**132KV NANYUKI-RUMURUTI UNDERGROUND CABLE**

PREAMBLE

The details in the following technical data sheets should be used to augment the Employer’s Requirements and as such the previously approved designs, unless otherwise advised, takes precedence in case of omissions and/ or inconsistency.

TECHNICAL DATASHEETS

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TECHNICAL DATASHEETS FOR ADSS /APPROACH CABLE

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **DESCRIPTION** | **UNIT** | **REQUIRED** | **OFFERED** |
| **GENERAL** |  |  |  |
| Reference Standards | Yes | IEC9001, ISO14001, IEC60793-1, IEC60793-2, ITU-TG.655, IEC60794-3-10. IEC60794-3-20 standards |  |
| Double jacket outer diameter | No\*mm |  |  |
| Type tests | Yes | Yes |  |
| Maximum pulling Tension | N |  |  |
| Cable offered has been in operation for more than 5 years. | YES | YES. Provide Completion certificate |  |
| Minimum bending radius | mm |  |  |
| Standard weight |  |  |  |
| Weight of grease |  |  |  |
|  |  |  |  |
| **OPTICAL CHARACTERISTICS** |  |  |  |
| Total number of Optical Fibers | Number | 48 or 96 as per project spec |  |
| Number of Fibers per buffer tube (max) | Number | 12 |  |
| Fiber Type/Mode |  | G.655/Single Mode |  |
| Operating wavelengths | nm | 1550, 1625 |  |
| Cladding diameter | μm/μm | 1251 |  |
| Maximum Transmission Rate | Gbps | 40 |  |
| Mode field Diameter at 1550nm | μm | (8-11)±0.6 |  |
| Core concentricity error | μm | <0.8 |  |
| Cladding Non-circularity | % | <1.0 |  |
| Cable cut off wavelength | nm | <1450 |  |
| Macrobend loss  Loss  Number of turns  Maximum at 0.1dB | mm  Number  dB | 30  100  0.1dB |  |
| Attenuation Coefficient  At 1550nm  At 1625nm | dB/km  dB/km | 0.22  0.24 |  |
| PMD Coefficient |  | <0.2 |  |

TECHNICAL DATASHEETS FOR JOINT BOXES

**JOINT BOXES**

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **DESCRIPTION** | **UNIT** | **REQUIRED** | **OFFERED** |
| **GENERAL** |  |  |  |
| Capacity of Fibers spliced | number | 24 or 48 or 96 as per project spec |  |
| Entrance Ports  2 way  3 way | YES  YES | YES  YES |  |
| Material |  | Metal and Aluminium Alloy |  |
| Colour |  | Silver |  |
| Weight |  |  |  |
|  |  |  |  |
| TECHNICAL |  |  |  |
| Fiber radius of curvature | mm | ≥43 |  |
| Fiber length of the plate to stay | mm | ≥1500mm |  |
| Additional Attenuation of optical discs to stay | dB | ≤0.01dB |  |
| Maximum capacity of fiber optic |  |  |  |
| Operational Temperature range | °C | -40°C to 80°C |  |
| Flattening performance | N/100mm | 2000N/100mm |  |
| IP Rating |  | IP65 |  |
| Atmospheric Pressure | Kpa | 62-106Kpa |  |
| Working Temperature | °C | -40°C to 65°C |  |
| Insulation Resistance | MΩ | 2\*104MΩ |  |

