ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)

ในการจัดซื้อจัดจ้างที่มิใช่งานก่อสร้าง

๑. ชื่อโครงการ..... การจัดหาเครื่องจักรใหญ่ สำหรับโครงการเรือตรวจการณ์ไกลฝั่ง

กิจกรรม .....จัดหาเครื่องจักรใหญ่ สำหรับโครงการเรือตรวจการณ์ไกลฝั่ง

/หน่วยงานเจ้าของโครงการ สำนักโครงการเรือตรวจการณ์ไกลฝั่ง ลำที่ ๒ บริษัท อู่กรุงเทพ จำกัด

๒. วงเงินงบประมาณที่ได้รับจัดสรร ๖,๐๘๔,๔๘๐ ยูโร (ราคาไม่รวมภาษีมูลค่าเพิ่ม ๗%)

๓. วันที่กำหนดราคากลาง (ราคาอ้างอิง) วันที่ ๒๗ มกราคม ๒๕๕๙

เป็นเงิน ๖,๐๘๔,๔๘๐ ยูโร (ราคาไม่รวมภาษีมูลค่าเพิ่ม ๗%)

๔. แหล่งที่มาของราคากลาง (ราคาอ้างอิง)

จากการสืบราคาปัจจุบัน จากท้องตลาด ๑ ราย ดังนี้

๔.๑ MAN Diesel & Turbo

๕. รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง (ราคาอ้างอิง)

๕.๑ นางจันทร์ทิพย์ ชำศิริพงษ์ หัวหน้าแผนกบริหารงานพัสดุ

Term of Reference (TOR)

Main diesel engines for the Royal Thai Navy Offshore Patrol Vessel

1. Objective

The Bangkok Dock Company (1957) Limited (Buyer) wishes to announce this Term of Reference (TOR) for procuring 2 sets of main diesel engines for the construction of the Royal Thai Navy Offshore Patrol Vessel (OPV).

2. Requirement

2.1 Goods shall be 2 (two) sets of MAN Diesel Engine, type 16V28/33D STC 4 strokes marine diesel engines, 7,200 kW per engine at 1,000 rpm (100% MCR)

2.2 Each engine is equipped with necessary auxiliary machineries. Tools, spare parts, documentations, commissioning and training shall be included. The detail and scope of supplies are in ANNEX A: Technical Requirement Specification.

2.3 Goods shall be manufactured and built in Germany

2.4 Goods shall be new and never used before.

3. Condition of Bidding

3.1 The bid price shall exclude Value Added Tax (VAT) and include all costs, expenses, fees, and cost for transportation which shall be CIF Laem Chabang Port, Chonburi, Thailand in accordance with Incoterms 2010 (by vessel with Thai flag or same privilege).

3.2 This bid price shall exclude customs duty for the list of materials imported into the Kingdom of Thailand.

3.3 The enumeration of the bid price must be provided in Total Price

3.4 The price validity shall be until 29th February 2016.

4. Qualification of Bidder

4.1 Bidder must be a professional to sell goods in this bid.

4.2 Bidder has never been on the blacklist of the Thai Government, or as a result of not receiving orders to another entity or person who is blacklisted by the Thai Government.

4.3 Bidder must act as principal for its own account and not as agent or broker. If any Bidder has a coordinator in Thailand, the name and contact details of such coordinator must be clearly specified in the proposal.

4.4 Bidder must have own bank account where receive/payment shall be made, except, if each payment is not over 30,000 Bath, the counter party may receive/paid by cash.

5. Document for Consideration

5.1 Bidder's Qualification Document

5.1.1 Copy of Company Registration/Affidavit1 and certified true copy**.**

5.1.2 Letter of power of attorney, in case of the bidder is authorized the behalf to bid, sign in the bid, or in the other cases. The letter shall be affixed the duty and enclosed with the copy of the identity card or passport and/or household registration, which declare both of the authorizer and behalf.

5.2 Technical Specification Document

5.2.1 The details of specification of goods in this bid must meet the buyer's requirements. The bidder must clearly identify the manufacturer profile and the country of origin.

5.2.2 Copy of List of document showing that the bidder has sold similar engine to the BAE Systems Surface Ships Limited for the River Class Vessel project for the UK Royal Navy.

5.2.3 If the Technical Specification documents do not comply with item 5.2.1 - 5.2.2, the buyer reserves the right not to consider the bidder.

