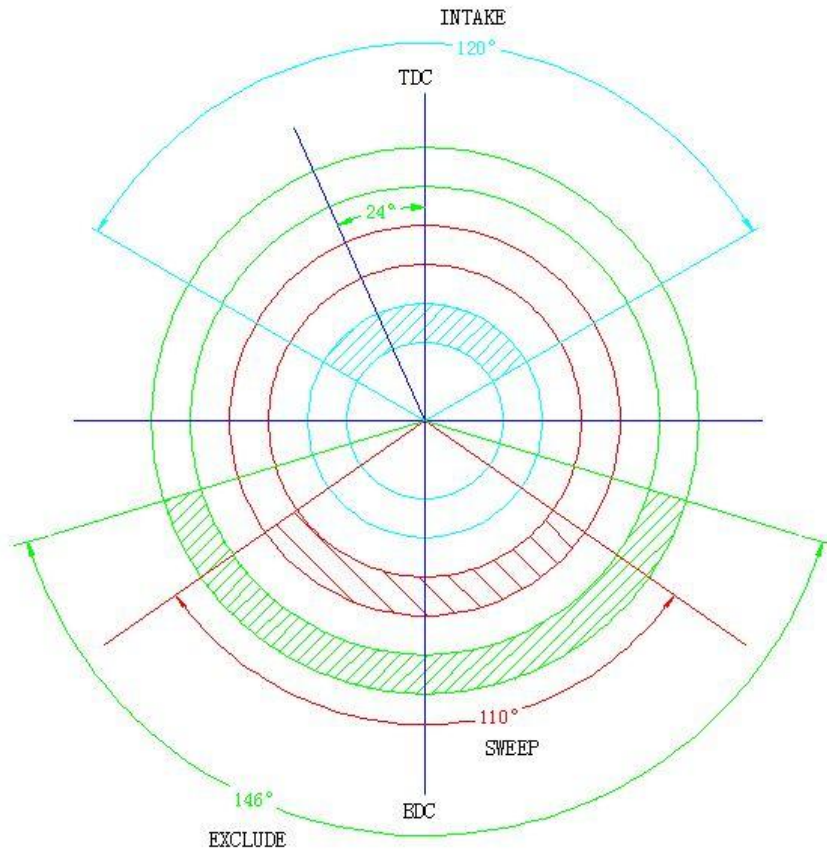




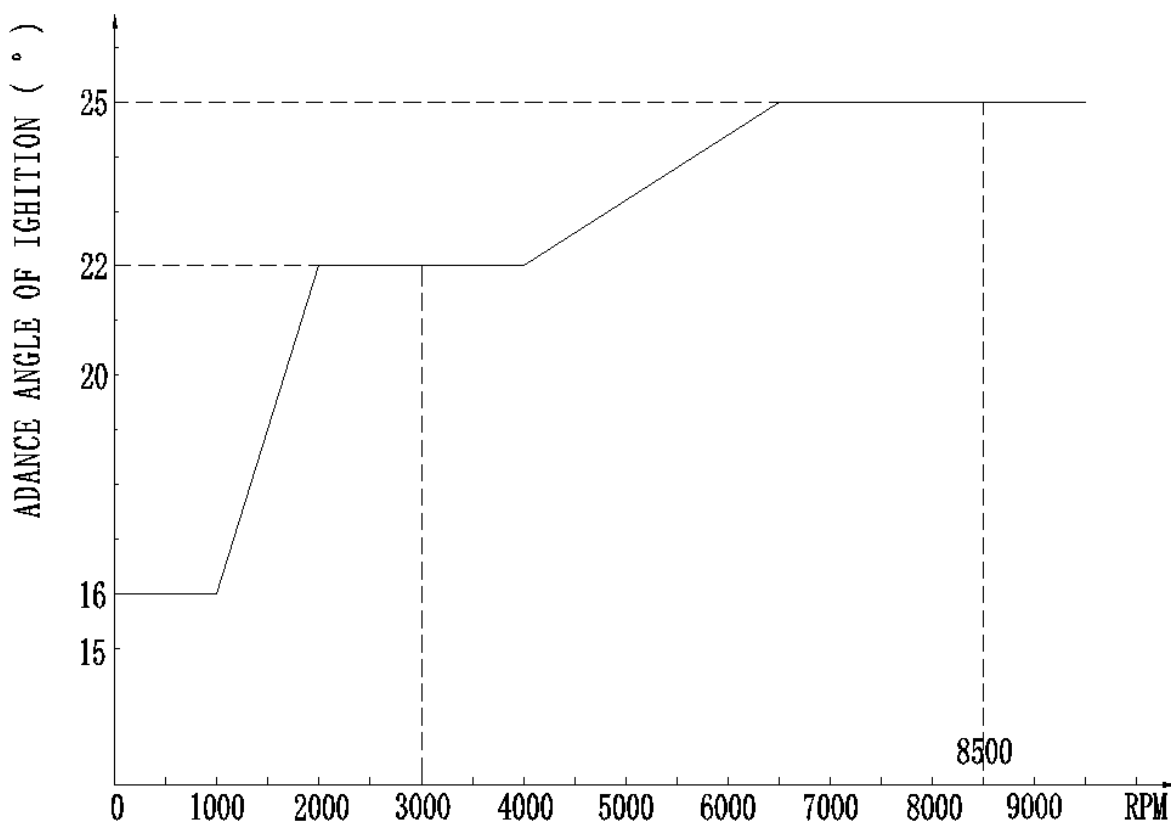
Engine type	ZM1E45F
Piston	
Drawing No.	ZM1E45F-03



