**Prilog 2: Tehničke specifikacije**

**Naziv predmeta nabave: Agregati**

Zahtjevi definirani Tehničkim specifikacijama predstavljaju minimalne tehničke karakteristike koje ponuđeni predmet nabave mora zadovoljavati.

Ponuditelj popunjava samo ćelije **obilježene sivom bojom**. "PONUĐENE FUNKCIONALNOSTI“ ponuditelj popunjava definirajući karakteristike ponuđenog predmeta nabave (napomena: ponuditelj popunjava tehničke specifikacije upisujući točne karakteristike ponuđenog predmeta nabave, izbjegavajući pri tome popunjavanje stupca samo riječima kao što su npr. „zadovoljava“, „DA“, „jednakovrijedno traženom“ ili „odgovara traženom“).

Stupac "NAPOMENA" ponuditelj može popuniti ukoliko smatra potrebnim.

Kako bi se ponuda smatrala valjanom, ponuđeni predmet nabave mora zadovoljiti sve što je traženo u obrascu Tehničkih specifikacija.

Za predmet nabave, za sve stavke/opise u kojima se eventualno traži ili navodi marka, patent, tip ili određeno podrijetlo, ponuditelj može ponuditi „jednakovrijedno“ traženom ili navedenom, ali u tom slučaju mora uz ponudu priložiti dokaze o jednakovrijednosti (katalog, potvrde proizvođača ili sl.).

