# JCB ENERGY ELECTRIC POWER INDUSTRY

JOENERGY

\* \* \* \* \* \* Palstal

MADRID / SPAIN





231 / 400 V – 50 Hz & 277 / 480 V – 60 Hz







#### **GENERATOR GENERAL INFORMATION**

| GENERATOR | FREQUENCY | VOLTAGE | POWER FACTOR | SPEED | DIESEL I | ENGINE |        | ALTERN     | ATOR  |               | TYPE OF    | GENE  | RATOR O | UTPUT |
|-----------|-----------|---------|--------------|-------|----------|--------|--------|------------|-------|---------------|------------|-------|---------|-------|
| Model     | Hz        | V       | Cos Q        | Rpm   | Brand    | Model  | Series | Brand      | Model | Series        | Operation  | kVA   | kW      | А     |
|           |           |         |              |       |          |        | ioc    | ų          | JCB   | 270S1<br>270S | Standby    | 155,0 | 124,0   | 224,0 |
| JCN 155   | 50        | 231/400 | 0.8          | 1500  |          |        |        | . <u>e</u> |       |               | Prime      | 140,9 | 112,7   | 203,6 |
|           |           |         |              |       |          | C10EIC | GII    | Ë          |       |               | Continuous | 98,6  | 78,9    | 142,5 |
|           |           |         |              |       | JCN      | G195JC | GII    | ENERG      |       |               | Standby    | 155,0 | 124,0   | 224,0 |
| JCN 155   | 60        | 277/480 | 0.8          | 1800  |          |        |        |            |       |               | Prime      | 140,9 | 112,7   | 203,6 |
|           |           |         |              |       |          |        |        |            |       | Continuous    | 98,6       | 78,9  | 142,5   |       |
|           |           |         |              |       |          |        |        |            |       |               |            |       |         |       |

Diesel Engines with Advanced Technology and Quality
Alternators with Advanced Technology and Quality
Low Exhaust Emission
Control Panel Suitable for Flexible Application
Patented Compact Designed and Sound proof Canopy
Low Operating Cost, Suitable for Heavy-Duty
Durability, Low Noise Level
Tropical 50 °C Radiator, First Class Product Support
Tropical 50 °C Radiator, First Class Product Support
Fuel Filter with Water and Particle Separator
Low Fuel Consumption, Low Oil Consumption
Global Technical Service and Maintenance Support
Wide Range of Affordable Spare Parts
High Quality and Reliable Technology
Half Century Experience in Generator Manufacturing

#### STAND BY POWER RATING - (ESP):

ESP is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Stand by Power rating. This rating should be applied where reliable utility power is available. A Stand By rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Stand by Power rating. Stand By ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. PRIME POWER RATING – (PRP):

Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories:

#### UNLIMITED TIME RUNNING PRIME POWER (ULTP):

PRP (Prime Power) is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours.

#### LIMITED TIME RUNNING PRIME POWER (LTP):

LTP (Limited Time Prime Power) is available for a limited number of hours in a no variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation

#### **CONTINUOUS POWER RATING (COP):**

-VERTA-106188

COP is the power that the engine can continue to use under the prescribed speed and the specified environment condition in the normal maintenance period stipulated in the manufacturing plant. And Continuous Power is applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.



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## PAY ATTENTION TO THE POINTS BELOW IN PICKING AND USING THE GENERATOR

\* Generators can work on Continuous Power at 70% of Prime power value if only all maintenances are done on time with original spare parts and high-quality oils that manufacturer advice.

\* Generators should not operate below 50% of Prime Power value. In such a case, the engine will burn excessive oil and eventually have irreparable damage.

\* If your need is 1000 kVA or above, you should prefer Synchronic Systems with 2-3 generators with failure back up and simultaneous aging.

\* These points will provide advantage for you with purchasing and operating the generator.

