

المواصفات الفنية الخاصة بالمناقصة رقم 2011/

SPECIFICATIONS FOR GENERATOR SET OPEN FRAM
(25 KVA -500KVA)

1) Introduction:

1. This specification defines the requirements of The Diesel Engine driven Alternator (Generator sets) for PTC Al-ghuraf site in Sana'a.
2. The bidder shall furnish a completely Generator sets With the Automatic control (AMF) panel and Automatic Transfer Switch (ATS) panel to maintain regulated continuous power with specified tolerances. To critical loads under normal and abnormal conditions.
3. All materials and equipment of this Generator sets shall be fully compatible with environment space conditions at the installation site.
4. The generator set shall operate In case of loss of the AC power source. or in Sequence with another generator set if no AC power source in the site.

2) Environment (Site condition):

1. The generator sets electrical output power: must be available at the following site conditions.

a) <u>Altitude</u>	:	<u>2500 M a.s.l.</u>
b) <u>Ambient Temperature</u>	:	<u>35°c.</u>
c) <u>Relative Humidity</u>	:	<u>60 – 90%.</u>
2. The tenders shall enclose graphic diagram of the de-rating of the generator sets depending on site conditions.

3) The generator set shall consist of the following major components:

- a) Engine.
- b) Alternator.
- c) Fuel pump.
- d) Solenoid valve (shut down devices).
- e) Dynamo charger.
- f) Starter motor.
- g) Battery.
- h) Automatic control (AMF) panel.
- i) Automatic Transfer Switch (ATS) panel.
- j) Exhaust system.

4) Engine:

1. Engine: must be diesel engine four stroke type 1500 R.P.M.
2. Cooling type: must be air cooled for genset with rated power < 60 KVA and water cooled for genset rated power > 60 KVA.
3. For water cooled full observation controlling with alarms must be provided for abnormal water level, and temperature.

5) Alternator :

1. The Alternator shall be brush less design three phase four wires screen protected star connected, salient pole, and self excited. class (H) insulation and IP 23.
2. The overload should be able to handle (110%) of rated power continuously at least one hour.
1. Excitation system (Self excitation (A VR) should be with permanent magnetic per 12 hours generator (P.M.G) in exciter field for fast voltage build up after short circuit and after a long time of inactivity.

6) Output:

Continuous rating power (KW/KVA) 380v/220vlt 3phase 4wires 50 HZ 0.8 power factor

7) Automatic control panel:

- a) The automatic control panel (AMF) should be fitted on the generator set and completely separated from the genset vibrations.
- b) AMF function:
 1. Start/stop the genset in auto/manual and test.
 2. Start the genset in case of mains goes outside with high /low voltage, high/low frequency phase sequence and phase missing.
 3. Stop the Engine when Mains is restored normally.
 4. Check & protection on engine & alternator and all genset main devices.
 5. AMF should have circuit breaker (MCCB) G.S output protection, measuring devices AC&DC, indicating lamp, shut down, warning alarms, protection circuits for genset as it is in the schedule attached.

8) ATS Automatic transfer switch :

1. The Automatic transfer switch (ATS) should separate from the GENSET. And its dimensions should be widely and enough for the equipment.

2. There are two types of ATS.

a) type one for two genset with mains circuit shall be equipped with hi. high

efficiency-DC Electronic Timer device to control the generating sets working periods. And flexible time sharing in long absence or unavailability of mains & the electronic Timer should be supplied from engines batteries (DC volt) ATS should give the order start up to 2nd genset in case of genset 1st failed.

b) type two : for one genset with mains

3. the types of ATS is functioning :

a) automatic start up the generator set in case of (mains) cutoff or voltage goes outside high/low voltage, high/low frequency with 0.95 and 1.05 of its nominal value . Or mains frequency goes outside the limit of 46 and 52 HZ & phase sequence, phase missing.

b) Give the automatic start, stop order to GENSETS, also to automatic switch over the load between GENSETS and Mains .



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9) The ATS shall be equipped with:

1. Mechanical and electrical load change over with protection .
2. Four pole contactors for each genset and mains with mechanical and electrical interlock .
3. Four pole contactors dummy load .
4. Checking devices for mains L/H voltage, L/H frequency, phase sequence, phase missing, overload & short circuits protection for mains & auxiliary circuit protection.
5. Load transfer switch (auto -off - man).
6. Measuring devices. For mains voltage load current mains frequency
7. Indicating lamps warning alarms.
8. Dummy load operation circuit: Automatic & Manual ON / OFF depending on the load on the gensets.
9. Retrasmits alarm to remote control in mains failure, genset one or genset two failure.
10. All of these equipments should be in the schedule attached.