TECHNICAL DATASHEETS FOR CCTV SURVEILLANCE CAMERAS

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

| **S n.** | **Specifications** | **Unit** | **Data** | |
| --- | --- | --- | --- | --- |
| **Required** | **Offered** |
| 1.0 | **OUTDOOR WIRELESS IP CAMERA** | | | |
| 1.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 1.2 | Type |  | Outdoor Wireless IP Camera |  |
| 1.3 | Standards |  | EN 55022 Class B, EN 55024, EN 50130-4, EN61000-6-1/3/2, EN 61000-3-2/3 and FCC Part 15 Subpart B Class B,  IEC62262, IEC61000-4-5, IEC60068-2-11. |  |
| 1.4 | Image Sensor |  | 1/2.8” 2.0-megapixel progressive scan CMOS sensor |  |
| 1.5 | Resolution and Day/Night Mode |  | 1920\*1080 resolution  Auto/Color/Monochrome (removable infrared-cut filter) mode |  |
| 1.6 | Shutter Speed |  | 1/100000s to 1s electronic shutter speed |  |
| 1.7 | Dynamic Range |  | 128dB wide dynamic mode |  |
| 1.8 | Digital Noise Reduction |  | Self-adaptive to 2D or 3D DNR |  |
| 1.9 | Backlight Compensation |  | Supported |  |
| 1.10 | Defog |  | Automatic/manual |  |
| 1.11 | Image Stabilisation |  | Electronic Image Stabilisation |  |
| 1.12 | IR coverage |  | Up to 80meters |  |
| 1.13 | Angular Field of View |  | Horizontal: [43° Wide 14°(Tele)] and Vertical: [22° (Wide) 9° (Tele)] |  |
| 1.14 | Video Compression |  | H.265/H.264/MJPEG |  |
| 1.15 | Multiple streaming |  | Double Full HD streams and Treble streams (30fps or 25fps) |  |
| 1.16 | Audio Compression |  | G.711a/G.711u/G.726/OPUS |  |
| 1.17 | Network Protocols |  | TCP, UDP, IPv4, IPv6, DHCP, DHCPv6, DNS, ICMP, SIP, RSP, SSL, NTP, SNMP, 802.1x, QoS, DDNS |  |
| 1.18 | Streaming Transmission and Encryption |  | Unicast/Multicast  AES 128/192/256 encryption algorithm |  |
| 1.19 | Intelligent Analytics |  | Loitering detection, Intrusion detection, Abandoned object detection, removed object detection, Target color recognition, Humans and vehicles distinguish, motion detection, tampering detection |  |
| 1.20 | Electrical and Serial Interfaces |  | 1xRJ-45 10/100Base-T self-adaptive Ethernet port,  At least 1\*RJ-45 10/100Base-T self-adaptive Ethernet port |  |
| 1.21 | Alarm and Audio Interfaces |  | Alarm: 2 channel input and 2 channel output,  Audio: 1 channel input and 1 channel output |  |
| 1.22 | Memory card Slot |  | Built in 32G memory slot |  |
| 1.23 | Power Supply |  | DC12V±25%, DC24V±25%, AC24V±25%, POE(IEEE802.3at) |  |
| 1.24 | Physical Characteristics |  | 6kV surge voltage protection, IK10 vandal proof metal casing, IP66 IP protection, 10-day salt spray test rating |  |
|  | | | | |
| **2.0** | **IP PAN TILT ZOOM CAMERA** | | | |
| 2.1 | Manufacturer and Country of Origin |  | To be specified |  |
| 2.2 | Type |  | IP Pan Tilt Zoom Camera |  |
| 2.3 | Standards |  | EN 55022 Class B, EN 55024, EN 50130-4, EN61000-6-1/3/2, EN 61000-3-2/3 and FCC Part 15 Subpart B Class B,  IEC62262, IEC61000-4-5, IEC60068-2-11. |  |
| 2.4 | Image Sensor |  | 1/2.8” 2.0-megapixel progressive scan CMOS sensor |  |
| 2.5 | Resolution and Day/Night Mode |  | 1920\*1080 resolution  Auto/Color/Monochrome |  |
| 2.6 | Shutter Speed and Iris Diaphragm |  | 1/100000s to 1s,  Automatic iris diaphragm |  |
| 2.7 | Dynamic Range | dB | 120dB WDR |  |
| 2.8 | Digital Noise Reduction |  | self-adaptive to 2D or 3D |  |
| 2.9 | Backlight Compensation and highlight suppression |  | Supported |  |
| 2.1 | Defog |  | Automatic/Manual |  |
| 2.11 | Image Stabilisation |  | G-Sensor Unit Electronic Image stabilization |  |
| 2.12 | Lens |  | Focal Length: 4.5mm-135mm,  Zoom: 30X Optical zoom and 16X Digital zoom, |  |
| 2.13 | Angular and Rotational Field of View |  | Angular: [60.89° Wide 2.67°(Tele)] and Vertical: [37.34° (Wide) 1.51° (Tele)]  Rotation: (Horizontal:0° to 360°, Vertical: -20° to +90°),  Horizontal Rotation Speed: [Manual: 0.1°/s to 450°/s, Preset≥450°/s],  Vertical rotation speed: [Manual: 0.1°/s to 400°/s, Preset≥400°/s], 256 preset positions, : 8 scan lines each with 32 preset positions  Max of 5 scan lines each 10minutes, |  |
| 2.14 | Video Compression |  | H.265/H.264/MJPEG |  |
| 2.15 | Multiple streaming |  | Double Full HD streams and Treble streams (30fps or 25fps) |  |
| 2.16 | Media Encryption |  | AES128/192/256 encryption algorithm |  |
| 2.17 | Network Protocols |  | TCP, UDP, IPv4, IPv6, DHCP, DHCPv6, DNS, ICMP, SIP, RSP, SSL, NTP, SNMP, 802.1x, QoS, DDNS |  |
| 2.18 | Streaming Transmission and Encryption |  | Unicast/multicast steaming transmission and stream encryption capable |  |
| 2.19 | Intelligent Analytics |  | Park Action: Home position, preset position tour, pattern scan, horizontal scan, vertical scan, random scan, frame scan and panoramic scan  ISP Packages: 5 defined scenarios (outdoor, indoor, motion capture, lowlight, and backlight modes),  Event Triggers: motion detection, covering detection, alarm input, intelligent analytics alarm and network disconnection |  |
| 2.2 | Electrical and Serial Interfaces |  | One RJ-45 10/100/1000Base-TX self-adaptive Ethernet port |  |
| 2.21 | Alarm Interfaces |  | 4-channel alarm input and 1-channel alarm output(pigtail) |  |
| 2.22 | Memory card Slot |  | Micro SD cards in 64GB maximum memory slot of Speed class≥6 |  |
| 2.23 | Power Supply |  | DC12V±25%, DC24V±25%, AC24V±25%, POE(IEEE802.3at) |  |
| 2.24 | Maximum Power consumption |  | 45W |  |
| 2.25 | Physical Characteristics |  | 6kV surge voltage protection, IK10 vandal proof metal casing, IP66 IP protection, 10-day salt spray test rating |  |
|  | | | | |
| 3.0 | **IP DOME CAMERA** | | | |
| 3.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 3.2 | Type |  | IP Dome Camera |  |
| 3.3 | Standards |  | EN 55022 Class B, EN 55024, EN 50130-4, EN61000-6-1/3/2, EN 61000-3-2/3 and FCC Part 15 Subpart B Class B,  IEC62262, IEC61000-4-5, IEC60068-2-11. |  |
| 3.4 | Image Sensor |  | 1/2.7” 2.0-megapixel progressive scan CMOS sensor |  |
| 3.5 | Resolution and Day/Night Mode |  | 1920\*1080 resolution  Auto/Multicolor/Monochrome (removable infrared-cut filter) |  |
| 3.6 | Shutter Speed and Iris Diaphragm |  | 1/100000s to 1s  Automatic iris diaphragm  Gain Control: Automatic/Manual |  |
| 3.7 | Dynamic Range |  | 120dB wide dynamic mode |  |
| 3.8 | Digital Noise Reduction |  | Self-adaptive to 2D or 3D |  |
| 3.9 | Backlight Compensation and highlight suppression |  | Supported |  |
| 3.10 | IR coverage |  | 30m minimum |  |
| 3.11 | Image Stabilisation |  | G-Sensor Unit Electronic Image stabilization |  |
| 3.12 | Lens |  | Focal Length: 2.8-12mm F1.4max,  Zoom: 30X Optical zoom and 16X Digital zoom |  |
| 3.13 | Angular Field of view and Camera Angle Adjustment |  | Angular field of view: Horizontal: [106° Wide 36°(Tele)] and Vertical: [57° (Wide) 20° (Tele)],  Camera angle adjustment: (Pan:0° to 356°, Tilt: 0° to 75°, Rotation: 0° to 356°), |  |