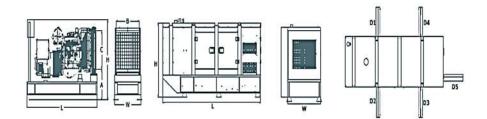
#### **GENERATOR DIMENSIONS AND TECHNICAL DRAWINGS**





| VALUES             |    | OPEN TYPE GENERATOR | CANOPY TYPE GENERATOR |
|--------------------|----|---------------------|-----------------------|
| WIDTH              | mm | 800                 | 1000                  |
| LENGTH             | mm | 2150                | 3000                  |
| HEIGHT             | mm | 1549                | 1380                  |
| WEIGHT (NET)       | Кg | 1217                | 1620                  |
| FUEL TANK CAPACITY | L  | 190                 | 223                   |

| SYMBOL | OPEN | CANOPY |
|--------|------|--------|
| L      | 2150 | 3000   |
| W      | 800  | 1000   |
| н      | 1600 | 1807   |
| S      | 547  | 220    |
| Α      | 696  |        |
| В      | 650  |        |
| С      | 680  |        |
| D1     |      | 520    |
| D2     |      | 604    |
| D3     |      | 604    |
| D4     |      | 604    |
| D5     |      | 604    |



## **FUEL CONSUMPTION**

| PERCENT OF PRIME POWER | 1500 rpm | 1800 rpm |
|------------------------|----------|----------|
|                        | l/hr     | l/hr     |
| 110 %                  | 33,59    | 33,59    |
| 100 %                  | 30,53    | 30,53    |
| 75 %                   | 23,47    | 23,47    |
| 50 %                   | 15,42    | 15,42    |





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## **DIESEL ENGINE MAIN TECHNICAL PARAMETERS**

|            | 4   |
|------------|---|
|            | Vertical, In Line   |
|            | Turbocharged & Intercooled  |
|            |   |
|            | Direct Injection  |
|            | 16:1  |
| mm         | 105   |
| mm         | 124   |
| L          | 4,3   |
|            | Electronic  |
|            | G3  |
|            | Counterclockwise  |
|            | 1-3-4-2   |
|            | Tier II   |
|            |   |
| Kg - m²    | 1,85  |
|            | 1,3   |
|            | _,_   |
| %          | ≤0,5  |
|            | ≤0,5<br>≤0,5  |
| /0         | 2,02  |
|            | Dry Type, Replaceable   |
|            | With Water Separator  |
|            |   |
|            | Element Type, Particulate Trap  |
| CAE (1620) | 2   |
|            | 3   |
| Inch (**)  | 11,5  |
| ~          |   |
|            | 25  |
|            | 100   |
|            | 30  |
| КРа        | 5   |
| КРа        | 10  |
| °C         | 38±2  |
|            | 1200  |
|            | 1388<br>780   |
| mm         |   |
| mm         |   |
| mm         | 1000  |
|            |   |
| mm         | 1000<br>460   |
| mm         | 1000<br>460<br>620  |
| mm<br>kg   | 1000<br>460<br>620<br>1,6:1   |
| mm<br>kg   | 1000<br>460<br>620  |
|            | mm<br>L<br>Kg - m <sup>2</sup><br>Kg - m <sup>2</sup><br>Kg - m <sup>2</sup><br>%<br>%<br>%<br>SAE (J620)<br>Inch (")<br>SAE (J620)<br>Inch (") |





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## **DIESEL ENGINE MAIN TECHNICAL PARAMETERS**