10) Information required with Tender:

A statement of compliance with this specification shall be submitted.

1. documentation description of the ENGINES & ALTERNATORS & AMF & ATS form manufactures .
2. country of origin of ENGINES & ALTERNATORS & AMF & ATS panels .
3. weights and dimensions of the equipment .
4. Manufactures standard test schedule.
5. Manufacturer's certification of origin.
6. The current rating of all the power cables.
7. Documentation: three set of documents, electrical and electronic diagrams.
8. Spare parts for Engine, Alternator, AMF, ATS list and price.
9. The entire schedule attached should be filling.

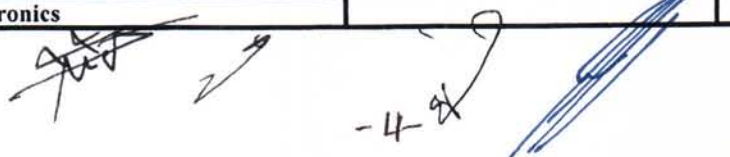
11- Training:

The tenderer must offer training abroad for TOW PTC engineers.
The training program must be described in detail and specifying training course duration during in the manufacturing test.

NOTE: THE TECHNICAL POINTS HIGHLIGHTED MUST BE CONSIDERED MAIN STANDARDS FOR OFFER EVALUATION.

OPEN FRAM Genset Description

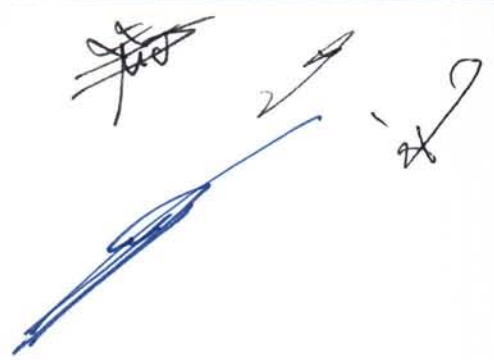
description	PTC Specification	Tender Specifications
Quantity		
Power KVA		
Altitude (M) above sea level	2500 M a.s.l.	
Ambient Temp. °c	35	
Humidity %	60 to 90	
Assembly by & country of Origin		
Operation	Auto	
Dimension of Genset (L * W * H) mm		
Dimensions drawings attached		
Oil heater	220V AC	
Exhaust system	as attached	
Diesel Engine specifications		
Diesel Engine		
Manufacture		
Country of Origin		
Date of Manufacture		
Type / model		
Duty Cycle	continuous	
Continuous power KW		
Over load Capacity		
Cooling type	Air < 60KVA & water > 60KVA	
Combustion		
Number of cylinder		
Configuration		
Speed (RPM)	1500	
Sound level		
Cylinder Bore & stroke m/m		
Number of stroke	4	
Number of valves		
Aspiration		
Mean piston speed		
Mean Effective Pressure		
Compression ratio		
Standard applicator		
Altitude above sea level (m)		
Ambient Temp		
Relative Humidity %		
Derating curves calculations attached		
Dimension (L * W * H) mm		
Cooling system radiator	>60KVA	
Direction of rotation viewed from free End		
Specific fuel oil consumption (g / Kwh) OR (liters/h) At 25% rated load (g / Kwh) At 50% rated load (g / Kwh) At 75% rated load (g / Kwh) At 100% (g / Kwh)		
battery capacity		
Governor specifications		
Manufacture		
Origin		
Type of Governor		
Mechanical or Electronics		



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Generator- Alternator specifications

Manufacture		
Type /model		
Country of Origin		
Date of Manufacture		
Reference Conditions		
Site Conditions		
Derating curves calculations attached		
Rated output(KVA)		
Rated Frequency (Hz)		
Rated Speed (RPM)		
Enclosure IP	23	
Insulation calss	H	
Voltage regulator	AVR	
Voltage Accuracy		
Efficiency %		
Exitation type (PMG)	MUST BE PROVIDED	
Cooling type		
verload capacity		
Power Factor	0.8	
Number of phases	3 phase +N	
Rated Voltage phese to phese (v)		
phase to neutral (V)		
Amortisseur /damper- load%At rated load		
Terminal box / arrangement		
Auxiliaries		
Daily Tank	not requested	
Operation type of fuel transfer	not requested	
Noise level with Residential silencer db @ mt		
Sound proof canopy db @ mt	not requested	