| 3.14 | Video and Audio Compression |  | Video: H.265/H.264/MJPEG  Audio: G.711a/G.711u/G.726/OPUS |  |
| 3.15 | Multiple streaming |  | Double Full HD streams and Treble streams (30fps or 25fps) |  |
| 3.16 | Media Encryption |  | AES128/192/256 encryption algorithm, |  |
| 3.17 | Network Protocols |  | TCP, UDP, IPv4, IPv6, DHCP, DHCPv6, DNS, ICMP, SIP, RSP, SSL, NTP, SNMP, 802.1x, QoS, DDNS |  |
| 3.18 | Streaming Transmission and Encryption |  | Unicast/multicast steaming transmission and stream encryption capable |  |
| 3.19 | Intelligent Analytics |  | Intelligent detections: (motion detection, covering detection),  Event actions: [Alarm output, SD card recording and snapshot], |  |
| 3.20 | Electrical and Serial Interfaces |  | 1xRJ-45 10/100Base-T self-adaptive Ethernet port, 1\*RS485 serial port |  |
| 3.21 | Alarm Interfaces |  | 1-channel alarm input and 1-channel alarm output |  |
| 3.22 | Memory card Slot |  | 64GB |  |
| 3.23 | Power Supply |  | DC12V±25%, DC24V±25%, AC24V±25%, POE(IEEE802.3at) |  |
| 3.24 | Maximum Power consumption | W | 9W |  |
| 3.25 | Physical Characteristics |  | 4kV surge voltage protection, IK10 vandal proof metal casing, IP66 IP protection, 10-day salt spray test rating |  |
|  | | | | |
| 4.0 | **VIDEO SURVEILLANCE SERVER** | | | |
| 4.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 4.2 | Type |  | Video Surveillance Server |  |
| 4.3 | Access Channels |  | 8 maximum video access channels, 8 video playback and download channels |  |
| 4.4 | Bandwidth | Mbit/s | input bandwidth: 128Mbit/s,  Video forwarding channels: 32  output bandwidth: 256Mbit/s, |  |
| 4.5 | Video Formats |  | H.264/H.265 |  |
| 4.6 | Decoding Performance |  | 1-channel 4K or 8-channel 1080p or 16-channel 720p |  |
| 4.7 | Preview Modes |  | 1/4/8/9/16 panes |  |
| 4.8 | Stacking function |  | 2 to 16 such modules, 2 number if storage disks with Hot-swappable SATA3.0 |  |
| 4.9 | Disk tyoe |  | 8TB enterprise-level hard disk |  |
| 4.10 | RAID Level |  | non-RAID mode/RAID1 |  |
| 4.11 | Recording modes |  | (supported manual recording, scheduled recording, and alarm-triggered recoding), Query by time or events option, Batch download or download by time segment options |  |
| 4.12 | Media Encryption |  | supports multiple encryption algorithms such as AES256 |  |
| 4.13 | Compatibility |  | Supports access of devices that comply with the GB/T 28181, ONVIF 2.4, or ONVIF Profile S protocol, DHSDK, also supports connection to other platforms that comply with various protocols such as GB/T 28181 to implement diverse functions such as live video viewing and PTZ control and alarm reporting |  |
| 4.14 | Protocols |  | TCP, UDP, IPv4, HTTPS, RTP, RSTP, RTCP, AIP, SSL, NTP, HTTP |  |
| 4.15 | External Interfaces |  | at least 1\*HDMI 2.0, 1\*VGA, 2\*10/100/1000Mbit/s Ethernet ports, 1\* USB3.0, 1\*USB2.0, 1\*BNC Audio input, 1\*BNC Audio output, 2\*input Alarm channels, 1\*output Alarm channels |  |
| 4.16 | Power Consumption | W | <60W |  |
| 4.17 | Power Supply | VAC | 100VAC to 240VAC(50Hz/60Hz) |  |
| 4.18 | Cabinet |  | Standard 19-inch 9U cabinet |  |
|  | | | | |
| 5.0 | **3KVA BATTERY BACKUP SUPPLY (Small/Medium Substation – 132kV and 220kV stations)** | | | |
| 5.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 5.2 | Type |  | 3kVA Battery Backup Supply |  |
| 5.3 | Output Power Capacity |  | 2.7kW/3.0kVA |  |
| 5.4 | Output Voltage and distortion | V | 230V nominal, configurable for 220V, 230V, or 240V nominal output voltage, distortion less than 5% at full load |  |
| 5.5 | Output Frequency | Hz | 47 - 53 Hz for 50 Hz nominal, 57 - 63 Hz for 60 Hz nominal |  |
| 5.6 | Output Connections |  | (8) IEC 320 C13 (Battery Backup), (2) IEC Jumpers (Battery Backup), (1) IEC 320 C19 (Battery Backup) |  |
| 5.7 | Input Voltage | V | 230V, 220V or 240V |  |
| 5.8 | Input Frequency | Hz | 50/60 Hz +/- 3 Hz (auto sensing) |  |
| 5.9 | Input Connections |  | IEC-320 C20, Schuko CEE 7 / EU1-16P, British BS1363A |  |
| 5.10 | Input Voltage Range | V | 160-286V |  |
| 5.11 | Battery Type |  | Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leak proof |  |
| 5.12 | Recharge Time | Hours | 3hrs |  |
| 5.13 | Interface Ports |  | USB |  |
| 5.14 | Control Panel |  | Multi-function LCD status and control console |  |
| 5.15 | Audible Alarm |  | Alarm when on battery, distinctive low battery alarm, configurable delays |  |
| 5.16 | Surge Energy Rating | Joules | 365 Joules |  |
| 5.17 | Filtering |  | Full time multi-pole noise filtering, 0.3% IEEE surge let-through, zero clamping response time, meets UL 1449 |  |
| 5.18 | Operating Temperature | °C | 0 - 40 °C |  |
| 5.19 | Audible Noise | dBA | 53.0dBA at 1 meter from surface of unit |  |
| 5.20 | Online Thermal Dissipation | TU/hr | 375.0BTU/hr |  |
| 5.21 | Protection Class |  | Minimum IP20 |  |
| 5.22 | Certification |  | CE, CSA, EAC, EN/IEC 62040-1, EN/IEC 62040-2, RCM, VDE |  |
|  | | | | |
| 6.0 | **5KVA BATTERY BACKUP SUPPLY( Large Substations – 400kV and 500kV substations)** | | | |
| 6.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 6.2 | Type |  | 5kVA Battery Backup Supply |  |
| 6.3 | Output Power Capacity |  | 3.5kW/5.0kVA |  |
| 6.4 | Output Voltage and distortion | V | 230V, configurable for 220V, 230V, or 240V nominal output voltage, distortion less than 5% at full load |  |
| 6.5 | Efficiency at Full load | % | 92% |  |
| 6.6 | Output Frequency | Hz | 47 - 53 Hz for 50 Hz nominal, 57 - 63 Hz for 60 Hz nominal |  |
| 6.7 | Output Connections |  | 8) IEC 320 C13 (Battery Backup), (2) IEC Jumpers (Battery Backup), (1) IEC 320 C19 (Battery Backup) |  |
| 6.8 | Input Voltage | V | 230V, 220V or 240V |  |
| 6.9 | Input Frequency | Hz | 50/60 Hz +/- 5 Hz (auto sensing) |  |
| 6.10 | Input Connections |  | IEC-320 C20, Schuko CEE 7 / EU1-16P, British BS1363A |  |
| 6.11 | Input Voltage Range | V | 140-280V |  |
| 6.12 | Battery Type |  | Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leak proof |  |
| 6.13 | Recharge Time | Hours | 3hrs maximum |  |
| 6.14 | Interface Ports |  | USB |  |
| 6.15 | Control Panel |  | ED status display with load and battery bar-graphs and On Line: On Battery: Replace Battery: Overload and Bypass Indicators |  |
| 6.16 | Audible Alarm |  | Alarm when on battery, distinctive low battery alarm, configurable delays |  |
| 6.17 | Surge Energy Rating | Joules | 555 Joules |  |
| 6.18 | Filtering |  | Full time multi-pole noise filtering, 0.3% IEEE surge let-through, zero clamping response time, meets UL 1449 |  |
| 6.19 | Operating Temperature | °C | 0 - 40 °C |  |
| 6.20 | Audible Noise | dBA | 55.0dBA at 1 meter from surface of unit |  |
| 6.21 | Online Thermal Dissipation | TU/hr | 1057.0BTU/hr |  |
| 6.22 | Protection Class |  | Minimum IP20 |  |
| 6.23 | Certification |  | CE, EN 50091-1, EN 50091-2, EN 55022 Class A, EN 60950, EN 61000-3-2, GOST, UL 1778, VDE |  |

