

SPECIFICATION NO. KWHM (E) 4.7
(Revised in March 2010.)

ELECTRONIC KILOWATTHOUR METERS

1.0 Standard Specifications:

The electronic kilowatt-hour meters shall conform to the latest edition of IEC-62052-11, IEC-62053-21, IEC-61358 or any other equivalent international standard, which shall be subject to the approval of Federal Electricity & water Authority.

2.0 Site Conditions:

The electronic Kilowatt-hour meter shall be installed outdoor (inside metering cabinet) in U.A.E. where the maximum humidity of 100% and maximum ambient temperature of 50 Deg. C. can be experienced. The meters shall be suitable for continuous operation at the above site conditions.

3.0 Scope and nature of work:

The specification provides for design, manufacture, test at manufacturer's works in presence of representatives from Federal Electricity & Water Authority, suitable packing, transportation and off-loading at FEWA's Stores in satisfactory condition and proper stacking as directed by FEWA . The meter shall be installed on a wooden board along with molded case circuit breakers at the consumers premises. The fixing facilities such as screws etc have to be supplied along with meters. The meters shall be embossed with the words " Property Of FEWA - UAE ".

4.0 Electronic meters Technical requirement.

4.1 General requirement.

Three types of the meters (for active energy measurement) shall be offered as per B.O.Q.

- Single phase electronic meters.
- Three phase electronic meters.
- Three phase CT operated electronic meters.

All meters shall comply with the relevant international standards and the general technical requirement as listed in this tender.

Meters shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure:

- Personal safety against electric shock
- Personal safety against effects of excessive temperature.
- Safety against spread of fire.

All parts and surfaces which are subject to corrosion under normal specified site and working conditions shall be effectively protected.

The meter shall have adequate mechanical strength and shall also withstand the elevated temperature, which is likely to occur in normal working conditions under the peak summer conditions here.

4.2 Meter power supply

Meter must be suitable for measuring via direct connection with low voltage with a network voltage of 3x240/415V (+ 10%) 50 Hz 3-phase.

In the case of 3-phase meters, these must work even when one or two phases are missing and to measure the active energy of the remaining phases

The meter must work in any of the following supply failure conditions:

- Missing neutral with normal supply of the three phases or normal operation of the two phases.
- Inversion of one phase and neutral

An indication of the supply phase condition and the phase sequence must be provided on the display.

Power supply must have enough energy reserves so that its function is not disrupted for 3-phase power outages up-to 500ms.

Meter has to comply with the overload and over-current requirements specified in IEC-62053-21.

In the event of power failure, all non-stored data non volatile (EEPROM) memory has to have a retention time of at least 15 years without help of any back-up supply.

4.3 Multi Tariff.

Meter should have capabilities to be configured in the future for a minimum of 2 rates fully programmable.

4.4 The specific details of meters.

4.4.1 Single phase electronic meters - direct connection to mains.

Standard ratings:

* Basic current (I _b)	20 Amps.
* Max. current (I _{max})	80 Amps.
* Reference voltage (U _{ref}) *	Single phase 240V 2-wire.
Reference frequency	50 Hz.
* Accuracy class	Class 1, according to IEC-62053-21
* Starting current	0.4% I _b (IEC-62053-21).

4.4.2 Three phase electronic meters - direct connection to mains.

Standard ratings:

* Basic current (I _b)	20 Amps.
* Max. current (I _{max})	100 Amps.
* Reference voltage (U _{ref}) *	Three phase 4-wire 3 x 240/415V.
Reference frequency	50 Hz.
* Accuracy class	Class 1, according to IEC-62053-21
* Starting current	0.4% I _b (IEC-62053-21).

4.4.3 Three phase CT operated current meters.

Standard ratings:

* Current rating	1.5 to 6 Amps. (secondary of CT)
* Reference voltage (Uref) *	Three phase 4 wire, 3 x 240/415V
Reference frequency	50 Hz.
* Accuracy class	Class 1, according to IEC-62053-21
* Starting current	0.2% Ib (IEC-62053-21).

4.5 Power losses (according to IEC-62053-21)

In voltage circuit at reference voltage and at reference frequency.