6. Delivery and Acceptance

6.1 If the goods are transported via sea freight that has Thai flag or the same privilege vessel in operation, Thai flag or the same privilege vessel shall be used. Relevant Bill of Lading shall also be provided.

6.2 The bidder must declare document and/or evidence of delivered goods that meet the specification and standard which specified in Contract or purchase order (PO) as stated in all respects.

6.3 If the delivered goods from bidder do not meet the requirements, buyer reserves the right to reject those goods. And in this case**,** the bidder must immediately take the right to change immediately.

6.4 Goods shall be ex-work delivery not more than 13 months after receiving Purchasing Order (PO) or Contract Effective Date (CED)

7. Warranty

Warranty period shall be not less than 12 months after the ship delivery to the RTN.

8. Assurance

All machinery supplied shall be according to class rules subjected to class approval. Bidder shall provide the class certificates in original. In some single cases only copies of class certificates could be accepted.

Splash guards for components of lube oil and fuel oil systems shall be according to IMO SOLAS requirements

9. Penalty

If the bidder cannot deliver on time as buyer's scheduled, bidder must pay on a daily rate penalty of 0.05 percent of the goods value that are not delivered from the date of delivery until the date that the bidder has fulfilled the conditions in the contract or PO

10. Performance Security

At the time of execution of the contract, the bidder shall submit to buyer a performance security in an amount of five percent (5%) of the contract value in favour of the buyer by a bank registered in Thailand.

11. Condition of Payment

11.1 Payments shall be;

- 15% down payment against an advance payment guarantee of 15 percent of contract value in favour of the buyer.
- 25% at the date not earlier than six months before contractual delivery date
- 60% at the date of ex-work notification by the bidder to the buyer

11.2 Payment by this condition shall be made out of an Irrecoverable and Confirmed Letter of Credit. The bidder is responsible for any other charges related to the transfer of the bank levy, and consent to such deductions from the amount transferred in that period.

11.3 The bank must be registered in Thailand.

12. Annex

ANNEX A: Technical Requirement Specification

ANNEX A
Technical Requirement Specification

GENERAL INFORMATION

Plant configuration

Four-stroke engine(s) as main propulsor.

Rules and regulations

Classification society: LR
Vessel Notation: IMO HSC Code or Naval Rules
Unrestricted service
Flag country: Thailand
Ice class: without
SOLAS compliance

- IMO revised MARPOL, Annex VI, Reg. 13 (4) TIER II in liquid mode

Ambient conditions

Specified engine performance and dimensioning of auxiliary equipment are based on:
1000 mbar ambient air pressure
45 °C ambient air temperature
38 °C LT cooling water temperature
32 °C sea water temperature

Quality of fuels

The common terms MGO, MDO and HFO are acc. to ISO8217:2012
defined as follows:
MGO = DMA, DMZ
MDO = DMB
HFO = RMG

Qualities of fuels according to MAN Diesel & Turbo current project guide. Minimum dynamic fuel oil viscosity of 2 cSt at engine inlet has to be ensured at any time.

The equipment is specified for marine gas oil (MGO)

Quality of engine cooling water

Fresh cooling water shall be treated according MAN Diesel & Turbo quality requirements - see current Project Guide

Quality of lube oil

Only approved lube oils shall be used for the equipment - see current Project Guide

Voltage on board for electrical consumers

3 x 400 Volts AC, 50 Hz
1 x 230 Volts AC, 50 Hz
24 Volts DC +/- 20%, max ripple 5% RMS

Testing of the equipment

Engine Factory Acceptance Test (FAT) on water brake in accordance with the requirements of the classification society. Engine tested with MGO. Engine is resiliently mounted. Standard function test of engine safety alarm and control system. Visual inspection after FAT for each engine according to MAN Diesel & Turbo standard (optical inspection of crankshaft, camshafts without removal of engine parts). Parts of this inspection work will be done by boroscopic tool. Customer will be notified in writing two weeks prior to the FAT.

Pipe and screw connections

Pipes with blank counter flanges, gaskets and bolts on connection end, unless otherwise stated.
Screw connections acc. to metric system.
External flanges according to DIN and/or ISO standards.

Packing and preservation

The equipment is packed and preserved according to MAN Diesel & Turbo standard - see current Project Guide

Plate lettering and indicator scales

Plate lettering is in German/English.
Indicator scales according to SI unit system.