Schedule describe AMF panel equipments		
AMF Description		
	PTC Specification	Tender Specificationes
Assembly by&country of Origin		
Type /model		
Type of AMF card		
AMF type analogue OR display		
Dimensions (HxWxD)mm		
Measures Device		
voltmeter for each phaes		
Ameter for each phase		
Frequency mater		
Gs working hour		
DC Voltmeter		
DC Ameter		
engien TEMP gauge		
oil pressure gauge		
KW Meter		
Otheres		
Auxiliarlies		
selector switch(MAN/OFF/AUTO)		
Auto Battery charger		
Alternator circuit breaker with over load	MCCB	
Auxiliary circuit Protection	MCBs	
Emergancy STOP		
otheres		
indectores alarm lamps and Protection		
High engien TEMP	shut down	
Low oil pressuer	shut down	
Over speed	shut down	
Over load	shut down	
Belt rupture	shut down	
GS Voltge out of limit	shut down	
High /Low frequency	shut down	
Gs working Normal	LED	
GS failuer	LED	
fail to start	LED	
Batt charger failuer	LED	
Batt charger ON	LED	
Alarm Retransmission		
GS Running	with no voltage	
GS failuer	with no voltage	

Schedule describe ATS type two for one G,S&Mains		
ATS Description		
	PTC Specification	Tender Specifications
Assembly by&country of Origin		
Type of ATS (code)		
ATS type card Analogue OR Electronics		
Dimensions (HxWxD)mm		
ATS Major components		
Changeover contactor 4pole M/Eprotection		
4pole contactors GS, Mains		
phase sepance		
phase missing		
low/high voltge		
low/high frequency		
Auxiliary circuit Protection	MCBs	
Mains circuet braeker with over load	MCCB	
selector switch mains M/AUTO		
selector switch GS M/AUTO		
Dummy load circuit with selector switch M /OFF /AUTO		
Terminals groups (size)	mm2	
Mains measures device		
Voltmeter for each phase		
Ammeter for each phase		
Frequency meter		
Lamp indictor & Alarms		
mains available		
mains on laod		
Gs 1 available		
Gs 1 on load		
mains Failure		
Alarm Retransmission		
mains failure		
mains available		
G.S runnig		



PTC TECH SPECIFICATION 2012

المواصفات الفنية الخاصة بالمناقصة رقم

SPECIFICATIONS FOR SOUND PROOF canopy GEN SET AND MOBILE SOUND PROOF canopy GEN SET

1. This specification defines the requirements of The Diesel Engine driven Alternator (Generator sets) for PTC Al-ghuraf site in Sana'a.
2. The bidder shall furnish a completely Generator sets With the Automatic control (AMF) panel and Automatic Transfer Switch (A TS) panel to maintain regulated continuous power with specified tolerances. To critical loads under normal and abnormal conditions.
3. All materials and equipment of this Generator sets shall be fully compatible with environment space conditions at the installation site.
4. The generator set shall operate In case of loss of the AC power source. or in Sequence with another generator set if no AC power source in the site.

2) Canopy features:

1- The enclosure should be:

- water and weather proof .
- dB levele should be (65-70) dB@ 1 meter .
- Side opening access for easy maintenance works.
- The enclosure base frame should be designed with supports for easy transferred using for klift.

2- Centrifugal fan:

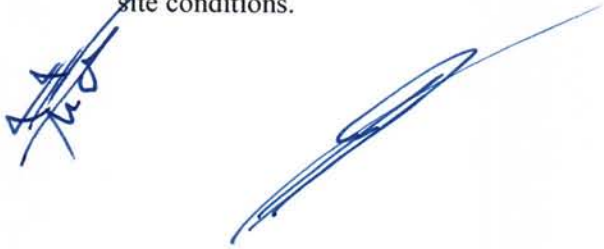
High velocity cooling air circuit shall maintain.
internal winding and rotor free of dust and dust particles.

3) environment (Site condition):

1. The generator sets electrical output power: must be available at the following site conditions.

a)Altitude	2500 M a.s.l
b)Ambient Ternperature :	35°c.
c)Relative Humidity	60 - 90%.