| COOLING SYSTEM                                    |            |          |  |
|---|------------|----------|--|
| Radiator Type                                     | 50ºC       | Tropical |  |
| Total Coolant Capacity                            | L          | 30       |  |
| Max. Perm. Coolant Outlet Temperature             | °C         | 103      |  |
| Max. Perm. Flow Resist. (Cool. System And Piping) | bar        | 0,5      |  |
| Max. Temperature of Coolant Warning               | °C         | 95       |  |
| Max. Temperature of Coolant Shutdown              | °C         | 98       |  |
| Thermostat Operation Temperature - Initial Open   | °C         | 72       |  |
| Thermostat Operation Temperature - Full Open      | °C         | 80       |  |
| Delivery of Coolant Pump                          | m ³/ h     | 2,37     |  |
| Min. Pressure Before Coolant Pump                 | bar        | 0,15     |  |
| Radiator Face Area                                | m²         | 0,44     |  |
| Rows  | Row        | 3        |  |
| Matrix Density                                    | Per / Inch | 15,5     |  |
| Material  |            | Aluminum |  |
| Width of Matrix                                   | mm         | 650      |  |
| Height of Matrix                                  | mm         | 680      |  |
| Pressure Cap Setting                              | kPa        | 90       |  |
| Estimated Cooling Air Flow Reserve                | kPa        | 0,125    |  |
| Engine Pre Heater-Tube (with Circulation Pump)    | W          | 1500     |  |
| LUBRICATION SYSTEM                                |            |          |  |
| Total System                                      | L          | 13       |  |
| Minimum Oil Level                                 | L          | 11       |  |
| Nominal Motor Operating Temperature               | °C         | 40       |  |
| Lubricating Oil Pressure (Rated Speed)            | bar        | 5        |  |
| Relief Valve Opens                                | kPa        | 300-400  |  |
| Oil / Fuel Consumption Ratio                      | %          | ≤1,63    |  |
| Normal Oil Temperature                            | °C         | 120      |  |
| ELECTRICAL SYSTEM                                 |            |          |  |
| Voltage   | V          | 12       |  |
| Starter   | kW         | 4,2      |  |
| Alternator Output Ampers                          | А          | 42       |  |
| Alternator Output Voltage                         | V          | 28       |  |
| Batteries Capacity                                | Ah         | 85       |  |
|   |            |          |  |



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## JCB ENERGY DIESEL ENGINE POWER RATINGS

| ENGINE MODEL | G195JC             |               | ENGINE FAMILY                  | JC28  | ENGINE SERIES | GII   |       |
|--------------|--------------------|---------------|--------------------------------|-------|---------------|-------|-------|
| Speed (Rpm)  |                    | TYPICAL GENER | TYPICAL GENERATOR OUTPUT (NET) |       | R             |       |       |
|              | Type of Operation  |               |                                | Gi    | ross          | Net   |       |
|              |                    | kVA           | kWe                            | KWm   | Нр            | kWm   | Нр    |
| 1500         | Stand By (Maximum) | 154,7         | 123,8                          | 140,0 | 187,9         | 136,0 | 182,6 |
|              | Prime              | 139,9         | 111,9                          | 127,0 | 170,5         | 123,0 | 165,1 |
|              | Stand By (Maximum) | 154,7         | 123,8                          | 140,0 | 187,9         | 136,0 | 182,6 |
| 1800         | Prime              | 139,9         | 111,9                          | 127,0 | 170,5         | 123,0 | 165,1 |

## **DIESEL ENGINE MATCHING PARAMETERS - 50 HZ**

| 50 HZ @ 1500 R/MIN                         |           | STAND BY | PRIME |
|--|-----------|----------|-------|
| Gross Engine Power                         | kW        | 140,0    | 127,0 |
| Net Engine Power                           | kW        | 136,0    | 123,0 |
| Fan Power Consumption (Belt Pulley Driven) | kW        | 3,0      | 3,0   |
| Other Power Loss                           | kW        | 1,0      | 1,0   |
| Mean Effective Pressure                    | MPa       | 1,73     | 1,57  |
| Intake Air Flow                            | m ³ / min | 8,85     | 8,00  |
| Exhaust Temperature Limit                  | °C        | 581      | 528   |
| Exhaust Flow                               | m ³/ min  | 24,83    | 22,58 |
| Boost Pressure Ratio                       |           | 2,19     | 1,96  |
| Mean Piston Speed                          | m / s     | 6,3      | 6,3   |
| Cooling Fan Air Flow                       | m ³/ min  | 164,0    | 164,0 |
| Typical Generator Output Power             | kVA       | 155      | 140   |
| HEAT REJECTION                             |           | STAND BY | PRIME |
| Energy in Fuel (Heat of Combustion)        | kW        | 342,0    | 312,0 |
| Gross Heat to Power                        | kW        | 140,0    | 127,0 |
| Energy to Coolant and Lubricating Oil      | kW        | 87,0     | 80,0  |
| Heat Dissipation Capacity *                | kW        | -        | -     |
| Energy to Exhaust                          | kW        | 99,0     | 90,0  |
| Heat to Radiation                          | kW        | 16,0     | 15,0  |
| *Intaka Intercooled system                 |           |          |       |