- $\leq 2W$ and 10VA

In current circuit at reference voltage and at reference frequency

- $\leq 4VA$

4.6 Electromagnetic compatibility (EMC)

The meter will be in accordance with the following regulations:

- Electrostatic discharge according to IEC61000-4-2
- Electromagnetic RF fields according to IEC61000-4-3.
- Fast transient burst according to IEC61000-4-4
- Fast of immunity to conducted disturbance induced by radio frequency fields according to IEC61000-4-6.
- Surge immunity test according to IEC61000-4-5
- Damped oscillating wave immunity test according to IEC61000-4-12 (only for CT operated meters)
- Radio interference suppression as per CISPR 22.

5.0 Construction.

5.1 Case.

The meter shall have a reasonably dust proof and moisture proof case Provision shall be made for sealing the terminal block and meter cover with sealing wire and lead seals. The meter shall comply with the dust proof requirements of IEC-60529 amended to date. The meter shall be IP53 complaint.

5.2 Meter base.

The base of the meter shall be made of high impact quality proven type material, be properly finished and free from all burrs and extra material etc.

The design of the base shall be such that it shall house the terminal block completely.

5.3 Meter cover.

The meter cover shall be made of ultraviolet stabilized, polycarbonate material. It shall be so constructed and arranged that any non-permanent deformation shall not prevent the satisfactory operation of the meter.

The polycarbonate meter cover shall be designed in a manner so that it cannot be deflected/lifted and pressed. In case the reinforcing ribs are provided to the cover then it shall however not effect the visibility of the display.

The internal parts and testing links can be sealed and are accessible only after removal of meter cover by breaking the seal.

5.4 Terminals - Terminal block

The terminals are of front connected type and shall be grouped in a terminal block having adequate insulating properties and mechanical strength. The

material of which the terminals block is made shall be capable of passing the tests given in IEC standard 60615-2-11 for a temperature of 135 Deg. C and a pressure of 1.8 MPa (Method A).

Terminal connection scheme should be clearly highlighted underneath the terminal cover.

Barriers shall be provided to prevent possible short-circuiting of the adjacent terminals of same or different potentials under normal operating conditions.

The terminals, the conductor fixing screws or the external or internal conductors shall not be liable to come into contact with metal parts.

All terminals and terminal screws shall be of tinned brass material with at least two terminal screws to tighten wires perfectly. For single phase and 3 phase meters for direct connection, the minimum size of terminals shall be suitable to accept copper wires of diameter not less than 6 mm. and 8 mm. respectively. Terminal blocks shall not have any openings (holes) either in front or by the sides of the block.

5.5 Terminal Cover:

The terminals shall have a separate polycarbonate cover, which can be sealed independently of the meter cover. The sealing screws shall be held captive.

The sealing screws shall be strong enough to withstand all types of forces applied on these during fastening and opening. These screws shall be properly galvanized.

Long terminal cover with aperture for cables to be provided.

5.6 Resistance to heat and fire.

The terminal block, the terminal cover and case shall ensure reasonable safety against spread of fire. They shall not be ignited by thermic overload of live parts in contact with them. To comply therewith these parts shall fulfill the conditions of the glow wire test and the test shall be carried out according to IEC 60695-2-11 with the following temperatures.

Terminal block	960 \pm 15 deg. C
Terminal Cover & Meter Cover	650 \pm 10 deg. C
Duration of application	30 sec +/- 1 sec

5.7 Current Transformers

(for CT operated 3 phase meters only)

Each current transformer as specified earlier shall be suitable for mounting on wooden boards or inside metering cabinets and shall be of ring type, resin insulated and shall be rated as specified in bill of quantity for primary and 5 amps for secondary. Also it shall conform to IEC 60044 standard. It shall be designed so that it shall not sustain any damage due to through fault currents and take 150% burden of connected apparatus for indefinite period in the worst condition of U.A.E. Class of accuracy shall be of 0.5 rated burden shall match with the meter offered and the connecting leads.

5.8 Display

The meter shall have LCD (Liquid Crystal Display), for multi-display purposes.

Minimum height of digits shall be 9.5mm and they should be legible in normal daylight conditions from a distance of six feet by an observer. The viewing angle shall be a minimum of +/- 15° from the front of the meter face line of sight.

Energy consumption should be displayed and updated on the meter at all times and there should be a provision for a pushbutton to scroll through the other specified data. The approval for the sequence of these values shall be taken from FEWA by manufacturer before programming.

The display of all registered energy values will be affected on a 7 digit LCD display having digit figures, with the possibility to have 1 decimal at the extreme right digit (programmable)

Energy registers shall reset to zero after it has reached its maximum display, i.e. after **9999999. or 999999.9**

5.9 Local Communication Optical Port

Meter shall have a port for local communication through optical head.