| **R.BR.** | **NAZIV STAVKE / PODSTAVKE** | **TRAŽENE TEHNIČKE SPECIFIKACIJE / FUNKCIONALNOSTI** | | **PONUĐENO** | **NAPOMENA**  **(ukoliko je potrebno)** |
| --- | --- | --- | --- | --- | --- |
| 1. | Puštanje u pogon diesel agregata – 1 usluga | Podrška kod ugradnje diesel motora | Ponuditelj mora provjeriti ispravnost izvedbe koncepta ispušnog sustava diesel motora (3D model) |  |  |
| Ponuditelj mora dostaviti sve potrebne tehničke podatke i upute potrebne za ispravnu ugradnju diesel motora |  |  |
| Ponuditelj mora dostaviti sve crteže i 3D modele koji su potrebni za ispravnu ugradnju diesel motora |  |  |
| Ponuditelj mora odgovarati na sva tehnička pitanja koja se mogu javiti u procesu ugradnje diesel motora, putem elektroničke pošte |  |  |
| Inicijalno pokretanje diesel motora | Ponuditelj mora izvršiti inicijalno pokretanje diesel motora |  |  |
| Ponuditelj mora dati povratne informacije o izvedenoj ugradnji diesel motora, te odrediti što je potrebno ispraviti prije završne provjere (*End Product Questionairre – EPQ*), putem elektroničke pošte |  |  |
| Inicijalno pokretanje diesel motora mora biti izvršeno na lokaciji društva RASCO d.o.o., Kolodvorska 120b, 48361 Kalinovac, Hrvatska |  |  |
| Završna provjera ispravnosti ugradnje diesel motora – *End Product Questionairre (EPQ)* | Ponuditelj mora izvršiti završnu provjeru ispravnosti ugradnje diesel motora |  |  |
| Ponuditelj mora dati povratne informacije o izvedenoj ugradnji diesel motora, te dostaviti popunjeni *End Product Questionairre – EPQ,* putem elektroničke pošte |  |  |
| Završna provjera ispravnosti ugradnje diesel motora mora biti izvršena na lokaciji društva RASCO d.o.o., Kolodvorska 120b, 48361 Kalinovac, Hrvatska |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2. | Diesel agregat za prototip – 1 kpl | 2.1. Diesel agregat za prototip – 1 kpl | Najveća snaga: | 62 kW (+ / - 3 kW) pri 2300 o/min |  |  |
| Najveći okretni moment: | 270 Nm (+ / - 10 Nm) pri 1350 o/min |  |  |
| Broj cilindara: | maksimalno 4 cilindra |  |  |
| Broj ventila po cilindru: | minimalno 2 ventila po cilindru |  |  |
| Standard ispušnih plinova: | prema regulativi (EU) 595/2009, Euro VI C za HTDB, ili jednakovrijedno |  |  |
| Zapremina cilindara: | do 2.97 litara |  |  |
| Način upravljanja motorom: | Zahtjev za brzinom preko CAN mreže |  |  |
| Kontroler motora (ECU): | BOSCH EDC17C49 ili jednakovrijedno |  |  |
| Omjer kompresije: | 17.5 (+/- 1) |  |  |
| Tip ubrizgavanja goriva: | direktno |  |  |
| Usis zraka: | turbo punjač + intercooler |  |  |
| Način hlađenja: | hlađen vodom |  |  |
| Smjer vrtnje (gledano od strane zamašnjaka): | suprotno kazaljci na satu |  |  |
| Masa motora bez ispušnog sustava: | 260 kg (+/- 20 kg) |  |  |
| Broj okretaja u donjem praznom hodu: | 800 o/min (+/- 150 o/min) |  |  |
| Najveći dozvoljeni broj okretaja: | 2300 o/min (+ / - 100 o/min) |  |  |
| Broj okretaja kod kojeg dolazi do isključenja pumpe goriva: | 2550 o/min (+ / - 10 o/min) |  |  |
| Potrošnja goriva pri broju okretaja donjeg praznog hoda: | do 0,55 kg/h |  |  |
| Potrošnja goriva pri broju okretaja najvišeg okretnog momenta: | do 222 g/kW h |  |  |
| Potrošnja goriva pri najvećem dozvoljenom broju okretaja: | do 244 g/kW h |  |  |
| Najveća dozvoljena temperatura ulja motora: | 135 °C (+ / - 5°C) |  |  |
| Tlak ulja pri broju okretaja donjeg praznog hoda: | 2,0 bar (+ / - 0,1 bar) |  |  |
| Tlak ulja pri najvećem dozvoljenom broju okretaja: | 4,0 bar (+ / - 0,1 bar) |  |  |
| Tražene karakteristike ulja: | SAE 10W40, API CJ-4, ACEA E6, ili jednakovrijedno |  |  |
| Najveća dozvoljena temperatura rashladne tekućine: | 105 °C (+/- 1°C) |  |  |