\*Intake Intercooled system





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## **DIESEL ENGINE MATCHING PARAMETERS - 60 HZ**

| 60 HZ @ 1800 R/MIN                         |                      | STAND BY | PRIME |
|--|----------------------|----------|-------|
| Gross Engine Power                         | kW                   | 143,0    | 130,0 |
| Net Engine Power                           | kW                   | 139,0    | 126,0 |
| Fan Power Consumption (Belt Pulley Driven) | kW                   | 3,0      | 3,0   |
| Other Power Loss                           | kW                   | 1,0      | 1,0   |
| Mean Effective Pressure                    | MPa                  | 1,51     | 1,37  |
| Intake Air Flow                            | m <sup>3</sup> / min | 9,29     | 8,42  |
| Exhaust Temperature Limit                  | °C                   | 610      | 556   |
| Exhaust Flow                               | m ³ / min            | 26,08    | 23,77 |
| Boost Pressure Ratio                       |                      | 2,30     | 2,10  |
| Mean Piston Speed                          | m / s                | 7,5      | 7,5   |
| Cooling Fan Air Flow                       | m <sup>3</sup> / min | 172,0    | 172,0 |
| Typical Generator Output Power             | kVA                  | 155      | 140   |
| HEAT REJECTION                             |                      | STAND BY | PRIME |
| Energy in Fuel (Heat of Combustion)        | kW                   | 359,0    | 326,0 |
| Gross Heat to Power                        | kW                   | 147,0    | 129,0 |
| Energy to Coolant and Lubricating Oil      | kW                   | 91,0     | 84,0  |
| Heat Dissipation Capacity *                | kW                   | -        | -     |
| Energy to Exhaust                          | kW                   | 104,0    | 95,0  |
| Heat to Radiation                          | kW                   | 16,8     | 18,0  |
| *Intake Intercooled system                 |                      |          |       |

## JCB ALTERNATOR TECHNICAL PARAMETERS AND SPECIFICATIONS



| ALTERNATOR TECHN | ICAL PARAMETERS |              |                                 |          |              |
|------------------|-----------------|--------------|---------------------------------|----------|--------------|
| Insulation Class |                 | Н            | Field Control System            |          | Self-Excited |
| Winding Pitch    |                 | 2/3 - (N° 6) | A.V.R. Model                    | Standard | SX460        |
| Wires            |                 | 12           | Voltage Regulation              | %        | ± 1          |
| Protection       |                 | IP 23        | Sustained Short-Circuit Current | 10 sec   | 300% (3 IN)  |
| Altitude         | m               | 1000         | Total Harmonic (*) TGH / THC    | %        | < 4          |
| Overspeed        | rpm             | 2250         | Wave Form: NEMA = TIF - (*)     |          | < 50         |
| Air Flow         | m³/sec.         | 0.514        | Wave Form: I.E.C. = THF - (*)   | %        | < 2          |
| Bearing Drive    | N/A             | -            | Bearing Non-Drive               | Bearing  | 6310-2RZ     |
| Rotor Winding    | 100%            | Copper       | Stator Winding                  | 100%     | Copper       |