TECHNICAL DATASHEETS FOR DRONE(UNMANNED AERIAL VEHICLE)

| **DRONE TECHNICAL DATA SHEETS** | | **UNIT** |  | **DATA** |
| --- | --- | --- | --- | --- |
|  | Required | Offered |
| 1 | OPERATING SPECIFICATIONS |  |  |  |
| a | Operational Altitude | Ft | 1000-12000 |  |
|  |  |  |  |  |
| b | Radio Range | km | 10 |  |
|  |  |  |  |  |
| c | Sensor agnostic system |  | Yes |  |
|  |  |  |  |  |
| d | Full autonomous flying, terrain following, target tracking, real time GPS waypoints |  | Yes |  |
|  |  |  |  |  |
| e | Dual Mode – Wireless and Laptop |  | Yes |  |
|  |  |  |  |  |
| f | Automated return home |  | Yes |  |
|  |  |  |  |  |
| g | Payload | Kg | 7 |  |
|  |  |  |  |  |
| h | Can fly in crosswinds | Kph | 50 |  |
|  |  |  |  |  |
| i | Flight Management Integration |  | Yes |  |
|  |  |  |  |  |
| j | Auto Takeoff, flight, and Landing |  | Yes |  |
|  |  |  |  |  |
| k | Parachute |  | Yes |  |
|  |  |  |  |  |
| l | Control |  |  |  |
|  |  |  |  |  |
|  | - Semi-automatic control via joystick |  | Yes |  |
|  |  |  |  |  |
|  | - Waypoints – terrain following accuracy |  | Yes |  |
|  |  |  |  |  |
| m | GPS integration |  | Yes |  |
|  |  |  |  |  |
| n | Real time downlink data |  | Yes |  |
|  |  |  |  |  |
| o | Flight Time |  |  |  |
|  |  |  |  |  |
|  | - Fuel Powered | Min | 90 |  |
|  |  |  |  |  |
|  | - Electric Powered | Min | 30 |  |
|  |  |  |  |  |
| p | Sealing | IP | 65 |  |
|  |  |  |  |  |
| q | Operating Temperature | °C | -10 to 70 |  |
|  |  |  |  |  |
| r | Absolute X,Y,Z Accuracy (RTK/PPK activated) | ppm | 150 cm + 2 |  |
|  |  |  |  |  |
| s | Absolute Vertical/Horizontal Accuracy |  |  |  |
|  |  |  |  |  |
|  | - With GCPs | cm | 3 |  |
|  |  |  |  |  |
|  | - Without GCPs | m | 5 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 2 | CAMERA SPECIFICATIONS |  |  |  |
| a | Pixels (Minimum) | MP | 16 |  |
|  |  |  |  |  |
| b | Electronic Shutter Speed |  | Yes |  |
|  | Still Photography Modes |  |  |  |
| c |  | Single Shot/Burst Shooting |  |
|  |  |  |  |  |
| d | Video Recording Modes |  | UHD, FHD, HD |  |
|  |  |  |  |  |
| e | Supported File Systems |  |  |  |
|  |  |  |  |  |
|  | - Photo Formats |  | JPEG, |  |
|  |  |  |  |  |
|  | - Video Formats |  | MPEG, MP4, MOV |  |
|  |  |  |  |  |
| f | Optional Image Formats |  | AutoCAD, ArcGIS, Trimble Business Center, Leica Geo Office, VAGNET Office Tools, MicroStation |  |
|  |  |  |  |  |
| g | Supported SD Cards |  | Micro SD (Min) 128 GB |  |
|  |  |  |  |  |
| h | Ground Sampling (Maximum) | cm/pixel | 1 |  |
|  |  |  |  |  |
| i | Nominal Minimal Coverage (At 120m/400ft) | ha | 220 |  |
|  |  |  |  |  |
| j | Minimal Coverage (At 1,500m/5000 ft) | km2 | 40 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 3 | TABLET/iPAD SPECIFICATIONS |  |  |  |
|  |  |  |  |  |
| a | Display (minimum) | In | 10 |  |
|  |  |  |  |  |
| b | Storage (minimum) | GB | 256 |  |
|  |  |  |  |  |
| c | Memory (minimum) | GB | 8 |  |
|  |  |  |  |  |
| d | Cramped Keyboard |  | Yes |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 4 | ROUTE SURVEY SYSTEM |  |  |  |
|  |  |  |  |  |
| a | Weight | Kg | 3.5 (Max) |  |
|  |  |  |  |  |
| b | Field of View | ° | 45 (Min) |  |
|  |  |  |  |  |
| c | Multiple Target Capability | No. | 5 |  |
|  |  |  |  |  |
| d | Scan Speed | Scan/sec | 120 (Min) |  |
|  |  |  |  |  |
| e | Measurement Rate | Measurements/sec | 100,000 |  |