MAIN ENGINE(S) FOR DIESEL-MECHANIC PROPULSION 2x16V28/33DSTC

Engine system

010-t 2 MAN Diesel & Turbo engine(s) type 16V28/33DSTC
Engine Data at ICFN rating acc. to ISO 3046:2002 for naval applications:

Bore	280 mm
Stroke	330 mm

MCR (100%) = 7200 kW at 1000 rpm

Fuel Stop Power 7350 kW
(ICFN, available 5 % of time)
mep 26,3 bar
Mean piston speed 11,4 m/s
As Diesel-mechanic drive, equipped for MGO operation with electronically-controlled unit pump injection system, turning clockwise / counter-clockwise.

Acceptance by LR, unmanned engine room,
certificate acc. to IMO MARPOL, Annex VI-2008,
reg.13 (4)/NOx- TIER2.
Fuel admission blocked at 7350 kW.
Fuel consumption acc. to ISO 3046:2002,
based on a lower calorific value of 42700 kJ/kg
at 7200 kW and 1000 rpm with attached lube oil-, FO-, HT-, LT- and SW- cooling water pump(s),
fulfilling the above NOx emission limitations
191,0 g/kWh (+ 5% tolerance).
Lube oil consumption approx. 0,4 g/kWh (+ 20% tolerance).

010.400.010-1 2 Flat Oil sump Tank

Design Features

Four stroke medium-speed diesel engine with MAN Diesel & Turbo exhaust gas turbo charging and two-stage charge air cooling,
basically designed for operation with MGO.

The engine block is a rigid and sturdy design monoblock with replaceable cylinder liners.

The 4 stud cylinder heads have 2 inlet and 2 outlet valves.

Crankshaft made of forged steel.
Torsional vibration damper at free end.
Straight cut connecting rods.
Main bearings and big-end bearings:
- Two part thin-walled bearing shells
- Main bearings cross-braced by tie rods
Composite piston with forged steel crown and steel skirt.

Electronically-controlled fuel injection system.

Charge air system

2 Set of Charge air cooler in fresh water and two stage design

2 High performance modular pulse converter turbo charging system,
with 2 MAN Diesel & Turbo turbochargers located on the counter coupling side with:
Intake silencer with dry air filter for air intake from the engine room. Exhaust gas piping on the engine, uncooled thermally insulated and lagged. Integrated water pipework. Sequential turbo charging (STC) with 2 flaps to shut off one turbocharger at low load.

Start and control air system

Compressed air starting equipment with main starting valve and air starter.

030.140.030	2	Compressed air pressure reducing unit (40/30 bar)
030.140.035	2	Pressure reducer for turning gear and control air (40/8,2 bar)
030.140.040	2	Lubricator, for pressure air treatment
030.140.060	2	Water trap, compressed air system
030.140.070	4	Water separator with filter for turning gear

Lubricating and cooling

Completely integrated lubricating oil system with wet sump tank, attached lube oil pump, plate type lube oil cooler and duplex filter with integrated oil thermostat.
Forced-feed lubrication for all bearing points of running gear, camshaft, timing gear and turbocharger. Separate High Temperature and Low Temperature cooling circuit. Cylinders, cylinder heads, fuel injection valves, exhaust valve seat rings and charge air cooler are water cooled. Pistons are oil cooled.

Flywheel and turning gear

Flywheel with toothing, with flywheel protection cover
Bolts connecting the flywheel with the crankshaft.

010.260.035	2	Air motor turning with: - Pushbutton switching equipment, control cable - Pneumatic valve remote control - Electric starting interlock when turning gear engaged.

Painting

010.300.010	2	Engine painting: outer surfaces with RAL9006 (white aluminum), cooling water spaces with anti-corrosion oil, oil sump underside with RAL9006 (white aluminum)

Engine safety, control and monitoring

010.285	2	Engine safety and control system SaCoSone, comprising: Control and injection unit, resiliently mounted on engine, consisting of: High integrated control modules, one for safety system and one for alarm handling and control, including the following functions:

