

**RETURN BIDS TO:  
RETOURNER LES SOUMISSIONS À:**  
**Bid Receiving - PWGSC / Réception des  
soumissions - TPSGC**  
**11 Laurier St. / 11, rue Laurier**  
**Place du Portage, Phase III**  
**Core 0B2 / Noyau 0B2**  
**Gatineau, Québec K1A 0S5**  
**Bid Fax: (819) 997-9776**

**REQUEST FOR PROPOSAL  
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government  
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

|   |   |
|---|---|
| <b>Title - Sujet</b><br>Electronic Power Source   |   |
| <b>Solicitation No. - N° de l'invitation</b><br>31184-159052/A  | <b>Date</b><br>2015-10-06   |
| <b>Client Reference No. - N° de référence du client</b><br>31184-159052   |   |
| <b>GETS Reference No. - N° de référence de SEAG</b><br>PW-\$\$HN-324-68117  |   |
| <b>File No. - N° de dossier</b><br>hn324.31184-159052   | <b>CCC No./N° CCC - FMS No./N° VME</b>                              |
| <b>Solicitation Closes - L'invitation prend fin<br/>at - à 02:00 PM<br/>on - le 2015-11-16</b>  | <b>Time Zone<br/>Fuseau horaire</b><br>Eastern Standard Time<br>EST |
| <b>F.O.B. - F.A.B.</b><br><b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>   |   |
| <b>Address Enquiries to: - Adresser toutes questions à:</b><br>Theriault, Joelle  | <b>Buyer Id - Id de l'acheteur</b><br>hn324                         |
| <b>Telephone No. - N° de téléphone</b><br>(819) 956-3484 ( )  | <b>FAX No. - N° de FAX</b><br>(819) 953-4944                        |
| <b>Destination - of Goods, Services, and Construction:<br/>Destination - des biens, services et construction:</b><br>NATIONAL RESEARCH COUNCIL CANADA<br>BLDG M-50<br>1200 MONTREAL RD<br>OTTAWA<br>Ontario<br>K1A0R6<br>Canada |   |

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du  
fournisseur/de l'entrepreneur**

|  |  |
|--|--|
| <b>Delivery Required - Livraison exigée</b><br>See Herein  | <b>Delivery Offered - Livraison proposée</b> |
| <b>Vendor/Firm Name and Address</b><br><b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>   |  |
| <b>Telephone No. - N° de téléphone</b><br><b>Facsimile No. - N° de télécopieur</b>   |  |
| <b>Name and title of person authorized to sign on behalf of Vendor/Firm<br/>(type or print)</b><br><b>Nom et titre de la personne autorisée à signer au nom du fournisseur/<br/>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b> |  |
| <b>Signature</b>   | <b>Date</b>                                  |

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## **PART 1 - GENERAL INFORMATION**

### **1.1 Security Requirements**

There is no security requirement associated with the requirement.

### **1.2 Requirement**

The contractor must provide the goods in accordance with the technical requirements provided as an Annex.

#### **1.2.1 Delivery Requirement**

Delivery is requested to be completed by December 31, 2015.

### **1.3 Debriefings**

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

### **1.4 Trade Agreements**

"The requirement is subject to the provisions of the North American Free Trade Agreement (NAFTA), and the Agreement on Internal Trade (AIT)."

## PART 2 - BIDDER INSTRUCTIONS

### 2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the *Standard Acquisition Clauses and Conditions Manual* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The 2003 (2015-07-03) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: 60 days  
Insert: 90 days

#### 2.1.1 SACC Manual Clauses

| SACC Reference | Section               | Date       |
|----------------|-----------------------|------------|
| <u>A9033T</u>  | Financial Capability  | 2012-07-16 |
| <u>B1000T</u>  | Condition of Material | 2014-06-26 |

### 2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

### 2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than five (5) calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by Bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

### 2.4 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the Bidders.

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## PART 3 - BID PREPARATION INSTRUCTIONS