TECHNICAL DATASHEETS FOR UNDERGROUND CABLE DETECTION AND SURVEILLANCE DATA SHEETS

**Table of compliance**

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **DESCRIPTION** | **UNIT** | **REQUIRED** | **OFFERED** |
| **SENSOR UNIT** | | | |
| Operating Temperature |  | 0 to 50℃ |  |
| Humidity |  | 20% to 80% noncondensing |  |
| Networking |  | Dual Gigabit Ethernet |  |
| Operating System |  | Windows 10 Pro 64-bit |  |
| SSD |  | Min. 2x120GB RAID1 array |  |
| USB |  | 4 USB 2.0 on rear panel, 2 on front panel  4 USB 3.1 on rear panel (2 Gen 1, 2 Gen 2) |  |
| Video |  | DisplayPort 1.4, HDMI 2.0b, DVI-D |  |
| Standard Alarm Interface |  | TCP/IP via Network Manager software (API) |  |
| Optional Alarm Interfaces |  | Relay closures via I/O modules or ASCII output |  |
| Optical:  Laser classification  Connector type  Fiber connections |  | Class 1, 1550nm wavelength  FC/APC  Four (4) |  |
| Power  Power Supply  Voltage  Power |  | Dual redundant field-replaceable  100 – 240VAC, 50Hz  200W max |  |
| Mechanical:  Style  Rack clearance  Weight  Rack Space |  | Standard 19 inch rackmount, 51cm deep  5cm front, 15cm rear  Sensor Unit: 23kg  Fiber Connection Module: 5kg  Keyboard/monitor/mouse: 10.5kg  6 RU contiguous rack space, min. 30cm above floor  4 RU – sensor unit 17.8cm  1 RU – fiber connection module 4.5 cm  1 RU – keyboard/monitor/mouse 4.5cm |  |
| Standards |  | FCC Part 15 Subpart B Class A  CE: Conformant to EMC Directive 2014/30/EU  Safety: EN 60950-1:2006 +A2:2013 |  |
| Detection Processing | km | 100 |  |
| Detection Resolution | m | Non cut-immune configuration – 15  Cut immune configuration – 30 |  |
| **ALARM REPORTING** | | | |
| Target Resolution | m | 45m for simultaneous alarms |  |
| Location Accuracy | m | 4m in a quiet environment |  |
| Virtual alarm zones (software assignable) | Zones | 1440 per sensor unit |  |
| Cable cut response | m | ±30 |  |
| Transmission Protocol |  | TCP |  |
| Interface Mode |  | Server |  |
| Number of Connections |  | 1 or more |  |
| Default Port |  | 4122 |  |
| Report Mode |  | 0 |  |
| Data Formatting |  | XML version 1.0 |  |
| XML Namespace |  | Proprietary |  |
| Text Encoding |  | US-ASCII |  |
| Nuisance Alarm Rate |  | To be determined on site |  |
| FAR | km/month | ≤1 |  |
| **SENSOR CABLE** | | | |
| Sensor cable number of fibres | No. | Standard cable (12,24,36,48)  Armoured cable (24) |  |
| Max length per reel | km | 5 |  |
| Fiber count | No. | Optional: 12,24,36,48  (2 required as sensor fibers, remaining dark fibers available for additional applications) |  |
| Fiber type/wavelength | nm | 1550 single mode |  |
| Bend radius (smallest allowable) | mm | Dynamic (during installation) – 220  Static (during operation) – 110 |  |
| Tensile rating | N | During installation – 2700 |  |
| Outside diameter/weight | mm; kg/km | 11.5 max; 75 |  |
| Optical power loss  Max. allowable loss  Max. cable attenuation  Max loss per event | dB/km  dB/km  dB | 0.3  0.25 @ 1550nm  0.1 |  |
| Probability of Detection (PD) | % | 95 |  |
|  |  |  |  |
| **CONDUIT** | | | |
| Material |  | Flexible Innerduct – high density polyethylene |  |
| Size | mm | OD 42.2; ID 35.3; Wall thickness 3.12 |  |
| Weight | kg/km | 394 |  |
| Length | m | 1829 |  |
| Bend Radius | cm | 46 |  |
| **ADJUSTABLE DETECTION PARAMETERS** | | | |
| Disturbance Threshold | Level | 5 |  |
| Alarm Threshold | Count | 10 |  |
| Duration Threshold | s | 2 |  |
| Disturbance Life | s | 15 |  |
| Disturbance Mask | s | 0.3 |  |
| Disturbance Range | m | 6 |  |
| Event Life | s | 60 |  |
| Environment Compensation |  | Spatial - Yes  Temporal – Yes |  |
| Parallel Motion Rejection |  | Yes |  |
| Perpendicular Motion Rejection |  | Yes |  |