Minimum speed is 9600 bauds

Optical head will ensure connection with HHU (Hand Held Unit) or Laptop/PC. In this regards, meters shall have a magnetic ring on the port so that optical head can stand on it without affecting the proper operation of the meter and shall comply with IEC 62056-21 standards.

5.10 Pulse Output : SO type pulse output configured at manufacture via auxiliary terminals. The pulse output should comply with IEC 62053-31 standard.

6.0 Nameplate

Name plate identification shall be as per IEC and BS standards, and shall include, but not limited to:

- Serial number and bar code (proposed bar code standards should be clearly indicated in the offer)
- Voltage and current rating
- LED meter constant (pulse / kWh)
- Manufacturer's name, year & country of manufacture.
- Manufacturer's type number.
- Number of phases & number of wires for which the meter is suitable i.e.3-phase, 4 wire.
- Accuracy class.
- Standard frequency: 50Hz.
- Reference temperature
- Property of FEWA
- Connection diagram.

7.0 Testing.

All meters and CTS shall be subject to routine and type tests in accordance with relevant clause of Standards IEC-62052-11/IEC-62053-21/IEC-61358/IEC-62053-31.

Following factory acceptance test in the presence of FEWA engineers, shall be conducted at the manufacturer's works for verifying compliance to specifications and metering standards.

- Impulse test
- AC voltage test
- Test of no load condition
- Test of starting condition
- Test of accuracy
- Verification of meter constant
- Test of Power Consumption
- Frequency variation
- Voltage variation
- Variation due to self heating
- Influence of self heating
- Influence of short time over currents.

The supplier shall make provision in his offer to bear all costs that are incurred in carryout out tests to the satisfaction of the Authority. However, costs towards travel, accommodation etc. of FEWA representatives shall not be included in the above price. Certificated copies of the type/special test reports not older than seven years for meters and CTs shall be submitted along with the offer. If acceptable type and special test reports are not submitted with the offer, FEWA reserves its right to ask tenderer to conduct all or any of the type and special tests as per the relevant international standards in the presence of FEWA representatives at no extra cost to the Authority.

8.0 Manuals

8.1 Maintenance Manuals

This manual is deemed to be used by the system maintenance staff as a reference handbook to understand the system in detail and rectify any problem that may occur in the overall system.

8.2.1 Software Maintenance Manual

The contents shall include details of the following:

Operating system administration and trouble shooting procedures for all components of the system.

System backup and restoration procedures.

9.0 Samples

Samples of offered kilowatt-hour meters shall be submitted with the offer. These samples shall be clearly labeled to indicate BOQ item No., Tender Number, Tenderer's and manufacturer's name and address.

SCHEDULE 'A'

SUB-MANUFACTURERS & SUB CONTRACTOR FOR AMR

The Tenderer shall state below the names of the Sub-Manufacturers / Sub-Contractor to the main manufacturer and details of the equipment proposed to be manufactured or supplied by them:

Name & Address of the Sub-Manufacturer	Description of Equipment

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE ' B '

PLACE OF MANUFACTURE, TESTING AND INSPECTION

The Tenderer to complete the following schedule for all materials he proposes to supply:

Item No.	Description	Manufacturer	Place of Manufacturer	Place of Testing and Inspection

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE 'C'

DEVIATION FROM TENDER SPECIFICATION

The Tenderer to state in the following schedule the deviations from the Tender Specifications proposed in his offer. Deviations other than those specifically listed below will not be taken note of :

Item No.	Description	Precise Details of the Deviations

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - D-1
GUARANTEED PARTICULARS OF ELECTRONIC KILOWATT HOUR METERS

Sl. No.	Description	Unit	1 phase, 240V	3phase, 3x240/415V		
			20 - 80 A	20 -100 A	200/5A	400/5 A
1	Manufacturer's name					
2	Country of origin					
3	Applicable standard					
4	Manufacturer's type/Model No.					
5	Rated voltage	Volt				
6	Frequency	Hz				
7	Accuracy class					
8	Degree of protection (IP)					
9	<u>Current Ratings :</u> a) At BSS/IEC conditions b) At UAE conditions	A A				
10	<u>Material :</u> a) Base b) Cover c) Viewing window					
11	<u>Terminals :</u> a) Material of terminals b) No. of terminal screws c) Material of terminal screws d) Material of internal screws e) Dia. of wire accepted	No. mm				