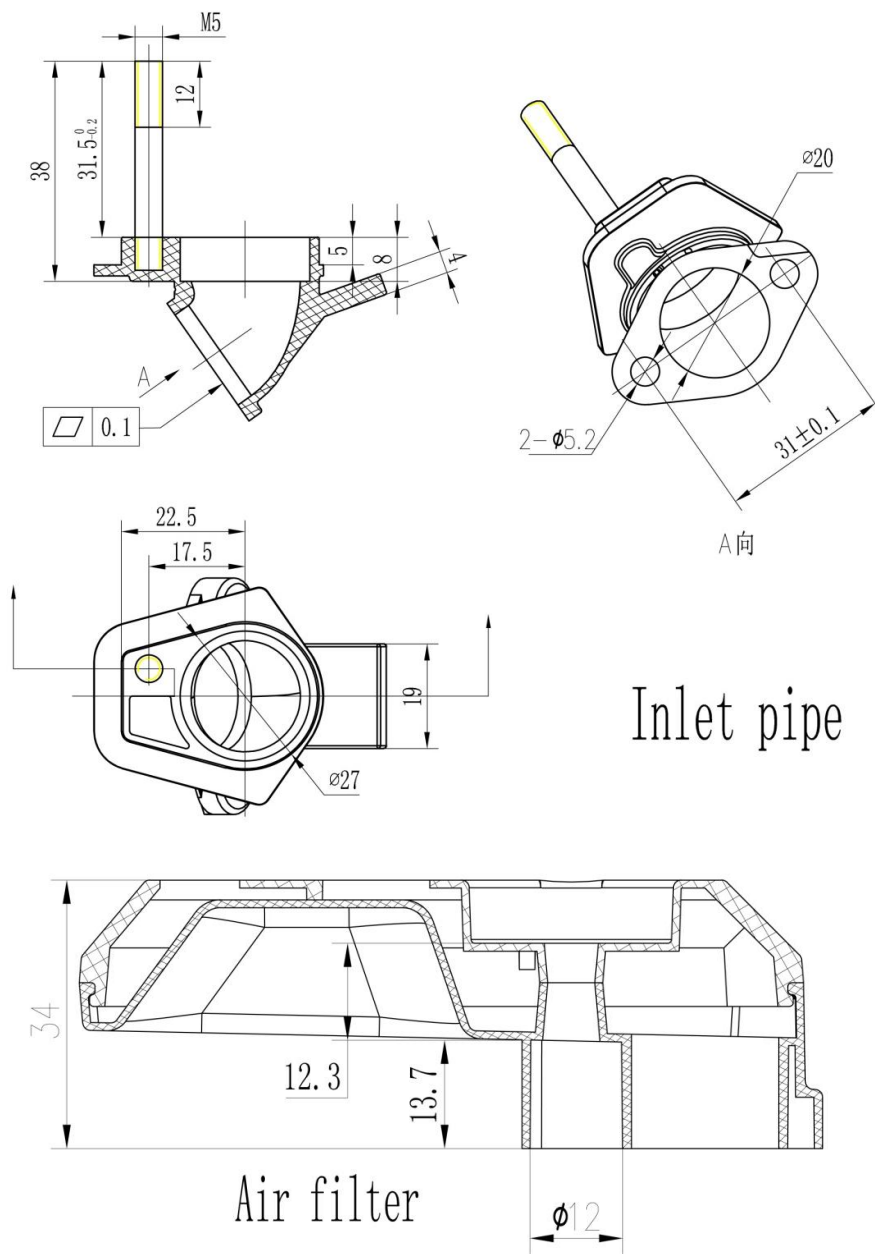
Engine type	ZM1E45F / ZM1E43F
Carburetor	
Drawing No.	ZM1E45F-04 / ZM1E43F-04