		- Splash oil temperature monitoring - Main bearing temperature monitoring (PT1000) - Lube oil temperature and pressure monitoring - Cooling water temperature and pressure monitoring - Charge air temperature and pressure monitoring - Exhaust gas temperature monitoring - Speed monitoring and overspeed protection - Engine control High integrated injection modules, including following functions: - Electronic speed governing - Fuel injection valve control Interface cabinet as floor standing cabinet for engine room installation (standard colour RAL7035 light gray), including gateway module for plant communication via interfaces to: - Propulsion control system - Gear box - Machinery alarm / integrated automation system - Power supply - Power management Local operating panel, integrated into the front doors, with two redundant TFT-touchscreens for: - Indication of engine operating data - Indication of status and alarm messages - Engine start/stop - Control station changeover - Increase/decrease of speed setpoint - emergency stop Bus cables between interface cabinet and engine included. With single core numbering
010.285.070-1	2	Contacts for clutch-in clutch-out signal to gear
010.290.120	2	Splash oil monitoring system
010.290.187-t	2	Uninterrupted power supply unit 24V DC for SaCoS one, installed in separate UPS cabinet standard color RAL7035 (light gray)
		Engine connecting elements
020.010.010	2	Flexible coupling, with rubber elements (size subject to torsional vibration calculation) between engine and gearbox to be attached to the flywheel by yard, with hub to be mounted on gearbox input shaft by gear manufacturer, design without torsional limit device, with fixing bolts with acceptance by LR, without ice class, main dimensions in accordance to makers catalogue
020.020.020-t	2	Direct resilient seating of the engine (cone elements)

		consisting of: - Brackets on the engine landing - Rubber elements - Base plates - Stud bolts between engine landing and brackets.
020.030.025-t	2	Set of flexible pipe adapters for cooling water, lube oil (without discharge), fuel oil and compressed air with counter flanges or screw joints.
		Lube oil system
	2	Lube oil service pump attached, at free end of engine (combined with fuel oil pump)
	2	Attached lube oil duplex filter
	2	Attached lube oil plate cooler
030.020.090-t P-007	2	Lube oil prelubricating pump set, free-standing, consisting of: - Pump, capacity: 26,1 m³/h - Electric motor approx. 4,51 kW - Integrated safety valve - Counterflanges
030.020.142-t	2	Suction strainer for priming pump.
030.020.280	2	Oil mist eliminator module, for eliminating the oil mist and regulating a constant underpressure in the engine´s crankcase, consisting of: - Oil mist eliminator, with oil drain - Local differential pressure indicator - Fan (ATEX zone II) - E-motor (ATEX zone II), IP55 - Frequency converter - Underpressure regulator - Mounted on a common base frame
		HT cooling water system
	2	HT cooling water service pump, attached for HT circuit at free end, not self-priming
	2	Cooling water thermostat wax type for HT
030.030.015-t H-001	2	Electrical preheating unit for HT engine cooling water, consisting of: - Heating device 30 kW - Circulating pump with electric motor 0,37kW/11,4 m³/h - Thermostatic temperature controls.
030.030.060 T-002	2	HT/ LT cooling water expansion tank, consisting of:

		- 2 Water inlet connections for HT and LT cooling water - 2 Magnetic liquid level measurement incl. high level and low level - switch, bolts, gaskets and junction boxes for mounting at side - 1 Pressure/Vacuum valve incl. bolts and gaskets - 4 Outlet connections DN32 incl. 2x blind flanges and 2x counter flanges with bolts and gaskets - 4 Ball valves DN32, flanged end
		LT cooling water system
	2	LT cooling water service pump, attached at free end, not self-priming, for engine consumption only
030.040.045-t	2	Combined cooler for HT/LT engine cooling water seawater cooled, for 100% engine rated capacity, plate type, including frame, with: - 6 thermometers - 3 drainage and 3 venting valves.
030.040.050	2	LT cooling water temperature control valve, with wax element actuator
		Seawater system
	2	Sea water service pump, attached, centrifugal type. Not self-priming, to be installed below the water line
		Fuel system
030.110.025 HE-007	2	LT fuel oil cooler
030.110.070-t FIL-013	2	Duplex fuel filter, complete with changeover cock enabling one filter element to be changed while engine is running.
030.110.100-t	2	Fuel flow rate measuring device, for liquid fuels, for differential metering of the fuel oil consumption of the engine, to be installed in the feed and return fuel oil pipe, consisting of: - One flow rate meters, Coriolis type.
030.110.115	2	Fuel oil pressure retaining valve
030.110.120	2	Fuel oil suction strainer
		Exhaust system
030.130.020	4	Expansion bellow(s) after turbocharger adapter, with counter flange, gaskets, screws and nuts
		Logistics
220.020.050-2	2	Transport CIF Laem Chabang (with requirements of Thai Flag or vessel with same privilege)