231 / 400 V – 50 Hz & 277 / 480 V – 60 Hz



## **ALTERNATOR SPECIFICATIONS**

#### 50 HZ / 231-400V COSQ 0,8 / 1500 RPM

| STANDARD USING ALTERNATOR |     |           |         | OPTIONAL USING ALTERNATOR |         |         |          |           |         |
|---------------------------|-----|-----------|---------|---------------------------|---------|---------|----------|-----------|---------|
| BRAND/MODEL               |     | JCB 270S1 |         | LEROY-SO                  | OMER    | TAL044H | STAMFORD | UC274     | ŧΕ      |
| DUTY                      |     |           |         | Continuous                |         |         |          | Stand By  |         |
| AMBIENT                   | C°  |           |         | 40°C                      |         |         |          | 27°C      |         |
| CLASS / TEMP. RISE        | C°  |           |         | H/ 125° K                 |         |         |          | H/ 163° K |         |
| SERIES STAR               | V   | 380/220   | 400/231 | 415/240                   | 1 Phase | 380/220 | 400/231  | 415/240   | 1 Phase |
| PARALLEL STAR             | V   | 190/110   | 200/115 | 208/120                   | 220     | 190/110 | 200/115  | 208/120   | 220     |
| SERIES DELTA              | V   | 220       | 230     | 240                       | 230     | 220     | 230      | 240       | 230     |
| OUTPUT POWER              | kVA | 141,0     | 141,0   | 146,0                     | -       | 155,0   | 155,0    | 161,0     | -       |
| OUTPUT POWER              | kW  | 112,8     | 112,8   | 116,8                     | -       | 124,0   | 124,0    | 128,8     | -       |

#### 60 HZ / 277-480V COSQ 0,8 / 1800 RPM

| STANDARD USING ALTERNATOR |          |          |         | OPTIONAL USING ALTERNATOR |         |         |         |          |         |
|---------------------------|----------|----------|---------|---------------------------|---------|---------|---------|----------|---------|
| BRAND/MODEL               | JUENERGY | JCB 270S |         | LEROY                     | SOMER   | TAL044E | STAMFOR | D UC27   | 4D      |
| DUTY                      |          |          |         | Continuous                |         |         | St      | and By   |         |
| AMBIENT                   | C°       |          |         | 40°C                      |         |         |         | 27°C     |         |
| CLASS / TEMP. RISE        | C°       |          |         | H / 125° K                |         |         | н       | / 163° K |         |
| SERIES STAR               | V        | 416/240  | 440/254 | 480/277                   | 1 Phase | 416/240 | 440/254 | 480/277  | 1 Phase |
| PARALLEL STAR             | V        | 208/120  | 220/127 | 240/138                   | -       | 208/120 | 220/127 | 240/138  | -       |
| SERIES DELTA              | V        | 240      | 254     | 277                       | 240     | 240     | 254     | 277      | 240     |
| OUTPUT POWER              | kVA      | 139,0    | 146,0   | 154,0                     | -       | 153,0   | 161,0   | 169,0    | -       |
| OUTPUT POWER              | kW       | 111,2    | 116,8   | 123,2                     | -       | 122,4   | 128,8   | 135,2    | -       |



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## **CONTROL MODULE ALERTS**

Emergency Stop Malfunction High Generator Frequency Low Generator frequency, Low Load Over Current, Unbalanced Current Low Generator Voltage High generator Frequency Phase sequence error Overload, Heat Sensor Broken Low Water Level (Optional) Low Oil Pressure, Reverse Power Low Water Temperature

#### Start Error, Stop Error Magnetic Pickup Error Charge Alternator Error Unbalanced Load Maintenance Time Alarm Low Speed, High Speed Broken Oil Sensor Cable High Oil Temperature (Optional) Low Fuel Level (Optional), High Battery Voltage Low Battery Voltage, High Water Temperature Electronic Can bus Errors (ECU)