| Tlak u sustavu rashladne tekućine: | od 1,0 do 1,2 bar |  |  |
| Početak/kraj otvaranja termostatskog ventila: | 88°C / 95°C (+/- 1°C) |  |  |
| Napon i kapacitet baterije: | minimalno 12V, 140 A |  |  |
| Izlazna struja alternatora: | minimalno 110 A |  |  |
| Kapacitet rashladne tekućine (samo motor): | do 5l |  |  |
| Kapacitet ulja motora: | do 7,3 l |  |  |
| Sustav ubrizgavanja goriva: | BOSCH Common-rail sustav ubrizgavanja sa filterom goriva, ili jednakovrijedno |  |  |
| Starter motor: | Bosch 12V – 2.5 kW starter motor, ili jednakovrijedno |  |  |
| Priključak za grijanje kabine: | motor mora imati priključak za grijanje kabine |  |  |
| Položaj turbopunjača: | Visoki položaj turbopunjača |  |  |
| Ožićenje motora: | Ožićenje motora (strana motora) mora biti isporučeno s motorom. Konektori za ožićenje motora od strane vozila moraju biti isporučeni s motorom |  |  |
| Tip kućišta zamašnjaka: | SAE4 kućište zamašnjaka, ili jednakovrijedno |  |  |
| Promjer zamašnjaka: | 8“ – 10“ |  |  |
| Bočni odgon snage: | motor mora imati bočni odgon snage |  |  |
| EGR sustav: | EGR sustav mora biti na prednjoj strani motora |  |  |
| Remenski razvod (FEAD): | Kompaktni FEAD sa linearnim napinjačem |  |  |
| Mjesta nošenja pri transportu: | Motor mora imati prednje i stražnje oko za nošenje/transport |  |  |
| TIP DPF-a (Diesel Particulate Filter): | DPF sa integriranim prekatalizatorom |  |  |
| Nosači DPF-a i SCR-a: | Nosači DPF-a i SCR-a moraju biti isporučeni s motorom |  |  |
| DPF senzor razlike tlaka: | DPF senzor razlike tlaka mora biti isporučen s motorom |  |  |
| NOx senzor: | Nox senzor DOC ulaz i SCR izlaz mora biti isporučen s motorom |  |  |
| Lambda senzor: | Lambda senzor DOC ulaz mora biti isporučen s motorom |  |  |
| Temperaturni senzori: | Temperaturni senzori DOC ulaz i DPF ulaz moraju biti isporučeni s motorom |  |  |
| Tlačne cijevi: | tlačne cijevi sa spajanje DPF-a i DPF senzora tlaka moraju biti isporučene s motorom |  |  |
| PM senzor: | PM senzor SCR izlaz mora biti isporučen s motorom |  |  |
| Urea (AD-Blue) mixer: | urea mixer (cijev za miješanje) mora biti isporučen s motorom |  |  |
| Urea rezervoar: | Urea rezervoar sa integiriranim senzorom razine i kvalitete, zapremine min. 14l mora biti isporučen s motorom |  |  |
| Električni ventil grijanja Urea rezervoara: | električni ventil grijanja Urea rezervoara mora biti isporučen s motorom |  |  |
| Urea ubrizgivač: | BOSCH ili jednakovrijedan Urea ubrizgivač mora biti isporučen s motorom |  |  |
| Urea dobavni modul: | BOSCH ili jednakovrijedan Urea dobavni modul mora biti isporučen s motorom |  |  |
| 2.2. Uređaj za dijagnostiku diesel motora – 1 kpl | Uređaj za dijagnostiku Euro VI C diesel motora: | Uređaj za dijagnostiku Euro VI C diesel motora mora biti isporučen s motorom |  |  |
| 3. | Diesel agregat za nultu seriju – 5 kpl | | Najveća snaga: | 62 kW (+ / - 3 kW) pri 2300 o/min |  |  |
| Najveći okretni moment: | 270 Nm (+ / - 10 Nm) pri 1350 o/min |  |  |
| Broj cilindara: | maksimalno 4 cilindra |  |  |
| Broj ventila po cilindru: | minimalno 2 ventila po cilindru |  |  |
| Standard ispušnih plinova: | prema regulativi (EU) 595/2009, Euro VI C za HTDB, ili jednakovrijedno |  |  |
| Zapremina cilindara: | do 2.97 litara |  |  |
| Način upravljanja motorom: | Zahtjev za brzinom preko CAN mreže |  |  |
| Kontroler motora (ECU): | BOSCH EDC17C49 ili jednakovrijedno |  |  |
| Omjer kompresije: | 17.5 (+/- 1) |  |  |
| Tip ubrizgavanja goriva: | direktno |  |  |
| Usis zraka: | turbo punjač + intercooler |  |  |
| Način hlađenja: | hlađen vodom |  |  |
| Smjer vrtnje (gledano od strane zamašnjaka): | suprotno kazaljci na satu |  |  |