SPARE PARTS AND TOOLS

Tools

220.020.090-1	2	Engine lifting device (on loan basis) and transport cradles
015.010.010-4	1	On-boards recommended tools (maker recommendation, as per enclosed list

Spare and wear parts

015.020.020-1	1	Set of on-board spare parts for engine as per enclosed list MAN Diesel & Turbo "On-board basic spare parts",
015.020.180-1	1	Set of engine driven pumps as spare parts consisting of: - 2 x Lube Oil pump - 2 x LT cooling water pump - 2 x HT cooling water pump - 2 x Seawater pump
020.010.010-1	2	Flexible coupling

TECHNICAL DOCUMENTATION

Certificates

- Relevant EIAPP Certificate according to IMO MARPOL NOx Technical Code 2008
- Class certificate

Calculations

Standard calculation and obtaining of classification society approval of torsional vibration calculation.
Supply of relevant alignment data for MAN Diesel & Turbo scope of supply such as:
Supply of alignment calculation to align engine to gearbox, gearbox to alternator and / or engine to alternator as well as extension shaft to external drive arrangement.

Documentation

Planning & Installation Manuals in English language consisting of:
- Engine installation drawing
- SCR system
- Dimensional drawings of loose supplied items
- System diagrams
- Heat balance
- Electrical diagrams
- Alignment instructions

will be provided in electronic format via MAN Diesel & Turbo Extranet.

170.010.050-1	1	Planning documentation in paper edition and DVD-ROM consisting of: Phase A data pack and Phase B data pack
170.010.050-2	1	ILS data (MAN Diesel & Turbo format)

Final Documentation

170.010.010-1	8	Sets of Final Instruction Manuals & Spare Parts Catalogue for engine, turbocharger and plant documentation in paper edition in English, consisting of: - Operating instructions and maintenance schedule for engine and turbocharger - Working Instructions - Spare parts catalogue - Tools and spare parts list - Workshop test protocol for engine - Set of relevant drawings - Set of documentations for the plant accessories and - Set of documentations for control and monitoring accessories (after commissioning) In addition one set in PDF-format on CD- or DVD-ROM.

COMMISSIONING

Commissioning

MAN Diesel & Turbo personnel are delegated for technical assistance during installation, initial start-up and sea trial

TRAINING

Training

240.010-2	1	Operator training at Navy dockyard in Sattahip up to 20 participants for 3 days period.
240.010-3	1	Maintainer training 8 participants 10-days at Augsburg PrimeServ Academy

On-board basic spare parts (Maker recommendations), for 1 ship:

- SaCoS*one* gateway and injection and control modules,
- Set of seals for cylinder head and fuel injector cover,
- Set of pressure and temperature transmitters (21 pieces).

On-board spare parts covering 30 days mission (Maker recommendations), for 1 ship:

- 24 filters inserts,
- 48 strainer elements,
- 48 filter elements,
- 32 gaskets,
- 4 charge air gaskets,
- 4 charge air casing gaskets.

On-board Tools (Maker recommendations), for 1 ship:

- Set of hydraulic tension kits,
- Hydraulic pressure pump (manual),
- Removal jack for cylinder head,
- Cylinder head removal tool,
- Mounting device cylinder head,
- Removal tool injection valve,
- Set of tools for general use,
- SaCoS*one* tool box,

Documentation:

Descriptions of the data for Phase A and Phase B data packs are described below:

Phase A is to include the following:

- Overall sizes
- Weight (kg)
- Centre of Gravity
- Maintenance Space Requirements
- Supply Voltage
- Kw Heat

b) Pipe Work Line Diagrammatic
c) System cabling Block Diagram defining cable types
d) Agreement with EMC policy (or confirmation that the system will operate correctly if it does not comply with the principles stated in the EMC policy).
e) Foot print and type of mountings for all equipment
f) Operational Requirements
g) Fixing and Hold Down details.
h) Interface details and positions (pipes, cables, ventilation)

Phase B is to include the following:

Sufficient to allow the Purchaser to finalize all design and installation requirements.

Certification of Phase A information, plus :

a) Cable entry details
b) Cable core function and connection details
c) Materials
d) Pipe Sizes
e) Valve types
f) Test pressures
g) Alignment Procedure
h) Torsional Vibration calculation for LR Approval. The Purchaser will provide the Supplier with necessary data for calculation not later than 4 months after Contract Effective Date.