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - D- 2**GUARANTEED PARTICULARS OF ELECTRONIC KILOWATT HOUR METERS**

Sl. No.	Description	Unit	1 Phase,240V	3 Phase, 3x240/415V		
			20-80A	20-100A	200/5 A	400/5 A
12	<u>Accuracy of Meter :</u> a) At 0.05 of basic current (Ib) and unity p.f. b) At 0.1 of basic current to max. current (Imax) and at unity p.f. c) At 0.1 of basic current (Ib) and at 0.5 p.f. lagging d) At 0.2 of basic current to max. current (Imax) and at 0.5 p.f. lagging					
13	<u>Overall Dimensions :</u> a) Height b) Width c) Depth	mm mm mm				
14	Weight of meter	Kg.				
15	a) Short circuit withstand current for 10ms b) Peak current capacity	KA KA				
16	A.C. Voltage Test.					
16.1	Impulse voltage withstand.	KV				
16.2	A.C. voltage withstand duration 1 minute	KV				

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - D- 3

GUARANTEED PARTICULARS OF ELECTRONIC KILOWATT HOUR METERS

Sl. No.	Description	Unit	1 Phase,240V	3 Phase, 3x240/415V		
			20-80A	20-100A	200/5 A	400/5 A
17	Meter Constant	(P/kwh)				
18	Registers: a) Type b) Number of digits	No.				
19	a) Provision of sealing of body and terminals b) Security of resetting and testing facilities	Yes/No (P/kwh)				
20	Min. starting current as % of basic current at unity power					
21	<u>Current Transformers :</u> a) Type b) Make & country of origin c) Ratio d) Burden e) Accuracy f) Continuous overload capacity g) Short circuit withstand current rating for 1 sec.	VA VA KA				
22	<u>Provision of Fixing Arrangement :</u> a) For meters b) For C.Ts	Yes/No Yes/No				

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - D- 4
GUARANTEED PARTICULARS OF ELECTRONIC KILOWATT HOUR METERS

Sl. No.	Description	Unit	1 Phase,240V	3 Phase, 3x240/415V		
			20-80A	20-100A	200/5 A	400/5 A
23	Test Certificates Confirm that following tests as per Annexure 'F' of IEC-62052-II have been done and report submitted with offer.					
23.1	Test of insulation properties	Yes/No				
23.2	Tests of accuracy requirements	Yes/No				
23.3	Tests of electrical requirements.	Yes/No				
23.4	Tests for electromagnetic compatibility (EMC)	Yes/No				
23.5	Tests of the effect of climatic Environments.	Yes/No				
23.6	Mechanical tests.	Yes/No				
24.	Guaranteed life of meter	Yrs.				

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - E
DETAILS OF PAST EXPERIENCE OF MANUFACTURER

Name and Address of Purchaser	Rating of Electronic Kilowatt-hour meter	Qty. supplied	Year of supply	Remarks

Name of the Tenderer :

Designation :

Signature :

Date :

Spec.val

SPECIFICATION NO. 4.5
(Revised in October 2003)

METERING CABINET

1 General :

The metering cabinet is intended to be mounted outdoor and shall comprise of one number of each of the following :-

- 1.1 Cabinet as specified below.
- 1.2 Energy meter as per Federal Electricity & Water Authority (FEWA) specification No. 4.7
- 1.3 Moulded case circuit breaker as per FEWA specification No. 4.6
- 1.4 Current transformers wherever applicable as per FEWA specification No. 4.7

The cabinet shall be supplied as per bill of quantity and shall be of suitable dimensions for mounting different sets of meters and moulded case circuit breakers as detailed below.

- a) One No. 3 phase, 4 wire, 415V/240V, 200A/5A kilowatt hour meter with current transformers of 200A/5A ratio and one No. 3 phase 415V/240V, 4 pole, 200 Amp moulded case circuit breaker.
- b) One No. 3 phase, 4 wire, 415V/240V, 400A/5A kilowatt hour meter with current transformers of 400A/5A ratio and one No. 3 phase 415V/240V, 4 pole, 400 Amp moulded case circuit breaker.