| Masa motora bez ispušnog sustava: | 260 kg (+/- 20 kg) |  |  |
| Broj okretaja u donjem praznom hodu: | 800 o/min (+/- 150 o/min) |  |  |
| Najveći dozvoljeni broj okretaja: | 2300 o/min (+ / - 100 o/min) |  |  |
| Broj okretaja kod kojeg dolazi do isključenja pumpe goriva: | 2550 o/min (+ / - 10 o/min) |  |  |
| Potrošnja goriva pri broju okretaja donjeg praznog hoda: | do 0,55 kg/h |  |  |
| Potrošnja goriva pri broju okretaja najvišeg okretnog momenta: | do 222 g/kW h |  |  |
| Potrošnja goriva pri najvećem dozvoljenom broju okretaja: | do 244 g/kW h |  |  |
| Najveća dozvoljena temperatura ulja motora: | 135 °C (+ / - 5°C) |  |  |
| Tlak ulja pri broju okretaja donjeg praznog hoda: | 2,0 bar (+ / - 0,1 bar) |  |  |
| Tlak ulja pri najvećem dozvoljenom broju okretaja: | 4,0 bar (+ / - 0,1 bar) |  |  |
| Tražene karakteristike ulja: | SAE 10W40, API CJ-4, ACEA E6, ili jednakovrijedno |  |  |
| Najveća dozvoljena temperatura rashladne tekućine: | 105 °C (+/- 1°C) |  |  |
| Tlak u sustavu rashladne tekućine: | od 1,0 do 1,2 bar |  |  |
| Početak/kraj otvaranja termostatskog ventila: | 88°C / 95°C (+/- 1°C) |  |  |
| Napon i kapacitet baterije: | minimalno 12V, 140 A |  |  |
| Izlazna struja alternatora: | minimalno 110 A |  |  |
| Kapacitet rashladne tekućine (samo motor): | do 5l |  |  |
| Kapacitet ulja motora: | do 7,3 l |  |  |
| Sustav ubrizgavanja goriva: | BOSCH Common-rail sustav ubrizgavanja sa filterom goriva, ili jednakovrijedno |  |  |
| Starter motor: | Bosch 12V – 2.5 kW starter motor, ili jednakovrijedno |  |  |
| Priključak za grijanje kabine: | motor mora imati priključak za grijanje kabine |  |  |
| Položaj turbopunjača: | Visoki položaj turbopunjača |  |  |
| Ožićenje motora: | Ožićenje motora (strana motora) mora biti isporučeno s motorom. Konektori za ožićenje motora od strane vozila moraju biti isporučeni s motorom |  |  |
| Tip kućišta zamašnjaka: | SAE4 kućište zamašnjaka, ili jednakovrijedno |  |  |
| Promjer zamašnjaka: | 8“ – 10“ |  |  |
| Bočni odgon snage: | motor mora imati bočni odgon snage |  |  |
| EGR sustav: | EGR sustav mora biti na prednjoj strani motora |  |  |
| Remenski razvod (FEAD): | Kompaktni FEAD sa linearnim napinjačem |  |  |
| Mjesta nošenja pri transportu: | Motor mora imati prednje i stražnje oko za nošenje/transport |  |  |
| TIP DPF-a (Diesel Particulate Filter): | DPF sa integriranim prekatalizatorom |  |  |
| Nosači DPF-a i SCR-a: | Nosači DPF-a i SCR-a moraju biti isporučeni s motorom |  |  |
| DPF senzor razlike tlaka: | DPF senzor razlike tlaka mora biti isporučen s motorom |  |  |
| NOx senzor: | Nox senzor DOC ulaz i SCR izlaz mora biti isporučen s motorom |  |  |
| Lambda senzor: | Lambda senzor DOC ulaz mora biti isporučen s motorom |  |  |
| Temperaturni senzori: | Temperaturni senzori DOC ulaz i DPF ulaz moraju biti isporučeni s motorom |  |  |
| Tlačne cijevi: | tlačne cijevi sa spajanje DPF-a i DPF senzora tlaka moraju biti isporučene s motorom |  |  |
| PM senzor: | PM senzor SCR izlaz mora biti isporučen s motorom |  |  |
| Urea (AD-Blue) mixer: | urea mixer (cijev za miješanje) mora biti isporučen s motorom |  |  |
| Urea rezervoar: | Urea rezervoar sa integiriranim senzorom razine i kvalitete, zapremine min. 14l mora biti isporučen s motorom |  |  |
| Električni ventil grijanja Urea rezervoara: | električni ventil grijanja Urea rezervoara mora biti isporučen s motorom |  |  |
| Urea ubrizgivač: | BOSCH ili jednakovrijedan Urea ubrizgivač mora biti isporučen s motorom |  |  |
| Urea dobavni modul: | BOSCH ili jednakovrijedan Urea dobavni modul mora biti isporučen s motorom |  |  |