#### **CONTROL PANEL SPECIFICATIONS**





- Powder Painted Steel Panel with Lockable Door
- ATS (Automatic Transfer Panel)-Optional
- Control Module
- Battery Charger
- Emergency Stop Button

- Terminal Blocks
- Load Output Terminal
- System Protection MSBs
- Circuit Breaker-Optional
- o LCD Screen
- Control Relays
- Backlit, 128x64 Pixels

#### **CONTROL MODULE TECHNICAL PARAMETERS**

| Brand                                 |                   | Brand                                | Trans-MIDIAMF.232.GP                  |  |
|---------------------------------------|-------------------|--------------------------------------|---------------------------------------|--|
| Dimensions                            | 120mmx94mm.       | Protection Class                     | IP65 From the Front                   |  |
| Weight                                | 260 gr.           | <b>Environmental Conditions</b>      | 2000 meters above sea level           |  |
| Ambient Humidity                      | Max. %90.         | Ambient Temperature-20°C to +70°C    |                                       |  |
| DC Battery Supply Voltage             | 8 - 32 V          | Battery Voltage Measurement          | 8 – 32 V                              |  |
| Network Frequency                     | 5 - 99,9 Hz       | Mains Voltage Measurement            | 3 - 300 V phase -Neutral, 5 - 99,9 Hz |  |
| Generator Voltage Measurement         | 3 - 300 V         | Generator Frequency                  | 5 - 99,9 Hz                           |  |
| Current Transformer Secondary         | 5A                | Working Period                       | Continuous                            |  |
| Charge Alternator Voltage Measurement | 8 - 32 V          | Charge Alternator Excitation         | n 210mA &12V, 105mA &24V Nominal 2.5W |  |
| Communication Interface               | RS-232            | Analog Sender Measurement            | 0 - 1300ohm                           |  |
| Generator Contactor Relay Output      | 5A & 250V         | Mains Contactor Relay Output         | 5A & 250V                             |  |
| Solenoid Transistor Outputs           | 1A with DC Supply | Start Transistor Outputs             | 1A with DC Supply                     |  |
| Configurable-3 Transistor Outputs     | 1A with DC Supply | Configurable-4<br>Transistor Outputs | 1A with DC Supply                     |  |



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## **CONTROL MODULE FUNCTION**

| Mains Voltage Level Control         | Generator Voltage Level Control                         | 3 Phase Generator<br>Protections                         | 3 Phase AMF Function                   | Alarm Horn                                |
|-------------------------------------|---|--|--|---|
| Network Frequency Level<br>Control  | Generator Frequency level<br>Control                    | - High / Low Voltage                                     | - High / Low Frequency                 | Heater Tube<br>Thermostat Control         |
| Engine Operating Option<br>Control  | Generator Current Level Control                         | - High / Low Frequency                                   | - High / Low Voltage                   | Modbus and SNMP                           |
| Engine Stop Option Control          | Generator Powder Level Control                          | <ul> <li>Current / Voltage</li> <li>Asymmetry</li> </ul> | - High / Low Water<br>Temperature      | Working Hour                              |
| Engine Speed (RPM) Level<br>Control | Generator work Schedule and<br>Timing Control           | - Overcurrent / Overload                                 | - High / Low Load                      | Ground Leakage                            |
| Battery Voltage Options<br>Times    | Oil Pressure Controllers Control                        | Overheat Control   | Mains., Generator ATS<br>Control       | Analog Modem                              |
| Check Engine Maintenance<br>Times   | Configurable Analog Inputs and<br>Outputs               | 1 Phase or 3 Phase, Phase Selection                      | Network, Voltage,<br>Frequency Display | Ethernet, USB, RS232,<br>RS485            |
| Communication Interfaces GPRS, GSM  | Keeping Error Records of Past<br>Events                 | Parameter Setting via<br>Control Module                  | Parameter Setting via<br>Computer      | Selectable Protection<br>Alarm / Shutdown |
| Engine Speed, Voltage,<br>Earning   | Configurable Programmable<br>Digital Inputs and Outputs | Water Temperature<br>Current and Frequency               | Hours of Operation<br>Phase sequence   | Battery Voltage<br>Oil Pressure           |

