



### **Addendum 03**

Package Name: Design, Supply and Installation of Microgrid Modifications and Expansions for Integration of Proposed Photovoltaic Generation Sites in 20 Islands Across Maldives

This Addendum 03 is issued in accordance with Sub-Clause No. 8.1 of Section 1 – Instructions to Bidders. The addendum forms part of the Bidding Document.

#### **1) Section 2: Bid Data Sheet (ITB 24.1 Revised as follows)**

<b>ITB 24.1</b>	<p>For <b><u>bid submission purposes</u></b> only, the Employer’s address is</p> <p>Attention: Ms. Fathimath Rishfa Ahmed, Chief Procurement Executive, National Tender, Ministry of Finance Street address: Ameenee Magu City: Malé, ZIP code: 20379 Country: Maldives</p> <p>The deadline for bid submission is Date: <b>20<sup>th</sup> August 2024</b> Time: <b>11:00:00 hours Maldivian time</b></p>
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#### **2) Section 6 - Employer’s Requirements (Requirement of Fibre Optic Cables to be added to Scope of Supply of Plant and Services as 1.16)**

##### **1.16 Requirement of Fibre Optic Cables**

In order to smoothly integrate the solar PV power plants into the microgrids, a dedicated fiber optic communication (FOC) network is necessary to be deployed for all considered island in the tender.

For all islands, all PV power plants shall communicate with and provide data to the EMS/SCADA system located at the powerhouse. The communication shall be realized with fibre optic cables.

The supplier shall provide optical fibre connectivity from each solar PV interconnection point to the powerhouse. The network shall be fault tolerant for single failure and shall at least be installed in ring structure. All FOC cables shall be terminated to patch panels; no fibres to be loose.

Underground splices shall not be foreseen.

## **Fibre Optic Cables**

Depending on the requirements by the proposed control system single mode and / or multi-mode FOCs shall be used.

The manufacturing, construction, labelling and testing of the fibre optic cable system shall meet the requirements established in the relevant applicable ITU and IEC codes, standards and recommendations.

### **Application**

The fibre optic cable shall be suitable to function properly and faultlessly under the prevailing environmental conditions and rodent-protected for direct buried application.

The fibre optic cable shall be laid in buried cable conduits. Therefore a fully dielectric fibre optic cable suitable for ducted or direct buried applications, filled with compound to prevent axial and longitudinal ingress of water and / or soluble chemicals throughout the cable shall be provided. The cable shall have loose tubes as secondary coating of fibres.

### **Main Cable Structure**

The cable shall be:

- Halogen free
- Metal free
- Axial and longitudinal tightness against water and / or soluble chemicals
- Rodent-protected
- Traction elements of Kevlar
- Lifetime of cable >30 years
- FOC fibre with primary coating Ø 250 +/- 15µm
- Secondary coating of fibres
- Filled centre fibre with 24 fibres
- Standard coloring

Outer cladding:

- Halogen free
- UV persistent
- Markings containing
- Manufacturer numbering

- Type of cable
- Number of fibres' and type of fibre
- Date; Metering and P/N marking

Cable markings shall be printed on the outer fibre cable jacket. The markings shall be permanent, insoluble in water and be legible for the duration of cable life. The markings shall be printed at intervals of not more than 2 meters.

Fibres and number of fibres

Diameter fibre: 9  $\mu\text{m}$  (+/- 10 %) – Single Mode

Diameter fibre: 62,5  $\mu\text{m}$  (+/- 10 %) – Multi Mode

Diameter cladding: 125  $\mu\text{m}$  (+/- 3 $\mu\text{m}$ )

Diameter coating: 250  $\mu\text{m}$  (+/- 15 $\mu\text{m}$ )

Damping: Single Mode max:

< 0,4dB/km, typ. 0,36dB/km at 1310 nm wavelength and

< 0,3 dB/km, typ. 0,26 dB/km at 1550 nm wavelength.

Multi Mode max:

< 0,9 dB/km, typ. 0,9 dB/km at 1310 nm wavelength.

Number of fibres: The long distance cable shall contain a minimum number of 12 fibres.

### **Measurement after Cable Installation**

#### **Measurement of splices**

To verify the maximum damping of splices ODTR measurement in both directions shall be performed. The max damping of 0.1 dB per splice shall not exceed.

Measurement of Cable Run from Termination to Termination

The characteristics of the cable run shall be measured and verified and protocolled by:

- Bi-directional Power Loss Measurement at 1310 +30/-15 nm and 1550 +30/-70 nm
- Bi-directional OTDR Measurement at 1310 +30/-15 nm und 1550 +30/-70 nm

The values for maximum damping are:

- max. damping splice: 0,10 dB
- max. damping connectors (pair): 0,50 dB

### **Fibre Optic Cable Accessories**

A detectable reinforced underground marking and warning tape shall be laid in the ground 300 mm above the protection conduit.

Type of connectors shall match the requirements of PCMS I/O modules and shall be of same type all over the plant. Contractor shall decide the used type (ST; SC; FC/PC)

The connector loss shall not exceed 0.5 dB per connector pair.

OTDR (Optical Time Domain Reflectometer) test report shall be submitted to Employer/Engineer.

The termination of each fibre in transmit and receive direction shall be provided on an optical distribution frame (ODF) for access to the transmission equipment. The ODF for receive and transmit direction shall be configured in accordance to the specified number of fibres (24). The ODF are to be installed in termination cabinets, which may be combined with the communication system.

### **3) Section 4 - Bidding Forms (Price Schedules are revised and is attached separately with this Addendum)**