### 3.1 Bid Preparation Instructions

Canada requests that Bidders provide their bid in separately bound sections as follows:

- Section I: Technical Bid (2 hard copies)
- Section II: Financial Bid (1 hard copy)
- Section III: Certifications (1 hard copy)
- Section IV: Additional Information (1 hard copy)

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that Bidders follow the format instructions described below in the preparation of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, Bidders should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

#### Section I: Technical Bid

In their technical bid, Bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

##### 3.1.1 Equivalent Product

- 1. Products that are equivalent in form, fit, function and quality to the item(s) specified in the bid solicitation will be considered where the Bidder designates the brand name and model and/or part number and NCAGE of the substitute product;
- 2. Products offered as equivalent in form, fit, function and quality will not be considered if:
  - (a) the bid fails to provide all the information requested to allow the Contracting Authority to fully evaluate the equivalency of each substitute product; or
  - (b) the substitute product fails to meet or exceed the mandatory performance criteria specified in the bid solicitation for that item.
- 3. In conducting its evaluation of the bids, Canada may, but will have no obligation to, request bidders offering a substitute product to provide technical information demonstrating the equivalency (e.g. Drawing, specifications, engineering reports and/or test reports), or to

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demonstrate that the substitute product is equivalent to the item specified in the bid solicitation, at the sole cost of bidders, within ten (10) business days of the request. If the bidder fails to provide the requested information within the specified timeframe, Canada may declare the bid non-responsive.

**Section II: Financial Bid**

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Applicable Taxes must be shown separately.

**3.1.2 Exchange Rate Fluctuation**

The requirement does not offer exchange rate fluctuation risk mitigation. Requests for exchange rate fluctuation risk mitigation will not be considered. All bids including such provision will render the bid non-responsive.

**Section III: Certifications**

Bidders must submit the certifications required under Part 5.

**Section IV: Additional Information**

**3.1.3 Delivery Offered**

While delivery is requested as indicated above, the best delivery that could be offered is\_\_\_\_\_.

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## **PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**

**You are reminded that this solicitation requires the compliance and/or completion of requirements attached as an Annex and forming part of this document.**

### **4.1 Evaluation Procedures**

- a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- b) An evaluation team composed of representatives of Canada will evaluate the bids.

#### **4.1.1 Technical Evaluation**

All bids must be completed in full and provide all of the information requested in the bid solicitation to enable full and complete evaluation.

##### **4.1.1.1 Mandatory Technical Criteria**

The following Mandatory requirements must be submitted with the bid for evaluation

- Technical compliance herein;

#### **4.1.2 Financial Evaluation**

##### **4.1.2.1 Pricing Basis**

The bidder must quote a firm unit price in Canadian dollars DDP Delivered Duty Paid (Ottawa, ON), Applicable Taxes extra, as applicable. Freight charges to destination and all applicable Custom duties and Excise taxes must be included.

### **4.2 Basis of Selection**

A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price on an aggregate basis will be recommended for award of a contract.



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## PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

### 5.1 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

#### 5.1.1 Declaration of Convicted Offences

As applicable, pursuant to subsection Declaration of Convicted Offences of section 01 of the Standard Instructions, the Bidder must provide with its bid, a completed [Declaration Form](#), to be given further consideration in the procurement process.

### 5.2 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid, but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame provided will render the bid non-responsive.

#### 5.2.1 Integrity Provisions – List of Names

Bidders who are incorporated, including those bidding as a joint venture, must provide a complete list of names of all individuals who are currently directors of the Bidder.

Bidders bidding as sole proprietorship, as well as those bidding as a joint venture, must provide the name of the owner(s).

Bidders bidding as societies, firms or partnerships do not need to provide lists of names.

#### 5.2.2 General Environmental Criteria Certification

By submitting the bid, the bidder certifies that the information submitted in the General Environmental Criteria table found at Table 1 is accurate and complete.

