



SPECIFICATION

Portable Near-Infrared Spectroscopy System for Eritrea

1. Scope

This specification describes requirements for a portable near-infrared spectroscopy (NIRS) system, including the NIRS instrument, a laptop computer and necessary software (hereinafter referred to as "the System") for qualitative and quantitative analysis of constituents of feeds, forages and foods using non-destructive principle, i.e. the System shall not require additional sample preparation but enable reuses of samples. Feeds include a wide range of crop residues, tree foliage, crop and food milling by-products, grains, cereals, etc. Forages include crop residues and various grasses from natural and cultivated pastures, grasslands and ranch lands fed to animals as fresh, dried or further processed (e.g., silage).

The System will be used at the National Agricultural Research Institute, Asmara, Eritrea (hereinafter referred to as "the End-User").

2. Requirements

The System shall meet the following functional, performance and technical requirements:

- 2.1. Be portable, able to be transported to the sampling location, and capable of using power from both mains electricity and battery;
- 2.2. Require little to no sample preparation before use and shall not require cleaning after operation;
- 2.3. Be capable of quantitative and qualitative analysis of materials with broader spectral features, such as food and feed products, grass and tree foliage, and a variety of raw materials for their nutrient contents;
- 2.4. Be capable to identify spectral characteristics of both solid and liquid samples in real time.
- 2.5. Have a resolution that allows maximum spectral information to be recovered from a sample in the near-infrared region with wavelengths at least 1000-2500 nm.
- 2.6. Be capable of multi-component analysis, fast material measurements with no compromise in quality;
- 2.7. Comes with chemometrics/statistical software with perpetual license for spectra data analysis with functions including at least spectra pre-treatment and transformation, calibration development and validation, multivariate classification and partial least squares measurements;
- 2.8. Be capable of transferring analysis results from the System to a Lab Information Management System (LIMS) in formats such as xml or csv. Alternatively, files may be extractable and saved in a file or a USB memory stick or transferred via WiFi connectivity.
- 2.9. Have operational software to carry out basic instrument operations, such as optical adjustments or collection of spectral data from samples.



- 2.10. Be comparable with Grams IQ and the Unscrambler chemometric software applications.
- 2.11. Be supplied with a compatible laptop/notebook with the following minimum requirements: Intel core (i5) processor, ≥ 2.66 gigahertz, ≥ 8 gigabyte random access memory, Intel HD Graphics; ≥ 1 TB hard disk; a mouse; digital interface communications ports (e.g., USB, HDMI, serial port, etc.), a 15-inch screen, English keyboard and Windows 10 English operating system.
- 2.12. Include a tool kit for routine maintenance and troubleshooting, installation, optimization and demonstration.
- 2.13. Comply with power specifications for Eritrea (220-240 volt; 50/60 HZ).

3. Other Requirements

- 3.1. The Contractor shall provide for the End-User a clear after-sales plan and technical support, including but not limited, to timely access to spare parts, availability and promptness of telephone/email communication and proximity of technical service to the End-User
- 3.2. The Contractor shall provide at least one example - with evidence of recent/past satisfactory service delivered - on such or related analytical instrumentation/system in the region.

4. Marking

The System shall have all safety markings in the English language. Additional (optional) markings in the French language shall be included.

5. Packing

- 5.1. The System, for the shipment by air to the End-User, shall be packed in accordance with international standards that are applicable for the shipment by air of this kind of equipment.
- 5.2. The packaging shall be suitable for extended storage at the End-User's site, in case of delay prior to installation.

6. Quality Requirements

- 6.1. The System shall be manufactured, shipped and installed in accordance with the Contractor's ISO quality assurance system or an equivalent quality assurance system. Documents shall be provided to demonstrate that the System meets the stated quality.
- 6.2. The Contractor shall document the compliance with this quality assurance system.

7. Testing and Acceptance

- 7.1. The System, prior to shipment, shall be tested for conformance with the manufacturer's performance specifications and the minimum requirements specified herein.
- 7.2. The System, after installation, shall be tested by the Contractor together with the End- User to demonstrate that the performance meets the manufacturer's performance specifications and the minimum requirements specified herein as determined by the IAEA and the End-User.

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7.3. The results of the testing of the System shall be documented by the Contractor in an acceptance protocol that shall be signed by the End-User. The acceptance protocol document shall also be communicated with the IAEA (Technical, Project Management and Contracting Officers).

8. Online Training

The Contractor shall provide three (3) days online training for the at least four (4) staff of the End-User in the operation and maintenance of the System upon the notification from the End-User that the System has been received at their premises. Training shall also include a guidance on basic maintenance/troubleshooting. The Contractor shall especially make sure that the End-User is familiarized with the System's software.

9. Deliverable Data Items

The Contractor shall provide two complete sets of operation and servicing manuals in both the English and the French language.