**Annex 2: Technical specifications**

**Procurement Title: Engines**

Requirements defined by this Technical Specifications represent minimum requirements that the offered goods/service must meet and are not allowed to be changed by Tenderer.

**Tenderer shall complete only cells marked with gray color.** Tenderer shall complete column "OFFERED FUNCTIONALITIES" defining in detail technical specifications of offered goods (note: tenderer fills the exact specifications of offered goods, while avoiding filling the columns only with words "compliant" and "equivalent", or "yes").

The column "NOTES" tenderer can fill up if deemed necessary.

For offer to be consider as compliant, offered goods/service must meet all the requirements presented in the Technical Specifications for offered Lot.

For the subject of the procurement, for all items/descriptions which may be affixed to a trademark, patent, type or specific origin, the Tenderer may offer "equivalent" to the requested or specified, but in that case must enclose proof of equivalence (catalog, manufacturer’s certificate, etc.).

| **ITEM NO.** | **ITEM / SUB ITEM** | **REQUIRED TECHNICAL SPECIFICATIONS / FUNCTIONALITIES** | | **OFFERED** | **NOTES**  **(if deemed necessary)** |
| --- | --- | --- | --- | --- | --- |
| 1. | Diesel engine commisioning – 1 service | Diesel engine installation support | Tenderer must check the correctness of the exhaust system concept (3D model) | FCA ITALY S.p.A., VM Motori will check the correctness of the exhaust system concept (3D model) |  |
| Tenderer must provide all necessary technical data and instructions required for correct diesel engine installation | FCA ITALY S.p.A., VM Motori will provide all necessary technical data and instructions required for correct diesel engine installation |  |
| Tenderer must provide all drawings and 3D models required for correct diesel engine installation | FCA ITALY S.p.A., VM Motori will provide all drawings and 3D models required for correct diesel engine installation |  |
| Tenderer must answer to all technical questions which may occur during diesel engine installation process, via e-mail | FCA ITALY S.p.A., VM Motori will answer to all technical questions which may occur during diesel engine installation process, via e-mail |  |
| Diesel engine initial start up | Tenderer must perform initial start up of diesel engine | FCA ITALY S.p.A., VM Motori will perform initial start up of diesel engine |  |
| Tenderer must provide feedback about performed diesel engine installation and determine what needs to be corrected before final check (*End Product Questionairre – EPQ*), via e-mail | FCA ITALY S.p.A., VM Motori will provide feedback about performed diesel engine installation and determine what needs to be corrected before final check (*End Product Questionairre – EPQ*), via e-mail |  |
| Initial startup of diesel engine must be performed at the premises of RASCO d.o.o., Kolodvorska 120 b, 48361 Kalinovac, Croatia | Initial startup of diesel engine will be performed at the premises of RASCO d.o.o., Kolodvorska 120 b, 48361 Kalinovac, Croatia |  |
| Final check of diesel engine installation – *End Product Questionairre (EPQ)* | Tenderer must perform final check of diesel engine installation correctness | FCA ITALY S.p.A., VM Motori will perform final check of diesel engine installation correctness |  |
| Tenderer must provide feedback about performed diesel engine installation and provide fulfilled *End Product Questionairre – EPQ*, via e-mail | FCA ITALY S.p.A., VM Motori will provide feedback about performed diesel engine installation and provide fulfilled *End Product Questionairre – EPQ*, via e-mail |  |