By submitting the bid the Bidder certifies that it meets, and will continue to meet throughout the duration of any resulting contract, a minimum of four out of seven requirements identified in the General Environmental Criteria Table found at Table 1;

Additional Information

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The Bidder must complete Table 1 by inserting a checkmark next to every criteria that are met. Bidders are requested to submit Table 1 with their bid. As this is a new procedure, Canada reserves the right to request Table 1 after bid closing. The Contracting Authority will inform the Bidder of a time frame within which to provide it. Failure to provide Table 1 within the required time frame will render the bid non-responsive.

**The Contractor must meet and continue to meet four out of seven criterions during the entire duration of the contract.**

| Green practices within supplier's organization:  | Insert a checkmark for each criteria that is met |
|--|--|
| Promotes a paperless environment through directives, procedures and/or programs.   |  |
| All documents are printed double sided and in black and white for day to day business activity unless otherwise specified by your client.  |  |
| Paper used for day to day business activity has a minimum of 30% recycled content and has a sustainable forestry management certification.   |  |
| Utilizes environmentally preferable inks and purchase remanufactured ink cartridges or ink cartridges that can be returned to the manufacturer for reuse and recycling for day to day business activity. |  |
| Recycling bins for paper, newsprint, plastic and aluminum containers available and emptied regularly in accordance with local recycling program.   |  |
| A minimum of 50% of office equipment has an energy efficient certification.  |  |
| Registered to ISO 14001 or has an equivalent environmental management system in place  |  |

### 5.2.3 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list ([http://www.labour.gc.ca/eng/standards\\_equity/eq/emp/fcp/list/inelig.shtml](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)) available from [Employment and Social Development Canada \(ESDC\) - Labour's](#) website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list at the time of contract award.

## PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

### 6.1 Security Requirements

There is no security requirement applicable to this Contract.

### 6.2 Requirement

The contractor must provide the goods in accordance with the technical requirements stated herein.

#### 6.2.1 SACC Manual Clauses

| SACC Reference | Section              | Date       |
|----------------|----------------------|------------|
| <u>B1501C</u>  | Electrical Equipment | 2006-06-16 |

### 6.3 Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

#### 6.3.1 General Conditions

2010A (2015-09-03), General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

### 6.4 Term of Contract

#### 6.4.1 Delivery Date

All the deliverables must be received on or before \_\_\_\_\_ (Delivery as offered and as accepted will be inserted at contract award).

### 6.5 Authorities

#### 6.5.1 Contracting Authority

The Contracting Authority for the Contract is:  
Joelle Theriault  
Public Works and Government Services Canada - Acquisitions Branch  
Logistics, Electrical, Fuel and Transportation Directorate - "HN" Division  
7B3, Place du Portage, Phase III, 11 Laurier Street, Gatineau, QC, K1A 0S5  
Telephone: (819) 956-3484 Facsimile: (819) 953-4944  
E-mail address: joelle.theriault@pwgsc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

## 6.5.2 Project Authority

The Project Authority for the Contract is: (will be inserted at contract)

Name:

Title:

Telephone: (xxx) xxx-xxxx Facsimile: (xxx) xxx-xxxx

E-mail:

The Project Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority; however the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

## 6.5.3 Contractor's Representative

Name and telephone number of the person responsible for: (will be inserted at contract)

### General enquiries

Name:

Telephone: \_\_\_\_\_

Facsimile: \_\_\_\_\_

E-mail: \_\_\_\_\_

### Delivery follow-up

Name:

Telephone: \_\_\_\_\_

Facsimile: \_\_\_\_\_

E-mail: \_\_\_\_\_

## 6.6 Payment

### 6.6.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm unit price, as specified in the contract. Customs duties are included and Applicable Taxes are extra.