TECHNICAL DATASHEETS FOR HANDHELD DATA COLLECTOR DATASHEET

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| DESCRIPTION | UNIT | REQUIRED | OFFERED |
| **PHYSICAL** |  |  |  |
| Size | mm | 196x93.4x17.2 |  |
| Weight | g | 385 |  |
| Processor |  | Qualcomm Snapdragon 626,Octa-Core |  |
| Memory |  | 4 GB RAM |  |
| Storage |  | 64GB |  |
| User Interface Keyboards |  | 2 volume keys,power key,3 programmable keys,standard Android touch panel |  |
| Battery |  | 8000mAh Li-Ion removable battery |  |
| Battery life |  | 72hours at 20 with GPS on |  |
| Charging time |  | 4 hours |  |
| **ENVIRONMENTAL** |  |  |  |
| Temperature |  |  |  |
| Operating | oC | -20 to +55 |  |
| Storage | oC | -40 to +70 |  |
| Humidity |  | 95% |  |
| Water & Dust Proof | IP | 67 |  |
| Free Drop | m | 1.2 |  |
| **INPUT/OUTPUT** |  |  |  |
| Expansion |  | Micro SD memory card(upto 256GB) |  |
| Display |  |  |  |
| Size |  | 6 inch capacitive multi-touch |  |
| Resolution | pixels | 1920x1080 |  |
| Brightness | CD/m2 | 500 |  |
| AUDIO |  | Built-in microphone and speaker  Audio jack through USB-C  Pogo pin connector |  |
| I/O |  | USB 3.0,external antenna connected |  |
| Digital Camera |  |  |  |
| Rear |  | 13MP with auto-focus and LED Flash |  |
| Front |  | 5MP |  |
| Sensors |  | Ambient light sensor, digital compass,  gyrometer, accelerometer, barometer |  |
| **GNSS** |  |  |  |
| GNSS Receiver |  | U-blox Neo-M8T |  |
| Internal antenna: 72 channels. |  | GPS L1 C/A, GLONASS, BeiDou, SBAS |  |
| Integrated real-time |  | SBAS (WAAS/EGNOS/MSAS/GAGAN/QZSS |  |
| Tri constellation system |  | GPS/GAL, GPS/GLO/GAL or GPS/BeiDou/GAL |  |
| External antenna connector |  | Yes |  |
| Protocol |  | Location Services |  |
| **ACCURACY** |  |  |  |
| Real-Time SBAS |  | < 2m |  |

TECHNICAL DATASHEETS FOR FIREWALL

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

| **S n.** | **Specifications** | **Unit** | **Data** | |
| --- | --- | --- | --- | --- |
| **Required** | **Offered** |
| 1.0 | **INDUSTRIAL FIREWALL** | | | |
| 1.1 | Manufacturer and Country of Origin |  | To be Specified |  |
| 1.2 | Type |  | Industrial Firewall |  |
| 1.3 | Description |  | Multiport firewall with 4 x GE RJ45 interfaces, 2 \* Shared Media pairs (GE RJ45/GE SFP), 1 DB9 Serial Port, 1 USB(Client/Server), 1\*RJ45 Console Port, |  |
| 1.4 | Power Consumption  Power supply  Power consumption (Average/Max)  Max Current | W  A | 48VDC power supply and external 12VDC power AC adapter connection  11.6W/14W  -48VDC/0.5A |  |
| 1.5 | System Performance  IPv4 Firewall Throughput  Firewall Latency (64 byte, UDP)  IPsec VPN throughput (512 byte)  IP Throughput (HTTP) | Gbps  μs  Mbps  Mbps | 1.5Gbps  4 μs  45Mbps  200Mbps |  |
| 1.6 | Compliance |  | FCC Part 15 Class A, C-Tick, VCCI, CE, UL/cUL, CB |  |
| 1.7 | Certifications |  | IEC 61850-3 (EMC) and IEEE 1613 Emission Compliant ICSA Labs: Firewall, IPsec, IPS, Antivirus, SSL-VPN |  |
| 1.8 | Device Support Licences |  | 5 years Hardware Unit, 24x7 Comprehensive Support license  5 years Advanced Hardware Replacement, Firmware and General Upgrades, VPN, Traffic Management, Threat protection bundle Services license (Application Control, IPS, AV, Botnet IP/Domain, Mobile Malware Service, Web Filtering, Antispam, Cloud support services including Virus Outbreak and Content Disarm & Reconstruct Services). |  |

TECHNICAL DATASHEETS FOR OPTICAL GROUND WIRE

Data about offered equipment to be filled in by the bidder.

