

Section VII. Technical Specifications

Notes for Preparing the Technical Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Procuring Entity without qualifying their Bids. In the context of Competitive Bidding, the specifications (*e.g.* production/delivery schedule, manpower requirements, and after-sales service/parts, descriptions of the lots or items) must be prepared to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of transparency, equity, efficiency, fairness, and economy in procurement be realized, responsiveness of bids be ensured, and the subsequent task of bid evaluation and post-qualification facilitated. The specifications should require that all items, materials and accessories to be included or incorporated in the goods be new, unused, and of the most recent or current models, and that they include or incorporate all recent improvements in design and materials unless otherwise provided in the Contract.

Samples of specifications from previous similar procurements are useful in this respect. The use of metric units is encouraged. Depending on the complexity of the goods and the repetitiveness of the type of procurement, it may be advantageous to standardize the General Technical Specifications and incorporate them in a separate subsection. The General Technical Specifications should cover all classes of workmanship, materials, and equipment commonly involved in manufacturing similar goods. Deletions or addenda should then adapt the General Technical Specifications to the particular procurement.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for equipment, materials, and workmanship, recognized Philippine and international standards should be used as much as possible. Where other particular standards are used, whether national standards or other standards, the specifications should state that equipment, materials, and workmanship that meet other authoritative standards, and which ensure at least a substantially equal quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the Special Conditions of Contract or the Technical Specifications.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Technical Specifications to specific standards and codes to be met by the goods and materials to be furnished or tested, the provisions of the latest edition or revision of the relevant standards and codes shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relate to a particular country or region, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable.

Reference to brand name and catalogue number should be avoided as far as possible; where unavoidable they should always be followed by the words "*or at least equivalent.*" References to brand names cannot be used when the funding source is the GOP.

Where appropriate, drawings, including site plans as required, may be furnished by the Procuring Entity with the Bidding Documents. Similarly, the Supplier may be requested to provide drawings or samples either with its Bid or for prior review by the Procuring Entity during contract execution.

Bidders are also required, as part of the technical specifications, to complete their statement of compliance demonstrating how the items comply with the specification.

Technical Specifications

Item No.	Specification	Statement of Compliance
		<p><i>[Bidders must state here either "Comply" or "Not Comply" against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of "Comply" or "Not Comply" must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer's un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidder's statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the applicable laws and issuances.]</i></p>
1	<p>Small engine test set Specifications: • Instrumentation Dimensions (fully assembled with fuel tank): Width 1400 mm x depth 300 mm x height 820 mm • Bed and Trolley dimensions (without engine): Width 950 mm x depth 475 mm x height 1050 mm Dynamometer: Hydraulic variable fill Maximum absorption: 7.5 kW @ 7000 rev.min-1 • Typical engine range: 3 to 4 kW, 3000 rev.min-1, 150 to 250 cc • Speed measurement: Proximity pick up and digital display • Torque measurement: Strain gauged load cell and digital display • Air consumption measurement: Air-box and orifice plate, pressure transducer and digital display</p>	

	<ul style="list-style-type: none"> • Ambient Air temperature and barometric pressure measurement: Thermocouple, pressure transducer and digital display • Exhaust temperature measurement: Engine thermocouple and digital display • Fuel consumption: Precision volumetric fuel gauges (analogue or automatic digital versions available) 	
1.1	<p>Auto volumetric fuel gauge with digital read-out</p> <ul style="list-style-type: none"> • Automatic volumetric fuel gauge • Accurately and automatically calculates fuel consumption • Directly displays fuel consumption on digital read-out • Can cycle continuously or run once only • Fully compatible with Data Acquisition System and software • Self-sealing couplings enable quick and efficient connection and disconnection of fuel lines with minimum loss or spillage of fuel <p>The Automatic Volumetric Fuel Gauge consists of a:</p> <ul style="list-style-type: none"> • precision fuel gauge with sensors; • digital read-out (display) unit which shows fuel consumption and allows data to be transferred to a suitable PC via the data acquisition system 	
1.2	<p>Modified 4 stroke diesel engine (electric start)</p> <p>Learning Outcomes investigations into the performance and characteristics of a four-stroke diesel engine, including:</p> <ul style="list-style-type: none"> • Torque, speed and power relationship • Brake mean effective pressure • Engine performance curves • Air and fuel consumption • Volumetric and thermal efficiencies • Willans line <p>When used with Small Engine Test Set, Cylinder Head Pressure Transducer, Crank Angle Encoder and Engine Cycle Analyser, students can investigate further features including:</p> <ul style="list-style-type: none"> • Plotting p-q and p-V diagrams • Engine cycle analysis • Indicated mean effective pressure • Indicated power 	