2 Metering Cabinet :

2.1 Construction

- i) The metering cabinet shall be made of fiberglass reinforced of approved quality and shall be of outdoor wall mounted type.
- ii) It shall have hinged door with suitable sealing arrangements.
- iii) The metering cabinet shall have a UV resistance toughened glass window which shall not fade / defuse with time and to be provided in the door in the same level of the meter to facilitate direct metering reading.
- iv) Locking facility for the front-door. Locks & keys shall be arranged by FEWA.
- V) 2mm thick sheet plate, fixed on the back wall of metering cabinet shall be provided for mounting MCCBS, C.T.S and meters etc.
- VI) Earthing terminal shall be provided in each cabinet.
- VII) Suitable ventilating arrangements preferably louvers shall be provided on the front door of the cabinet and these louvers shall be covered from the back with stainless steel wire mesh to avoid entry of crawling animals e.g. lizard etc.
- VIII) Four Nos. of holes of 14mm diameter shall be provided at the four corners of the cabinet. 4 Nos. bolts of 12mm dia. and of 100mm length and suitable mounting arrangements shall be supplied with each cabinet for the purpose of fixing the same on the wall of the consumer's premises.
- IX) The cabinet shall be prewired and provided with suitable terminal blocks and cable glands for incoming and outgoing cables. The incoming cable to the cabinet shall be connected to the moulded case circuit breaker.
- X) The cabinet shall be designed to conform to the protection class of IP55.
- XI) The cabinet and internal components shall be vermin proof protected against corrosion for many years of satisfactory services in the prevailing climatic conditions of U.A.E. i.e. 100% humidity and ambient temperature upto 50 deg.C.

- XII) Danger / Property plate: Danger plate in both Arabic and English language, approved by FEWA shall be fixed on the door. The word "**Property of FEWA**", shall be either embossed on the enclosures or written clearly on a separate plate of approved design.

2.2 Drawings

Detailed drawings showing the internal arrangement of the cabinet detailing dimensions of the meter, moulded case circuit breaker and the relative distances of the above components with reference to the inner walls of the cabinet duly marked shall be submitted by the tenderer along with the offer.

2.3 Sample

Sample of cabinet shall be submitted by successful tenderer along with the detailed drawings for approval before commencement of supplying the cabinets.

3. Testing:

All metering cabinets shall be subjected to routine tests according to relevant international standards. Certified copies of the type test certificates, not older than 7 years, shall be supplied with offer, if acceptable type test-certificates are not enclosed with the offer. FEWA reserves its right to ask the tenderer to conduct all or any of the type tests as per international standards in presence of FEWA representatives at no extra cost to FEWA. Routine test shall be carried out in presence of representatives from FEWA at the manufacturer's works.

The supplier shall make provision in his offer to bear all costs that are incurred in carrying out these tests to the satisfaction of FEWA. However, cost towards travel, accommodation, etc of FEWA representatives shall not be included in the above price.

SCHEDULE 'A'

SUB-MANUFACTURERS

The Tenderer shall state below the names of the sub-manufacturers to the main manufacturer and details of the equipment proposed to be manufactured or supplied by them:

Name & Address of the Sub-Manufacturer	Description of Equipment

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SCHEDULE 'B'

PLACE OF MANUFACTURE, TESTING AND INSPECTION

The Tenderer to complete the following schedule for all materials he proposes to supply

Item No.	Description	Manufacturer	Place of manufacture	Place of testing and inspection

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SCHEDULE 'C'

DEVIATION FROM TENDER SPECIFICATION

The Tenderer to state in the following schedule the deviations from the tender specifications proposed in his offer. Deviations other than those specifically listed below will not be taken note of:

Item No.	Description	Precise Details of the Deviations

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SCHEDULE 'D'
GUARANTEED PARTICULARS OF TARIFF METERING CABINETS

Sl. No.	Description	Unit	3 - Phase	
			200 AMPS	400 AMPS
1	Manufacturer's name			
2	Country of origin			
3	Type No.			
4	Length	mm		
5	Width	mm		
6	Depth	mm		
7	Weight of the complete cabinet assembly			
8	Material of cabinet (Fiber glass)			
9	Type of locking arrangement			
10	<u>Fixing arrangements :</u>			
	a) Dia. of fixing holes	mm		
	b) Size of bolts	mmxmm		
11	Material of insulation barrier provided at the inner rear wall of the cabinet			
12	Protection class for the cabinet (IP code No. to be specified)			
13	Type and kind of ventilation			
14	No. of earthing terminals provided			
15	Means of connection between MCCB & terminal block			
	a) Material			
	b) Size	mmxmm		
16	Current carrying capacity	Amp		
17	Size of glands provided	cable size		
18	Size of lugs provided	cable size		