Name of Manufacturer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Model: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **DESCRIPTION** | **UNIT** | **REQUIRED** | **OFFERED** |
| **GENERAL** |  |  |  |
| Reference Standards | Yes | IEC60794-4-1, IEEE-1138 standards |  |
| Stranding Direction – Outer Layer | Direction | Right Hand |  |
| Number and Diameter of Aluminium Allow strands | No\*mm |  |  |
| Number and Diameter of Aluminium clad steel strands | No\*mm |  |  |
| Type tests | Yes | Yes |  |
| Cable offered has been in operation for more than 5 years. | YES | YES. Provide Completion certificate |  |
| Internal Fiber tube Diameter | mm |  |  |
| Overall diameter | mm |  |  |
| Guaranteed Ultimate Tensile Strength | kN |  |  |
| Final Modulus of elasticity | N/mm2 |  |  |
| Maximum Short Circuit Current Capacity | kA2 sec |  |  |
| Maximum Temperature withstand under short circuit current (1sec) without optical or mechanical degradation |  |  |  |
| Standard weight |  |  |  |
| Weight of grease |  |  |  |
| Maximum Tensile Strength –Long Term  Maximum Tensile Strength –Short Term | Kg/mm  Kg/mm |  |  |
| Lightning withstand as per IEC 60794-4-1 |  |  |  |
| Maximum DC Resistance at 20°C | Ohm/km |  |  |
|  |  |  |  |
| **OPTICAL CHARACTERISTICS** |  |  |  |
| Total number of Optical Fibers | Number | 24 or 48 or 96 as per project spec |  |
| Number of Fibers per buffer tube (max) | Number | 12 |  |
| Fiber Type/Mode |  | G.655/Single Mode |  |
| Fiber Colour codes Standard |  | TIA-598C |  |
| Buffer/binder Colour Coding followed |  | YES |  |
| Operating wavelengths | nm | 1550, 1625 |  |
| Cladding diameter | μm/μm | 1251 |  |
| Maximum Transmission Rate | Gbps | 40 |  |
| Mode field Diameter at 1550nm | μm | (8-11)±0.6 |  |
| Core concentricity error | μm | <0.8 |  |
| Cladding Non-circularity | % | <1.0 |  |
| Cable cut off wavelength | nm | <1450 |  |
| Macrobend loss  Loss  Number of turns  Maximum at 0.1dB | mm  Number  dB | 30  100  0.1dB |  |
| Attenuation Coefficient  At 1550nm  At 1625nm | dB/km  dB/km | 0.22  0.24 |  |
| PMD Coefficient |  | <0.2 |  |

TECHNICAL DATASHEETS FOR 132 KV SURGE ARRESTORS

|  |  |  |  |
| --- | --- | --- | --- |
| **132 kV surge Arrestors** | | **Required** | **Offered** |
|  | Manufacturer and country of origin |  |  |
|  | Type | MOA |  |
|  | Standard | IEC 60099-4 |  |
|  | Installation | outdoor |  |
|  | Rated voltage of arrester (kV) | 120 |  |
|  | Maximum overvoltage factor on the system due to any switching duty, PU | 2.3 |  |
|  | Rated system frequency, HZ | 50 |  |
|  | Condition of system neutral | Solid |  |
|  | TOV capacity: |  |  |
|  | * For 1 second, kVrms * For 10 second, kVrms | ≥ 139  ≥ 132 |  |
|  | Max. permissible line to ground voltage (kV) |  |  |
|  | Power frequency withstand voltage, 1 min., kV | ≥ 325 |  |
|  | Impulse voltage at (1.2/50 microsecond) | 750 |  |
|  | Residual voltage at (8/20 microsecond) and at 10 kA, (kV) | ≤ 311 |  |
|  | Residual voltage at (30/60 microsecond) and at 1,0 kA, (kV) | ≤ 257 |  |
|  | Rated discharge current (kA) | 10 |  |
|  | Maximum discharge current (kA) |  |  |
|  | Creepage distance (mm) | 4495 |  |
|  | Overall dimensions (mm) (height) |  |  |
|  | Overall weight (kg) |  |  |
|  | Max. residual voltage with current wave of  (30/70 micro sec.) at 1 kA (kV) |  |  |
|  | Energy capability as per IEC 60099-4 |  |  |
|  | Line discharge class (IEC) | 3 |  |
|  | 2 impulses, as per IEC 99-4, kJ/kV, Ur | 7,8 |  |
|  | Pressure relief withstand |  |  |
|  | Catalogues No. |  |  |
|  | Standards applied | IEC  60099-4 |  |
|  | Manufacturer quality system in accordance with ISO 9001 |  |  |
|  | * Date of issue | Yes |  |
|  | * Validity | Latest |  |
|  | * Certificate attached to the offer |  |  |
|  | Type test certificate to be issued by independent laboratory or independently witnessed type test certificate to be submitted | Yes |  |
|  | * Certificate to be attached to the offer | Yes |  |
|  | * Report to be attached to the offer | Yes |  |