#### SOUND PROOF CANOPY AND BASE FRAME (CHASIS) SPECIFICATIONS

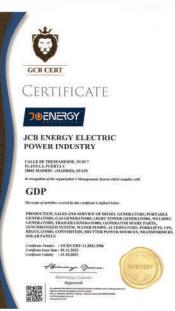


- Special, Registered JCB Energy Design and Colour
- A1 Quality DKP / HRU / Galvanized Steel
- Sensitive Twist on Automatic Press Brake
- Delicate Cut on Automatic Punch and Laser Bench
- Sensitive Welding on Robotic Welding Bench
- Chemical Cleaning Nano Technology Before Painting
- Robotic Painting with Electrostatic Powder Paint
- Drying and stabilizing on 200 °C Ovens
- 1500 Hour Salt Test
- o Glass wool Isolation, A1 Class Material -50/+500 ℃
- Special Covering Over Glass Wool
- Best Sound Level (in Dba)
- Temperature Tests
- Rustproof Accessories

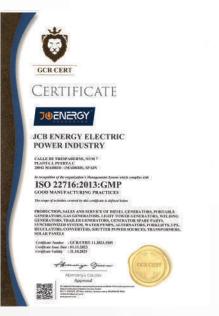
- Cable Exit Connectors and Glands
- Emergency Stop Button
- Fuel Level Gauge
- Fuel Drain Cap
- Fuel Inlet and Return Records
- Impermeability Test for Fuel Tank
- Vacuumed Rubber Mounted
- High Quality weatherstrips
- High Quality Shock Absorbers
- Fuel Filling Cap (with ventilation)
- Lifting and Carrying Equipment
- Internal Exhaust Mufflers (Silencers)
- External Exhaust Mufflers (Silencers)
- Radiator water Filling Cap
- o Daily Fuel Tank, External Fuel Tank

# OUR CERTIFICATES











CERTIFICATE HEALTHY & SAFE WORKPLACE CERTIFICATE

JUENERGY JCB ENERGY ELECTRIC POWER INDUSTRY

CALLE, DE TRENPADERNE, NUM 7 PLANTA 2, PURITA C 20942 MADRID - (MADRID), NPAIN ETREMON CONTROL TO DRAME & ManBY, and Tafe Worksham

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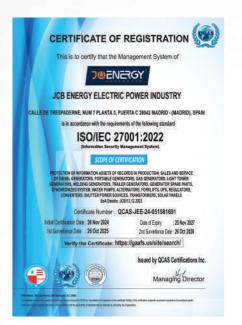
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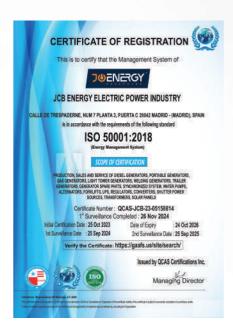
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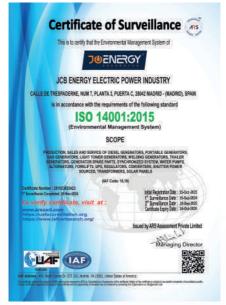


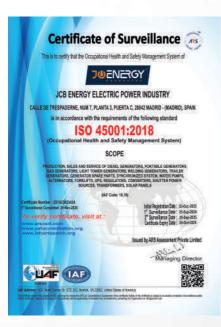
CE -VERTA-106188 -VERTA-106189











#### DNV

#### MANAGEMENT SYSTEM CERTIFICATE

#### Certificate no: Initial certification date: D012084 14 August 2007

The is to cardy that the management system of HD Hyundai Infracore Co., Ltd. Head Office & Incheon Plant 40 (highes). Drops, indexe, 2200, Republic of Korea and the sites as mentioned in the appendix accompanying this cartificate has been toyaid to conform to the Environmental Management System standard. Iso 14001;2015

Valid: 14 October 2023 - 13 October 2026

The certificate is walls for the following scope: Design, Development, Manufacture, Servicing of Internal Combustion Engine for use in Marine Industry, General Industry and Automotive Industry, and Earth Moving Equipment[Excavator, Wheel Loader, Dezer], Testing of Earth Moving Equipment[Excavator and Wheel Loader].