2. The tenders shall enclose graphic diagram of the de-rating of the generator sets depending on site conditions.



1) The generator set shall consist of the following major components:

- a) Engine.
- b) Alternator.
- c) Fuel pump.
- d) Solenoid valve (shut down devices).
- e) Dynamo charger.
- f) Starter motor.
- g) Battery.
- h) Automatic control (AMF) panel.
- i) Automatic Transfer Switch (ATS) panel.
- j) Exhaust system.

4) Engine:

1. Engine: must be diesel engine four stroke type 1500 R.P.M.
2. Cooling type:

-For 150 kva (SOUND PROOF ,canopy) must be WATER cooled full protected against abnormal high water level and temperature full observation controlling with alarms must be provided for abnormal water level, and temperature.

- For 25kva (MOBIEL SOUND PROOF ,canopy) must be AIR cooled

5) Alternator:

1. The Alternator shall be brush less design three phase four wires screen protected star connected, salient pole, and self excited, class (H) insulation and IP 23.
2. The overload should be able to handle (110%) of rated power continuously at least one hour.
3. Excitation system (Self excitation (AVR) should be with permanent magnetic per 12 hours generator (P.M.G) in exciter field for fast voltage build up after short circuit and after a long time of inactivity.

6) Output:

1. Continuous rating power (KW/KVA) 380v/220volt 3phase 4wires 50 HZ 0.8 power factor.

7) Automatic control panel:

- a) The automatic control panel (AMF) should be fitted on the generator set and completely separated from the genset vibrations.
- b) AMF function:
 1. Start/stop the genset in auto/manual and test.
 2. Start the genset in case of mains goes outside with high /low voltage, high/low frequency phase sequence and phase missing .
 3. Stop the Engine when Mains is restored normally.
 4. Check & protection on engine & alternator and all genset main devices.
 5. AMF should has circuit breaker (MCCB) G.S output protection, measuring devices AC&DC, indicating lamp, shut down, warning alarms, protection circuits for genset as it is in the schedule attached.

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8) ATS Automatic Transfer Switch :

1. The Automatic transfer switch (ATS) should separate from the GENSET. And it's dimensions should be widely and enough for the equipment.
2. There are two types of A TS.
 - a) Type one for two genset with mains circuit shall be equipped with high efficiency DC Electronic timer device to control the generating sets working periods. And flexible time sharing in Ion absence or unavailability of mains & the electronic Timer should be supplied from engines batteries (DC volt). A TS should give (he order start up to 2nd genset in case of genset 1st failed.
 - b) Type TWO: for one genset with mains.
3. The types of A TS is functioning:
 - a) Automatic start up the generator set in case of (mains) cutoff or voltage .goes outside high /low voltage, high/low frequency with 0.95 and 1.05 Of its nominal value. Or mains frequency .goes outside the limit of 46and 52 HZ& phase sequence, phase missing:
 - b) Give the automatic start stop order to GENSETS, also to automatic switch over the load between GENSETS and Mains.

9) the ats shall be equipped with :-

1. Mechanical and electrical load change over with protection.
2. Four ole contactors for each genset and mains with mechanical and electrical interlock.
3. Four ole contactors dummy load.
4. Checking devices for mains L/H voltage, L/H frequency, phase sequence, phase missing, overload & short circuits protection for mains & auxiliary circuit protection.
5. Load transfer switch (auto -off - man).
6. Measuring devices for mains voltage load current mains frequency.
7. Indicating lamps warning alarms.
8. Dummy load operation circuit: Automatic & Manual ON / OFF depending on the load on the gensets.
9. Retransmits alarm to remote control in mains failure, genset one or genset two failure.
10. All of these equipments should be in the schedule attached.

MS 2/27/2012

Schedule describe ATS type two for one G,S&Mains+DC		
ATS Description		
	PTC Specification	Tender Specifications
Assembly by&country of Origin		
Type of ATS (code)		
ATS type card Analogue OR Electronics		
Dimensions (HxWxD)mm		
ATS Major components		
Changeover contactor 4pole M/Eprotection		
4pole contactors GS, Mains		
phase sepance		
phase missing		
low/high voltge		
low/high frequency		
Auxiliary circuit Protection	MCBs	
Mains circuet braeker with over load	MCCB	
selector switch mains M/AUTO		
selector switch GS M/AUTO		
Dummy load circuit with selector switch M /OFF /AUTO		
Terminals groups (size)	mm2	
Mains measures device		
Voltmeter for each phase		
Ammeter for each phase		
Frequency meter		
Lamp indictor & Alarms		
mains available		
mains on laod		
Gs 1 available		
Gs 1 on load		
mains Failure		
Alarm Retransmission		
mains failure		
mains available		
G.S runnig		