| Final check of diesel engine installation correctness must be performed at the premises of RASCO d.o.o., Kolodvorska 120 b, 48361 Kalinovac, Croatia | Final check of diesel engine installation correctness will be performed at the premises of RASCO d.o.o., Kolodvorska 120 b, 48361 Kalinovac, Croatia |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2. | Diesel engine for prototype – 1 set | 2.1. Diesel engine for prototype – 1 set | Max. power: | 62 kW (+ / - 3 kW) at 2300 rpm | 62 kW at 2300 rpm |  |
| Max torque: | 270 Nm (+ / - 10 Nm) at 1350 rpm | 270 Nm at 1350 rpm |  |
| Number of cylinders: | max. 4 cylinders | 4 cylinders |  |
| Valve number per cylinder | min. 2 valves per cylinder | 2 valves per cylinder |  |
| Emmision regulative: | according to regulation (EU) 595/2009, Euro VI C for HDTB, or equivalent | according to regulation (EU) 595/2009, Euro VI C for HDTB |  |
| Cylinders volume: | up to 2.97 liters | 2.97 liters |  |
| Engine regulation strategy: | Speed request via CAN | Speed request via CAN |  |
| Engine control unit (ECU): | BOSCH EDC17C49 or equivalent | BOSCH EDC17C49 |  |
| Compression ratio: | 17.5 (+/- 1) | 17.5 (+/- 1) |  |
| Fuel injection type: | direct | direct |  |
| Air intake: | turbo + intercooler | turbo + intercooler |  |
| Cooling: | water cooled | water cooled |  |
| Engine rotation (looking at flywheel): | anticlockwise | anticlockwise |  |
| Engine weight without exhaust system: | 260 kg (+/- 20 kg) | 260 kg (+/- 20 kg) |  |
| Low idle rpm: | 800 rpm (+/- 150 rpm) | 800 rpm (+/- 150 rpm) |  |
| Max. rpm: | 2300 rpm (+ / - 100 rpm) | 2300 rpm |  |
| Governor drop rpm: | 2550 rpm (+ / - 10 rpm) | 2550 rpm |  |
| Fuel consumption at low idle rpm: | up to 0,55 kg/h | 0,55 kg/h |  |
| Fuel consumption at max. torque rpm: | up to 222 g/kW h | 222 g/kW h |  |
| Fuel consumption at max. rpm | up to 244 g/kW h | 244 g/kW h |  |
| Max. allowed oil temperature: | 135 °C (+ / - 5°C) | 135 °C |  |
| Oil presure at low idle rpm: | 2,0 bar (+ / - 0,1 bar) | 2,0 bar |  |
| Oil pressure at max. rpm | 4,0 bar (+ / - 0,1 bar) | 4,0 bar |  |
| Required oil characteristics: | SAE 10W40, API CJ-4, ACEA E6, or equivalent | SAE 10W40, API CJ-4, ACEA E6 |  |
| Coolant fluid max. temperature: | 105 °C (+/- 1°C) | 105 °C |  |
| Coolant fluid circuit pressure: | from 1,0 to 1,2 bar | from 1,0 to 1,2 bar |  |
| Thermostatic valve start/end opening: | 88°C / 95°C (+/- 1°C) | 88°C / 95°C |  |
| Battery voltage and capacity: | min. 12V, 140 A | 12V, 140 A |  |
| Alternator output current: | min. 110 A | 110 A |  |
| Engine coolant capacity (engine only): | up to 5l | 5l |  |
| Engine oil capacity: | up to 7,3 l | 7,3 l |  |
| Fuel injection system: | BOSCH Common-rail injection system with fuel filter, or equivalent | BOSCH Common-rail injection system with fuel filter |  |
| Starter motor: | Bosch 12V – 2.5 kW starter motor, or equivalent | Bosch 12V – 2.5 kW starter motor |  |
| Cab heater connection: | Engine must have cab heater connection | Engine will have cab heater connection |  |
| Turbocharger position: | High position turbocharger | High position turbocharger |  |
| Engine wiring harness | Engine side wiring harness must be delivered with engine. Machine side wiring harness connectors must be delivered with engine | Engine side wiring harness will be delivered with engine. Machine side wiring harness connectors will be delivered with engine |  |
| Flywheel housing type: | SAE4 flywheel housing, or equivalent | SAE4 flywheel housing |  |
| Flywheel diameter: | 8“ – 10“ | 8“ – 10“ |  |
| Side power take-off: | engine must have side power take-off | engine will have side power take-off |  |
| EGR system: | EGR system must be on front engine side | EGR system will be on front engine side |  |
| Engine FEAD: | Compact FEAD with linear tensioner | Compact FEAD with linear tensioner |  |
| Transportation eyebolts: | Engine must have front and rear eyebolt for carriage/transport | Engine will have front and rear eyebolt for carriage/transport |  |
| DPF type (Diesel Particulate Filter): | DPF with integrated pre-Cat | DPF with integrated pre-Cat |  |