Engine type	ZM1E45F / ZM1E43F
Valve timing	
Drawing No.	ZM1E45F-05 / ZM1E43F-05



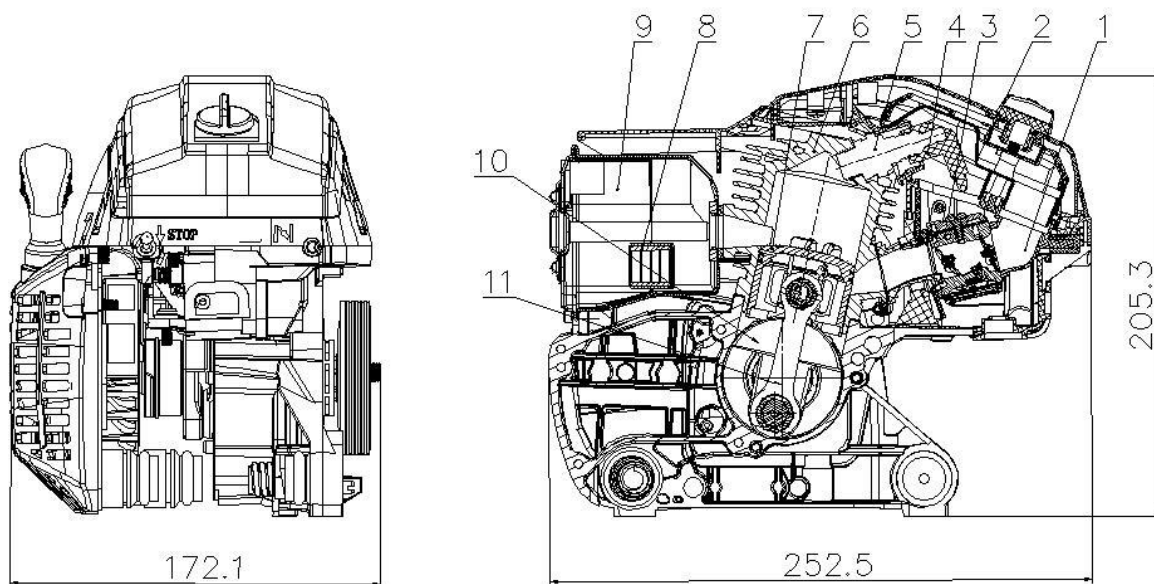
Engine type	ZM1E45F / ZM1E43F
Ignition advance curve	
Drawing No.	ZM1E45F-06 / ZM1E43F-06



Inlet pipe

Air filter

Engine type	ZM1E45F / ZM1E43F
Inlet path/air filter	
Drawing No.	ZM1E45F-08 / ZM1E43F-08




- 1. Air Inlet Curving Pipe 2. Air Filter Comp
- 3. Carburetor 4. Ignition ASS'Y 5. Spark Plug
- 6. Cylinder 7. Piston 8. Catalyst
- 9. Muffler 10. Crankshaft 11. Connecting

Engine type	ZM1E45F / ZM1E43F
Engine structure	
Drawing No.	ZM1E45F-09 / ZM1E43F-09

Attachment 3 Manufacturer's declaration on compliance with Regulation (EU) 2016/1628