### 6.6.2 Single Payment

SACC Manual clause [H1000C](#) (2008-05-12) Single Payment

### 6.6.3 SACC Manual Clauses

| SACC Reference         | Section   | Date       |
|------------------------|-----------|------------|
| <a href="#">G1005C</a> | Insurance | 2008-05-12 |

## 6.7 Invoicing Instructions

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.

(a) The original must be forwarded to the following address:

National Research Council Canada  
ASPM Material Management  
BLDG, M-22 Montreal Road  
Ottawa, ON CANADA K1A 0R6

(b) One (1) copy must be forwarded to the following email address:  
Frontdesk-m-22@nrc.gc.ca

(c) One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

Department of Public Works and Government Services - "HN" Division  
7B3 Place du Portage, Phase III, 11 Laurier Street, Gatineau, QC, K1A 0S5  
Attention: Joelle Theriault

## **6.8 Certifications**

### **6.8.1 Compliance**

The continuous compliance with the certifications provided by the Contractor in its bid and the ongoing cooperation in providing additional information are conditions of the Contract. Certifications are subject to verification by Canada during the entire period of the Contract. If the Contractor does not comply with any certification, fails to provide the additional information, or if it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

## **6.9 Applicable Laws**

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in \_\_\_\_\_. *(Insert the name of the province or territory as specified by the Bidder in its bid, if applicable)*

## **6.10 Priority of Documents**

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the general conditions 2010A (2015-09-03), General Conditions - Goods (Medium Complexity)
- (c) Annex, Requirement;
- (d) the Contractor's bid dated \_\_\_\_\_ *(insert date of bid)*

## **6.11 Shipping Instructions**

*NRC Account number will be inserted at contract*



## **Electronic Power Source for Electrical Power Measurements – Measurement Science and Standards**

**1.0 Statement of Requirement:** The National Research Council has a requirement for an Electronic Power Source as per the Mandatory Technical specifications below and as outlined in the deliverables.

**2.0 Background:** The Electrical Power Measurements Group at NRC/MSS provides High Voltage calibration services to testing laboratories, electrical utilities and manufacturers of electrical equipment including manufacturers of large power transformers. Calibrations are usually performed at the NRC High Voltage laboratory in Ottawa.

High voltage calibrations are a very important and expanding revenue generation service for the Group now accounting for more than \$100k on revenue per year. There are increasing demands to perform work at voltages higher than 100,000 Volts and at frequencies other than the usual 60Hz frequency used in North America. Clients are asking for calibrations at frequencies from 50 to 400 Hz and for voltages up to 200,000 Volts or more.

At present the Group has very limited high voltage supply capabilities at frequency other than 60 Hz. Tests are only possible up to 90,000 Volts and only at 50 Hz. These tests need to be done with a very old (50+ years) motor generator set with limited voltage capabilities and only at 50Hz. The old equipment no longer meets our R&D needs or the calibration requirements of our clients.

Many High Voltage calibrations require a very stable, low distortion source of voltage. This means that a high capacity power amplifier should be used as a source instead of a motor generator set. This power amplifier solution has the added benefit that the calibrations can also be done at frequencies other than 50 or 60 Hz.

The new amplifier must have a capacity 45kVA and be compatible with the power distribution supply (3 phase, 60 Hz, 480-600 VAC) in the EPM high voltage lab. The output of the amplifier must be single phase 120-240 VAC, at least 47 to 400Hz to comply with the input voltage requirements of a recently purchased 200,000 Volts transformer used during high voltage calibrations. This combination of Electronic Power Source and 200,000 Volts transformer will meet the demands of the clients of the Group for the foreseeable future.