| Brackets for DPF and SCR | Brackets for DPF and SCR must be delivered with engine | Brackets for DPF and SCR will be delivered with engine |  |
| DPF differential pressure sensor: | DPF differential pressure sensor must be delivered with engine | DPF differential pressure sensor will be delivered with engine |  |
| NOx sensor: | NOx sensor DOC in and SCR out must be delivered with engine | NOx sensor DOC in and SCR out will be delivered with engine |  |
| Lambda sensor: | Lambda sensor DOC in must be delivered with engine | Lambda sensor DOC in will be delivered with engine |  |
| Temperature sensors: | Temperature sensors DOC in and DPF in must be delivered with engine | Temperature sensors DOC in and DPF in will be delivered with engine |  |
| Pressure pipes: | Pressure pipes for connection betweed DPF and DPF pressure sensor must be delivered with engine | Pressure pipes for connection betweed DPF and DPF pressure sensor will be delivered with engine |  |
| PM sensor | PM sensor SCR out must be delivered with engine | PM sensor SCR out will be delivered with engine |  |
| Urea (AD-Blue) mixer: | Urea mixer (mixing pipe) must be delivered with engine | Urea mixer (mixing pipe) will be delivered with engine |  |
| Urea tank: | Urea tank with integrated level and quality sensors, with min. 14l volume, must be delivered with engine | Urea tank with integrated level and quality sensors, with min. 14l volume, will be delivered with engine |  |
| Urea tank heater electro valve | Urea tank heater electro valve must be delivered with engine | Urea tank heater electro valve will be delivered with engine |  |
| Urea injector | BOSCH or equivalent Urea injector must be delivered with engine | BOSCH Urea injector will be delivered with engine |  |
| Urea supply module: | BOSCH or equivalent Urea supply module must be delivered with engine | BOSCH Urea supply module will be delivered with engine |  |
| 2.2. Diesel engine diagnostic device – 1 set | Euro VI C diesel engine diagnostic device: | Euro VI C diesel engine diagnostic device must be delivered with engine | Euro VI C diesel engine diagnostic device will be delivered with engine |  |
| 3. | Diesel engines for zero series – 5 sets | | Max. power: | 62 kW (+ / - 3 kW) at 2300 rpm | 62 kW at 2300 rpm |  |
| Max torque: | 270 Nm (+ / - 10 Nm) at 1350 rpm | 270 Nm at 1350 rpm |  |
| Number of cylinders: | max. 4 cylinders | 4 cylinders |  |
| Valve number per cylinder | min. 2 valves per cylinder | 2 valves per cylinder |  |
| Emmision regulative: | according to regulation (EU) 595/2009, Euro VI C for HDTB, or equivalent | according to regulation (EU) 595/2009, Euro VI C for HDTB |  |
| Cylinders volume: | up to 2.97 liters | 2.97 liters |  |
| Engine regulation strategy: | Speed request via CAN | Speed request via CAN |  |
| Engine control unit (ECU): | BOSCH EDC17C49 or equivalent | BOSCH EDC17C49 |  |
| Compression ratio: | 17.5 (+/- 1) | 17.5 (+/- 1) |  |
| Fuel injection type: | direct | direct |  |
| Air intake: | turbo + intercooler | turbo + intercooler |  |
| Cooling: | water cooled | water cooled |  |
| Engine rotation (looking at flywheel): | anticlockwise | anticlockwise |  |
| Engine weight without exhaust system: | 260 kg (+/- 20 kg) | 260 kg (+/- 20 kg) |  |
| Low idle rpm: | 800 rpm (+/- 150 rpm) | 800 rpm (+/- 150 rpm) |  |
| Max. rpm: | 2300 rpm (+ / - 100 rpm) | 2300 rpm |  |
| Governor drop rpm: | 2550 rpm (+ / - 10 rpm) | 2550 rpm |  |
| Fuel consumption at low idle rpm: | up to 0,55 kg/h | 0,55 kg/h |  |
| Fuel consumption at max. torque rpm: | up to 222 g/kW h | 222 g/kW h |  |
| Fuel consumption at max. rpm | up to 244 g/kW h | 244 g/kW h |  |
| Max. allowed oil temperature: | 135 °C (+ / - 5°C) | 135 °C |  |
| Oil presure at low idle rpm: | 2,0 bar (+ / - 0,1 bar) | 2,0 bar |  |
| Oil pressure at max. rpm | 4,0 bar (+ / - 0,1 bar) | 4,0 bar |  |