canopy Genset Description

description	PTC Specification	Tender Specifications
Quantity		
Power KVA		
Altitude (M) above sea level	2500 M a.s.l.	
Amb. Tempr. °c	35	
Humidity %	60 to90	
Assembly by&country of Origin		
Operation	Auto	
Dimension of Genset (L * W * H) mm		
Dimensions drawings attached		
Oil heater	220V AC	
Exhaust system	as attached	
Diesel Engine specifications		
Diesel Engine		
Manufacture		
Country of Origin		
Date of Manufacture		
type /model		
Duty Cycle	contenuous	
Continuous power KW		
Over load Capacity		
Cooling type	Air < 60KVA &water>60KVA	
Combustion		
Number of cylinder		
Configuration		
Speed (RPM)	1500	
Sound level		
Cylinder Bore &stroke m/m		
Number of stroke	4	
Number of valves		
Aspiration		
Mean piston speed		
Mean Effective Pressure		
Compression ratio		
standard applier		
Altitude above sea level (m)		
Amben Temp		
Relative Humidity %		
Derating curves calculations attached		
Dimension (L * W * H) mm		
Cooling system radiator	>60KVA	
Direction of rotation viewed from free End		
Specific fuel oil consumption (g / Kwh)OR (litres/h) At25% rated load (g / Kwh) At50% rated load (g / Kwh) At75% rated load (g / Kwh) At100% (g / Kwh)		
battery capacity		
Governor specifications		
Manufacture		
Origin		
Type of Governor		
Mechanical or Electronics		

Generator- Alternator specifications

Manufacture		
Type /model		
Country of Origin		
Date of Manufacture		
Reference Conditions		
Site Conditions		
Derating curves calculations attached		
Rated output(KVA)		
Rated Frequency (Hz)		
Rated Speed (RPM)		
Enclosure IP	23	
Insulation calss	H	
Voltage regulator	AVR	
Voltage Accuracy		
Efficiency %		
Exitation type (PMG)	MUST BE PROVIDED	
Cooling type		
Overload capacity		
Power Factor	0.8	
Number of phases	3 phase +N	
Rated Voltage phese to phese (v)		
phase to neutral (V)		
Amortisseur /damper- load%At rated load		
Terminal box / arrangement		
Auxiliaries		
Daily Tank	not requested	
Operation type of fuel transfer		
Noise level with Residential silencer db @ mt		
Sound proof canopy db @ mt	65-70	

جدول الكميات والتكلفة التقديرية لاحتياجات المولدات لعام 2012م

ملاحظات عامة	الإجمالي \$	سعر الوحدة \$	ملحقات المولدات	عدد المولدات	القدرة KVA
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد واحد (1) كبينة التحكم ATS لمولد واحد + كهرباء عمومي	1	500
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد واحد (1) كبائن التحكم ATS لمولد واحد + كهرباء عمومي	1	300
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد (2) اثنان كبينة التحكم ATS لمولد واحد + كهرباء عمومي	2	150
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد (2) اثنان كبينة التحكم ATS لمولد واحد + كهرباء عمومي	2	100
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد (4) أربعة كبائن التحكم ATS لمولدين + كهرباء عمومي وعدد (6) ستة كبائن التحكم ATS لمولد + كهرباء عمومي	12	35
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد (10) عشرة كبائن التحكم ATS لمولدين + كهرباء عمومي وعدد (4) أربعة كبائن التحكم ATS لمولد + كهرباء عمومي	22	25
مع كافة التوابع لكل مولد (كبينة الـ AMF ومجموعة إجاز العادم)			عدد (8) ثمان كبائن التحكم ATS لمولد واحد + كهرباء عمومي	8	25 كاتم
			الإجمالي	48	

ملاحظات:-

- 1) يجب توفير جميع التوابع والملحقات وجميع أجزاء العادم.
- 2) يجب توفير قائمة مستقلة بأسعار جميع قطع الغيار ولجميع القدرات المحددة في جدول الكميات.
- 3) يجب أن يشمل العرض تدريب لعدد (٢) مهندسين خارج اليمن على التشغيل وإصلاح الأعطال وفي مصنع الشركة أثناء الفحص المصنعي ولمدة أسبوعين مع ضرورة توضيح برنامج التدريب في العرض المقدم على أن يشمل التدريب تذاكر السفر.