	<ul style="list-style-type: none"> • Comparison of brake and indicated mean effective pressures • Mechanical efficiency of the engine <p>Fuel: Diesel to minimum specifications EN590, BS2869 A1/A2 or ASTM D 975 - 1D/2D Engine Capacity: 232 cc Power and Torque : 3.1 kW at 3450 RPM Torque 10 Nm at 1700 RPM Speed: Governed to 3200 to 3400 RPM Cooling: Air cooled</p>	
1.3	<p>Engine cycle analyzer</p> <ul style="list-style-type: none"> • Significantly enhances practical investigations, demonstrations and studies of internal combustion engines • Can also be used with other engines fitted with suitable cylinder head transducers and crank angle encoders • Includes powerful Windows based software specially designed for educational use • Automatic calculation and real-time display of p-q plots and p-V plots and other important parameters • Useful snap-shot, replay and animation functions • Accurate, clear animations of crank, piston, inlet and exhaust valve positions help students visualise the engine cycle • Students can export data for further analysis <p>Learning Outcomes When used with suitable test engines, the analyser allows investigations into a variety of internal combustion engine characteristics, including:</p> <ul style="list-style-type: none"> • The thermodynamic cycle of an internal combustion engine • Calculation of indicated mean effective pressure and indicated power • Comparison of indicated mean effective pressure and brake mean effective pressure • Mechanical efficiency of the test engine • Further work using exported data such as combustion analysis <p>Crank angle input: Shaft encoder with 360 pulses per revolution Resolution: 1 degree Pressure signal conditioning: Precision charge amplifier with digital thumb-wheel calibration</p>	

	<p>Maximum engine speed: 7000 rev.min⁻¹ PC connection: Via USB type 1.1 or 2 Auxiliary input: 0 to 10 V via BNC connector</p>	
1.4	<p>Data acquisition frame mounted Key Specifications</p> <ul style="list-style-type: none"> • All mains connectors and cables • STP (shielded twisted pair) cables for equipment connection • Data Export: – XLSX file (default) – HTML file (optional) <p>Software features:</p> <ul style="list-style-type: none"> • Recording data manually or automatically • Data capture set by time or intervals • Display of real-time data, in digital form or as an analogue meter • Real-time traces of analogue signals • Logging data for printing and later analysis • Exporting data for use by other software • Performing real-time calculations to generate userdefined data • Creating and printing charts and data tables • Customisable layouts <p>Accessories (supplied):</p> <ul style="list-style-type: none"> • All mains connectors and cables • STP (shielded twisted pair) cables for equipment connection <p>Digital Inputs:</p> <ul style="list-style-type: none"> • 6 off RJ45 connection • 4 off SPC (DTI) inputs <p>Analogue Inputs:</p> <ul style="list-style-type: none"> • 1 DIN type socket for dual trigger input • 2 DIN type sockets for signal inputs of 0 to 10 V or 4 to 20 mA • Sample rate up to 25 kHz with 12 bit resolution • Bandwidth/Filter cut-off 3 kHz (nominal) <p>Data Export: • XLSX file (default) • HTML file (optional)</p>	
1.5	<p>Online Learning Management Software (include 1-year subscription)</p> <ul style="list-style-type: none"> • Subscription: 1 year • Software features include: <ul style="list-style-type: none"> o Monitors student participation through time logging o Records data manually or automatically o Data capture can be set by time or intervals o Displays real-time data in digital form or as an analogue meter o Real-time traces of analogue signals 	

	<ul style="list-style-type: none"> o Exports data for use by other software o Performs real-time calculations to generate user defined data o Creates and prints charts and data tables o Customizable layouts o Provides automatic calculation, recording, charting and data export remotely o An unlimited number of students can simultaneously acquire and process live experimental data remotely from their computer, just as they would in the laboratory o Students can individually manipulate the experiment data remotely o Intuitive and easy-to-use, with clear, customisable display and layout options o To monitor engagement, the connection status of students are time logged o Suited to remote classroom demonstrations, laboratory experiments and group work • Standard Features: o Supplied with comprehensive user guide • Data Export: o XLSX file (default) o HTML file (optional) 	
2.	<p>Branded Laptop Processor: Intel Core i7 Memory: 8 GB Storage: 512GB SSD Screen: 15.6" Operating System: Windows 10</p>	
<p>***** Nothing Follows*****</p>		

Additional Requirements:

The technical specification that shall be submitted by the Bidder shall include, among others:

1. *product specifications as supported by brochures or catalogues for Item no. 7;*
2. *bidder's certification that it has after-sales support for Item nos. 1, 2, 3, 4, 5 and 6;*
3. *bidder's certification for two (2) years warranty for Item nos. 1, 2, 3, 4, 5 and 6; and*
4. *certification from manufacturer/distributor that bidder is authorized dealer for Item nos. 1, 2, 3, 4, 5 and 6.*