#### DNV

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Lanuari de meterre metorerres de Madera SALIDA IF de Registra 1415/80.645 Focies 2597.2223 12/82.09

RENE SANCHEZ ROMAN, MANAGER CH'THE DEMARTMENT O' LIGAL ADMSONY SERVICES AND THE DATAINGE OF THE OFFICIAL OMAXBER OF COMMERCE, MOUERRE AND SERVICES OF MARIND, WITH INDUSTRIED OFFICE AT PLAZA DE LA INDERDIDICA 1, MARIND, DAVIN

CERTIFY. That, according to the background data on moord at this Chambar and others produced by the Company

CB-ID-BERGY RECEISE FOOMER INCOMENTS II, a Company with Tax ID. Namine IN 1975594, and Is registreed office a strengt impactements in 20000 Masking is registreed on MMAy 2004. and the the basing of the 3D Sentan companies, of the Economic Activities Tax Tarihi function Set Us performing in futureing schaft;

· Menufacture of electrical material for use and equipment

In whites whereast, for the appropriate purpose, i have issued and signed this Certificate, to which Latts the stamp of this Chamilee, in Madrial on 28 July 2004.





Libratus de Manare Maista Maria Nº de Register 155 / 85 660 Fecha: 3607/355 1357/35

BENE SANCHEZ ROMAN, DIRECTORA DEL DEIWOTMENTO DE ASESORIA IMPORTA Y CINSO DE LA CIMARIA OFICIAL DE COMERCIO, INDUSTINA Y SURVICIS DE MARIRO, CON OCIACIONI SOCIAL EN LA TILAZA DE LA INDEPENDENCIA Y IL IMPORTO-ENTRATA CERTIFICA Que de los antecedentes que obrin en ente Cuipenación y de coso entididos por la recordad, manta

HIMPING due la compañía ACI INTROV ELECTIC ENVERT ADALTINE 4.1. a con accéption preventi de proclamation equation, constituit de moltante existence hanne acception preventi de la constituit de moltante existence hanne Calegoria de Marcía de activitativa en la constituit de moltante hanne acception de la constituit de la constituit de moltante la constituit de activitati à la constituit de la constituit de la constituit de activitati à la constituit de la constituit de la constituit de activitati à la constituit de la constituit de la constituit de activitati à la constituit de la constituit de la constituit de activitati à la constituit de la constituit de activitati à la constituit de la constituit de activitati de

"Actividad propipal 27,11 Astronautiv de matures, gebreradores y transformadar eléctricos".

METRODA: METRODA: Can seguine se despende de la socitura de contitución, el capital encil de la compañía (x.p. 1980/07 18/0780; POMRI INDUSTRY 21, se fija en la centidad de 1980/08 el (REOCINER ME HONOCOMPTOS MITTE LINDOS), allados en 1990/ participaciones sociales, de 1000 (UNI BRO) de veter nominal cade una, internadore complementen en 1 al 1900 antes incluider, que son integramente ausuritás y desenticiostan por de com fundado:

Operational processing to consider the electron of economic determined and the electron of the

Conjug productions of the compariso ACI MINITORY FLICTING: CONVEX INFOLISTINY SL, con domicilia an calle Traspademe namera 7, 20042. Majorida y provide de Namera de Namificación radia 19:207528, contras dada de esta en el gruportapidante da la Sacolín II amprovancia de las Tanfas del Inguestos sobre Actividades Económicas, qui finalda para ejecto ha estardad. Términami en amenania difectivo de Milantetory reglamentari.









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