| Required oil characteristics: | SAE 10W40, API CJ-4, ACEA E6, or equivalent | SAE 10W40, API CJ-4, ACEA E6 |  |
| Coolant fluid max. temperature: | 105 °C (+/- 1°C) | 105 °C |  |
| Coolant fluid circuit pressure: | from 1,0 to 1,2 bar | from 1,0 to 1,2 bar |  |
| Thermostatic valve start/end opening: | 88°C / 95°C (+/- 1°C) | 88°C / 95°C |  |
| Battery voltage and capacity: | min. 12V, 140 A | 12V, 140 A |  |
| Alternator output current: | min. 110 A | 110 A |  |
| Engine coolant capacity (engine only): | up to 5l | 5l |  |
| Engine oil capacity: | up to 7,3 l | 7,3 l |  |
| Fuel injection system: | BOSCH Common-rail injection system with fuel filter, or equivalent | BOSCH Common-rail injection system with fuel filter |  |
| Starter motor: | Bosch 12V – 2.5 kW starter motor, or equivalent | Bosch 12V – 2.5 kW starter motor |  |
| Cab heater connection: | Engine must have cab heater connection | Engine will have cab heater connection |  |
| Turbocharger position: | High position turbocharger | High position turbocharger |  |
| Engine wiring harness | Engine side wiring harness must be delivered with engine. Machine side wiring harness connectors must be delivered with engine | Engine side wiring harness will be delivered with engine. Machine side wiring harness connectors will be delivered with engine |  |
| Flywheel housing type: | SAE4 flywheel housing, or equivalent | SAE4 flywheel housing |  |
| Flywheel diameter: | 8“ – 10“ | 8“ – 10“ |  |
| Side power take-off: | engine must have side power take-off | engine will have side power take-off |  |
| EGR system: | EGR system must be on front engine side | EGR system will be on front engine side |  |
| Engine FEAD: | Compact FEAD with linear tensioner | Compact FEAD with linear tensioner |  |
| Transportation eyebolts: | Engine must have front and rear eyebolt for carriage/transport | Engine will have front and rear eyebolt for carriage/transport |  |
| DPF type (Diesel Particulate Filter): | DPF with integrated pre-Cat | DPF with integrated pre-Cat |  |
| Brackets for DPF and SCR | Brackets for DPF and SCR must be delivered with engine | Brackets for DPF and SCR will be delivered with engine |  |
| DPF differential pressure sensor: | DPF differential pressure sensor must be delivered with engine | DPF differential pressure sensor will be delivered with engine |  |
| NOx sensor: | NOx sensor DOC in and SCR out must be delivered with engine | NOx sensor DOC in and SCR out will be delivered with engine |  |
| Lambda sensor: | Lambda sensor DOC in must be delivered with engine | Lambda sensor DOC in will be delivered with engine |  |
| Temperature sensors: | Temperature sensors DOC in and DPF in must be delivered with engine | Temperature sensors DOC in and DPF in will be delivered with engine |  |
| Pressure pipes: | Pressure pipes for connection betweed DPF and DPF pressure sensor must be delivered with engine | Pressure pipes for connection betweed DPF and DPF pressure sensor will be delivered with engine |  |
| PM sensor | PM sensor SCR out must be delivered with engine | PM sensor SCR out will be delivered with engine |  |
| Urea (AD-Blue) mixer: | Urea mixer (mixing pipe) must be delivered with engine | Urea mixer (mixing pipe) will be delivered with engine |  |
| Urea tank: | Urea tank with integrated level and quality sensors, with min. 14l volume, must be delivered with engine | Urea tank with integrated level and quality sensors, with min. 14l volume, will be delivered with engine |  |
| Urea tank heater electro valve | Urea tank heater electro valve must be delivered with engine | Urea tank heater electro valve will be delivered with engine |  |
| Urea injector | BOSCH or equivalent Urea injector must be delivered with engine | BOSCH Urea injector will be delivered with engine |  |
| Urea supply module: | BOSCH or equivalent Urea supply module must be delivered with engine | BOSCH Urea supply module will be delivered with engine |  |