### 3.0 Mandatory Technical Specifications:

1. **Output Power:** Single Phase, Minimum of 45 kVA, 45 kW
2. **Output Voltage:** (minimum requirement) Single Phase, adjustable, 0-280V AC (rms). Dual output voltage configurations, with low range 0-130V AC (rms) and high range 0-260V AC (rms) is acceptable.
3. **Output Current:** (minimum requirement) 0-150 Amps (rms) (@240 VAC).
4. **Output Frequency:** (minimum requirement) 47 to 400 Hz. Lower and higher frequency limits are acceptable.
5. **Output Distortion:** Maximum 1% Total Harmonic Distortion for 50 and 60 Hz, Maximum of 2% THD for other frequencies.
6. **Output Frequency Options:** The unit must have provision for both internal output frequency control through internal precision oscillator circuitry, and an input for external output frequency control. The external output frequency control allows the output signal of the power source to be set by external circuitry.
7. **Internal Output Frequency Control:** Unit must provide operator controllable internal fixed frequency generation of a minimum of 50, 60, and 400 Hz, other frequencies and / or variable frequency control are desirable but not required.
8. **External Output Frequency Control:** Unit must provide an input connection for external output frequency control, and provision to switch the system from internal to external frequency control. The input control signal for external output frequency control may be a 50% duty cycle TTL logic signal or a low voltage sine wave (7 volts max. rms). The unit output frequency must be the same frequency as input.
9. **Remote Monitoring:** USB and/or RS232 interface with provision for remote monitoring of unit operating information including (minimum requirement): input and output voltage, current, frequency, kW/kVA.
10. **Dimensions / Weight:** In order to allow placement and movement of the unit in limited spaces, the unit must be one self-contained module, maximum dimensions 1 meter wide x 2 meter high x 1 meter deep, maximum weight 1000kg. The unit must be free standing and have casters and/or provision to be moved with a forklift or pallet truck.
11. **Input Connections:** Internal terminal block with provision on the unit chassis for a cable clamp (NRC will install power cable after supply of unit)
12. **Output Connections:** high current bus connections suitable for 200 Amp



- 13. Power Control:** The unit must have an input circuit breaker mounted for operator access on the front panel.
- 14. Load Power Factor:** Any (0 to 1) Typically Inductive
- 15. Load Regulation:** +/- 1%, transient load step recovery time less than 1 cycle for 100% load change
- 16. Line Regulation:** +/- 1 % for 10% line voltage change
- 17. Ambient Operating Temperature:** 15 to + 35°C
- 18. Cooling:** Unit must have self-contained forced air cooling
- 19. Efficiency:** Minimum energy efficiency 80%
- 20. Maximum Operating Noise Level:** (at any output power) 68 dbA at one meter from front of unit
- 21. Power Source Input Voltage:** 3 phase AC, either 480 V or 600 V Line-Line (delta) (+/- 10%), 60Hz
- 22. Power Source Input Current:** Maximum 90 A (any phase, not including inrush current) at maximum power output
- 23. Input power Factor:** between 1.0 and 0.8 inductive (lagging)
- 24. Isolation:** Input is electrically isolated from output and frame to at least 1200 Volts
- 25. Expandability:** For potential future power expansion, unit should be capable of being paralleled with additional identical or slave units to increase output current.
- 26. Servicing:** From previous experience with power amplifiers operating in a high voltage/high power test environment, unit failures can occur due to external system faults, overloads, transients, etc. NRC requires minimum operating downtime due to client calibration commitments. The supplier must be able to provide North American repair service in order to reduce repair turnaround time to less than 30 days including shipment time, for 90% of repairs. (NRC is not prepared to pay air freight costs for repairs for a unit weighing up to 1000 kg.)
- 27. Safety Mark Requirement:** The unit must have CE and/or CSA and/or UL safety certification



**28. Measurements:** The power supply must be able to take and display the following measurements: Status; Input Frequency, Vrms, Irms, Real Power (kW), Apparent Power (kVA); Output Frequency, Vrms, Irms, Real Power, Apparent Power. More measurements such as Efficiency, Power Factor, Peak Current, are acceptable but not required.

#### **4.0 Deliverables:**

- 4.1 Electronic Power Source
- 4.2 Documentation and Manuals in English
- 4.3 Warranty - minimum 1 year