TECHNICAL DATASHEETS FOR 132 KV XLPE CABLE

|  | **Minimum Requirements** | | **Data Offered** |
| --- | --- | --- | --- |
| **Description** | **Unit** | **Data** |
| Manufacturer’s name |  | to be specified |  |
| Country of manufacture |  |  |  |
| Location of manufacturing site |  | to be specified |  |
| Manufacture quality certification |  | ISO 9001 |  |
| Circuit rating required | MVA |  |  |
| **General description of cable** |  |  |  |
| Number of cores |  | 1 |  |
| System voltage | kV | 132 |  |
| Conductor size | mm² |  |  |
| Insulation type |  | XLPE |  |
| Metal sheath type |  | Lead |  |
| Over sheath type |  | HDPE |  |
| **Insulation Coordination** |  |  |  |
| Highest system Voltage (Um) (Insulation class) | kV | 145 |  |
| Nominal Voltage between conductors | kV | 132 |  |
| Rated frequency | Hz | 50 |  |
| Nominal Voltage between conductor and sheath (Uo) | kV | 76.2 |  |
| Rated Withstand impulse Voltage( altitude < 1000 M) | kV | 650 |  |
| Rated short duration power frequency withstand voltage (altitude < 1000 M) | kV | 275 |  |
| **Rating** |  | 1 |  |
| Maximum continuous direct- buried current rating assuming  Ground temperature of 30o C, Max. Soil Thermal resistivity of 2.7Km/W, Flat formation configuration and special bonding of metal sheath Guaranteed current rating Single Trench Calculation Method | A | To be specified     IEC 60840 |  |
| Maximum continuous in air current , assuming Air Temperature (in shade) of 40˚C, Flat formation configuration spacing of 250 mm, Thermally independent of other circuits and special bonding of metal sheath  Calculation Method | A | To be specified  IEC 60840 |  |
| Maximum permissible core temperature for continuous operation | ˚C | 90 |  |
| Short circuit capacity for 1 sec Permissible Max. Sheath Temperature  Permissible Max. Conductor Temperature | kA °C °C | To be specified |  |
| Permissible emergency Overload |  |  |  |
| Applied on 100% continuous load  Emergency current rating Max. Emergency temperature  Allowable duration/ operation Allowable total duration/ operation Max. average duration/average on total life of cable | A ˚C  h h h | to be specified |  |
| Applied on 50% continuous load  Emergency current rating Max. Emergency temperature Allowable duration/ operation Allowable total duration/ operation Max. average duration/average on total life of cable | A °C h h h | to be specified |  |
| Applied on 100% continuous load  Emergency current rating  Max. Emergency temperature  Allowable duration/ operation  Allowable total duration/ operation  Max. average duration/average on total life of cable | A ˚C h  h  h | to be specified |  |
| Construction features |  |  |  |
| **Conductor**  Material  Nominal cross section  Shape and type of conductor  Overall diameter  Water bl˚Cking method  Semiconductor blinder tape | mm² mm | Copper  tape/yarn yes |  |
| **Conductor Screen**  Material  Nominal Thickness  Minimum Thickness  Nominal overall diameter  Compound identification reference | Mm mm mm mm | Fully bonded Semicon. XLPE |  |
| **Insulation**  Material  Nominal Thickness  Minimum Thickness  Nominal overall diameter  Max. Continuous operating temperature  Compound identification reference  Maximum stress at nominal voltage  At conductor screen  At insulator screen  Maximum stress at impulse voltage  At conductor screen  At insulator screen | mm  mm  mm  ˚C  kV/mm kV/mm  kV/mm  kV/mm  kV/mm  kV/mm | XLPE  20  yes |  |
| **Insulation screen**  Material  Nominal Thickness  Nominal overall diameter  Compound identification reference  Indelible ink marking on screen | mm  mm | Fully bonded Semicon. XLPE |  |
| XLPE manufacturing methods  Extrusion line type e,g CCv,MDCV,VCV  Single pass/triple exclusion Curing method Cooling method Degassing period | days | VCV  Yes dry dry |  |
| Bedding for moisture absorption  Type of Material  Nominal Thickness  Minimum thickness  Nominal overall diameter | mm mm mm mm |  |  |
| **Metallic screen**  Type and Material  Nominal Thickness  Minimum thickness  Nominal diameter over screen  Cross sectional area of the screen  Short time current density(1sec) | mm mm mm mm² 2kA/mm² | Copper wire |  |
| **Bedding/Binder tape**  Type and Material  Nominal Thickness  Minimum thickness  Nominal overall diameter over bedding | mm mm mm |  |  |
| **Metallic screen**  Type and Material  Nominal Thickness  Minimum thickness  Nominal diameter over screen  Cross sectional area of the screen  Short time current density(1sec) | - mm mm mm mm² 2kA/mm² | lead-alloy ½ C |  |
| **Protective anti corrosion external sheath covering**  Bitumen undercoat  Type and material  Colour  Nominal thickness  Minimum thickness  Termite resistant  Type of anti-termite protection  Thermal resistivity  Type of fire protection for closing section | Mm mm   Km/w | HDPE Black  Yes Specify max. 6.0 |  |
| Type of conductive outer layer |  | Graphite/or semicon. polymer |  |
| Weight of completed cable  Copper  Insulation  Lead alloy  Gross weight | Kg/m Kg/m Kg/m Kg/m | to be specified |  |
| **Losses** |  |  |  |
| Maximum dielectric loss per meter/ phase when operating at nominal voltage frequency and at maximum conductor temperature | W/m | to be specified |  |
| Maximum sheath loss per meter/ phase when operating at nominal voltage frequency and at current stipulated in item 3 with sheath bonded and earthed as recommended (sectionalising Cross bonding) | W/m | to be specified |  |
| Maximum conductor loss per meter/ phase when operating at nominal voltage frequency and at current stipulated in item 3 | W/m | to be specified |  |
| Total loss of cable per metre/ phase of three phase circuit | W/m | to be specified |  |
| Electrical values |  |  |  |
| Maximum dc resistance of conductor at 20˚C | Ω/m | to be specified |  |
| Maximum ac resistance of conductor at operating temperature C | µΩ/m | to be specified |  |
| Equivalent reactance of three phase circuit | µΩ/m | to be specified |  |
| Electrostatic capacitance per conductor of cable at nominal voltage and operating temperature | pF/m | to be specified |  |
| Max. charging current per conductor at nominal voltage | mA/m | to be specified |  |
| Charging capacity of three phase system (at Uo) | Var/m | to be specified |  |
| Max. dielectric loss factor of cable at nominal voltage and frequency at a conductor temperature of; |  | to be specified |  |
| Positive and negative impedance | Ω/m | to be specified |  |
| Zero sequence impedance (as installed conditions)  Resistance  Reactance  Capacitance | Ω/m Ω/m pF/m | to be specified |  |
| Surge impedance | Ω/m | to be specified |  |
| Bonding and earthing |  |  |  |
| Type of special bonding |  |  |  |
| Max. Sheath potential of completed cable with conductor at max. earth fault current of 31.5 kA with sheath bonded and earthed as recommended | V/m | to be specified |  |
| Max. sheath potential of completed cable with conductor at rated current with sheath bonded and earthed as recommended | V/m | to be specified |  |
| Testing |  |  |  |
| **Routine tests**  As per IEC 60840  Additional tests specified as required by the Employer. |  | yes |  |
| Sample tests  5Uo for 1 h ( as per Employer’s spec) |  | IEC 60840 |  |
| **Type tests**  Test regime  Location of test  date of test |  | yes |  |
| **Commissioning tests**  AC voltage withstand  Partial discharge monitoring  Over sheath DC voltage test | kV | 1.7Uo for 1 hour < 10pC 12kV for 15 minutes |  |