We, Zhejiang Zomax Garden Machinery Co., Ltd., Hereby declares that the following engine type/engine family (*) complies in all respects with the requirements of Regulation (EU) 2016/1628 of the European Parliament and of the Council, Commission Delegated Regulation (EU) 2017/654 , Commission Delegated Regulation (EU) 2017/655 and Commission Implementing Regulation (EU) 2017/656 and does not use any defeat strategy. All emission control strategies comply, where applicable, with the requirements for Base Emission Control Strategy (BECS) and Auxiliary Emission Control Strategy (AECS) set-out in section 2 of Annex IV to Delegated Regulation (EU) 2017/654, and have been disclosed in accordance with that Annex and with Annex I to Implementing Regulation (EU) 2017/656.

- 1.1. Make (trade name(s) of manufacturer) : 
- 1.2. Commercial name(s) (if applicable) : N/A
- 1.3. Company name and address of manufacturer : Zhejiang Zomax Garden Machinery Co., Ltd.
No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang, China
- 1.4. Name and address of manufacturer's authorised representative (if any) : Brumar Garden Products S.r.l.
Loc. Valgera 110/B - 14100 ASTI (AT) - ITALY
- 1.6. Engine type designation/engine family designation/FT : Parent engine: ZM1E45F
Commercial names: N/A
Engine within family: ZM1E43F
Commercial names: N/A

Place : Wenling Zhejiang

Date : 2017-03-31

Signature : Huang xinyue



Technical Manager

Attachment 4 **Manufacturer's statement on compliance with the exhaust emission limits when use fuels other than the reference fuels**

N/A

Attachment 5 **Overview of the emission control strategy for electronically controlled engines**

N/A

Attachment 6 **The functional operational characteristics of the NOx control measures and inducement system**


N/A

Attachment 7 **The functional operational characteristics of the particulate control measures**

N/A

Attachment 8 Manufacturer's declaration, and supporting test reports or data, on deterioration factors

We, Zhejiang Zomax Garden Machinery Co., Ltd., hereby declare that the EDP we chosen is most closely approximates the expected useful lives of the equipment into which the engines are expected to be installed. This conclusion is based on the surveys of the life spans of the equipment in which the subject engines are installed.

- 1.1. Make (trade name(s) of manufacturer) : 
- 1.2. Commercial name(s) (if applicable) : N/A
- 1.3. Company name and address of manufacturer : Zhejiang Zomax Garden Machinery Co., Ltd.
No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang, China
- 1.4. Name and address of manufacturer's authorised representative (if any) : Brumar Garden Products S.r.l.
Loc. Valgera 110/B - 14100 ASTI (AT) - ITALY
- 1.6. Engine type designation/engine family designation/FT : Parent engine: ZM1E45F
Commercial names: N/A
Engine within family: ZM1E43F
Commercial names: N/A
- 1.7. Category and sub-category of the engine type/engine family : Category: NRSh
Sub-category: NRSh-v-1a
- 1.8. EDP hours : 50h (cat 1: Consumer products)

The EDP is carried out on parent engine, please refer TÜV SÜD's test report 17-00630-CX-SHA-00 for details.

Place : Wenling Zhejiang

Date : 2017-03-31

Signature : Huang xinyue



Technical Manager

Attachment 9 Manufacturer's declaration, and supporting test reports or data, of the infrequent regeneration adjustment factors

N/A

Attachment 10 The physical connector required to receive the torque signal from the engine Electronic control Unit (ECU) during the in-service monitoring test

N/A

Attachment 11 Manufacturer's declaration and supporting data on tampering prevention for emission control systems



Tamper-proof carburetor, the adjusting screw is D-shaped, only possible to be adjusted by manufacturer by using the special screwdriver, and the screwdriver will not available on the market. If the user uses want to use other device to adjust it, the screw head will be destroyed.

Zhejiang Zomax Garden Machinery Co., Ltd.

Information document: ZM1E45F-ext.00

No.48, Aodihu Road, Taiping District, Wenling City, Zhejiang,

New approval

China

Issue Date: 2017-03-31

Attachment 12 List of scheduled for emission-related maintenance requirements

N/A