Signature of Tenderer : _____

SCHEDULE 'E'

DETAILS OF PAST EXPERIENCE OF MANUFACTURER

Name and address	Details of MCCBS	Qty. Supplied	Year of supply	Remarks

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SPECIFICATION NO. 4.6
(Revised in October 2003)

MOULDED CASE CIRCUIT BREAKER (MCCB)

1. Standard Specifications:

The moulded case circuit breaker shall conform to the latest edition of BSS 3871 or IEC 60947 or any other equivalent standard which shall be subject to the approval of Federal Electricity and Water Authority (FEWA).

2. Site Conditions:

The moulded case circuit breakers shall be installed in UAE where the maximum humidity of 100% and maximum ambient temperature of 50 Deg. C. can be experienced. It shall be suitable for continuous operation at the above site conditions.

3. Scope and Nature of Work:

The specification provides for design, manufacture, test at manufacturer's works in presence of representatives from Federal Electricity and Water Authority, suitable packing, transportation and off-loading at FEWA's Stores in satisfactory condition and proper stacking as directed by FEWA. The moulded case circuit breakers will be installed on wooden boards or inside the metering cabinet as specified in the bill of quantity along with energy meters at the consumer's premises.

4. Rating:

a) Single Phase Moulded Case Circuit Breaker

It shall be of two pole continuously rated at 60 A as specified in the bill of quantity and shall operate at a voltage of 240 V single phase 2 wire supply at 50 Hz in the environmental conditions of UAE. Symmetrical r.m.s value of the breaking current capacity shall be not less than 9 KA at above operating voltage.

b) Three Phase Moulded Case Circuit Breaker:

It shall be of four pole continuously rated as per bill of quantity and shall operate at a voltage of 415V, 3 phase 4 wire supply at 50 Hz in the environmental conditions of UAE.

- (i) The MCCB shall have r.m.s breaking current capacity not less than 9KA for 60A and 100A ratings at above operating voltage.
- (ii) The MCCB shall have r.m.s. breaking current capacity not less than 30KA for 200 amps and 400 amps ratings at above operating voltage.

5. Construction:

i) General:

The breaker specified for installation on wooden board shall be supplied in an insulated housing with provision for sealing the terminals and facility to seal operating handle (toggle) in "OFF" position independently with accessibility to operate handle without opening the housing. Such insulated housing shall conform to a protection class of IP 55. For installation inside the metering cabinet, no insulated housing shall be provided. The moulded case circuit breaker shall be integral units for overload, short circuit as per B.O.Q. The tenderer shall supply the derating curves upto 50 Deg.C. ambient temperature with his offer and indicate clearly the BSS, IEC, VDE or the corresponding international standard ratings and the derating factor.

ii) Drawings and Catalogues:

Detailed constructional drawings with dimensions, catalogues and detailed technical literature shall also be supplied along with the offer.

iii) Tripping Mechanism:

The moulded case circuit breaker shall have delayed thermal release for overload and instantaneous electromagnetic release for short circuit protection.

iv) Pole Terminals:

The pole terminals shall be made of tinned brass and separated from each other by phase barriers.

The terminal arrangement for accepting incoming service cables shall be push-in type for MCCBs rated upto 100 amps with at least two terminal screws to tighten conductor perfectly and shall be lug type for MCCBs rated 200 amps and 400 amps. Bimetallic lugs suitable for cable sizes detailed for applicable ratings shall also be supplied within the quoted price.

The pole terminals for different ratings of moulded case circuit breakers shall be designed to accept suitable sizes of cable conductors as detailed below.

S.No.	Rating of MCCB	Size of Conductor	Specification of Cable
1.	Single Phase 60 Amps	Upto 25 mm ²	2 core 25 sq.mm, XLPE insulated stranded Al. conductor cable
2.	Three Phase 60 Amps	Upto 35 mm ²	4 core 35 sq.mm, XLPE insulated stranded Al. conductor cable
3.	Three Phase 100 Amps	Upto 50 mm ²	4 core 50 sq.mm, XLPE insulated stranded Al. conductor cable
4.	Three Phase 200 Amps	Upto 185 mm ²	4 core 185 sq.mm, XLPE insulated stranded Al. conductor cable
5.	Three Phase 400 Amps	Upto 300 mm ²	4 core 300 sq.mm, XLPE insulated stranded Al. conductor cable

In case the push-in type terminals of offered MCCBs do not accept the cable sizes as detailed above an extended terminals arrangement of approved type with cover and sealing facility shall be supplied to suit the required sizes of cable within the quoted price.

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6. Testing:

All moulded case circuit breakers shall be subjected to routine tests according to the relevant international standards. Certified copies of the type test certificates, not older than seven years, shall be supplied along with the offer. If acceptable type test certificates are not enclosed with the offer, FEWA reserves its right to ask the tenderer to conduct all or any of the type tests as per relevant international standards in presence of FEWA representatives at no extra cost to FEWA. Routine tests shall be carried out in presence of representatives from FEWA at the manufacturer's works.

The supplier shall make provision in his offer to bear all costs that are incurred in carrying out these tests to the satisfaction of FEWA. However, costs towards travel, accommodation, etc. of FEWA representatives shall not be included in the above price.

7. Samples:

Samples of offered MCCBs shall be submitted. These samples shall be clearly labeled to indicate BOQ item No., Tender No., Tenderer's and Manufacturer's name and address.

T-4-6
Mccb 4-6
sm

SCHEDULE - A

SUB-MANUFACTURERS

The Tenderer shall state below the names of the sub-manufacturers to the main manufacturer and details of the equipment proposed to be manufactured or supplied by them:

Name & Address of the Sub-Manufacturer	Description of Equipment

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - B

PLACE OF MANUFACTURE, TESTING AND INSPECTION

The Tenderer to complete the following schedule for all materials he proposes to supply

Item No.	Description	Manufacturer	Place of manufacture	Place of testing and inspection

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - C

DEVIATION FROM TENDER SPECIFICATION

The Tenderer to state in the following schedule the deviations from the tender specifications proposed in his offer. Deviations other than those specifically listed below will not be taken note of:

Item No.	Description	Precise Details of the Deviations

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE - D

GUARANTEED PARTICULARS OF MCCBS

Sl. No.	Description	Unit	1Phase, 240V	3 Phase, 415/240 Volts			
			60A	60A	100A	200A	400A
1.	Manufacturer's Name						
2.	Country of Origin						
3.	Applicable Standard						
4.	Type No.						
5.	No. of Poles						
6.	Rated Voltage	Volt					
7.	Continuous Current :						
	a) At IEC/BS conditions	Amps					
	b) At UAE conditions	Amps					
8.	Rated Symmetrical breaking capacity at 240/415 Volts a)						
	l _{cu} (Sym)	KA					
	b) l _{cs} (Sym)	KA					
9.	Making capacity at 240/415 Volts	KA					
10.	a) Thermal current release setting range	A					
	b) Type of magnetic release trip current	Fixed/ Adjustable					
11.	Time of Tripping :						
	a) At 1.5 times of rated thermal current setting	Sec,					
	b) - do - but 10 times	"					
	c) For magnetic release	"					
12.	No. of make & break operations:						
	a) At normal current	No.					
	b) At short circuit current	No.					
13.	<u>Terminals :</u>						
	a) Type						
	b) Materials of terminals						
	c) Cross section of cable conductor it can accommodate	Sq.mm					
	d) Suitable for copper or aluminium cable	Yes/No.					
	e) Extension of terminal arrangement provided	Yes/No.					

Name of Tenderer : _____
 Designation : _____
 Signature : _____
 Date : _____

SCHEDULE - D

GUARANTEED PARTICULARS OF MCCBS

Sl. No.	Description	Unit	1Phase, 240V	3 Phase, 415/240 Volts			
			60A	60A	100A	200A	400A
14.	Dimensions : a) Height b) Width c) Depth	mm mm mm					
15.	Weight	Kg.					
16.	a) A.C. Voltage withstand test b) Duration of test	KV Min					
17.	<u>Type of sealing arrangement for</u> a) Terminal covers b) Extended terminal arrangement covers c) Operating Toggle in "OFF" position						

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____

SCHEDULE 'E'

DETAILS OF PAST EXPERIENCE OF MANUFACTURER OF MCCBS

Name and address	Rating of MCCB	Qty.	Year of supply	Remarks

Name of Tenderer : _____

Designation : _____

Signature : _____

Date : _____