



وزارة الكهرباء والماء والطاقة المتجددة
Ministry of Electricity & Water & Renewable Energy
دولة الكويت | State of Kuwait

قطاع شبكات التوزيع الكهربائية

كراسة الأسس والمعايير لتأهيل مصانع
لوحات الضغط المتوسط 11 ك.ف

PRE-QUALIFICATION OF MANUFACTURERS FOR THE MANUFACTURE OF 11 KV SWITCHGEARS



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تمهيد

ترغب وزارة الكهرباء والماء والطاقة المتجددة في تأهيل المصانع لتصميم وتصنيع لوحات الضغط المتوسط 11 ك.ف والقاطع الكهربائي 11 ك.ف وذلك عبر اعتماد الوزارة للتصاميم الهندسية التصنيعية للمنتج وفق المواصفات الفنية المذكورة في الكراسة وتقديم المصنع للمخططات الهندسية وكافة المتطلبات المذكورة في المستندات الواجب تقديمها والمذكورة في اشتراطات الكراسة ، على ان يقدم المصنع ما يثبت قدرته التصنيعية لاعتماده كمصنع وذلك من خلال تقديم شهادات الفحص النوعي والتقارير الفنية لتلك الاختبارات كما هو مذكور في كراسة التأهيل.



1. أسس ومعايير المتطلبات المالية :

- (1) أن تكون الميزانية العمومية لآخر ثلاث سنوات مالية منفصلة مدعمة بتقرير مدقق الحسابات للشركة / للمصنع عن كل سنة مالية متضمنة بيان المركز المالي وقائمة الدخل على أن يكون مكتب التدقيق معتمد من قبل وزارة التجارة والصناعة وذلك للشركات / المصانع (المحلية).
- (2) على الشركات الأجنبية/ المصانع الأجنبية تقديم المستندات المالية على أن تكون معتمدة من مكتب تدقيق في بلد الشركة / المصنع وموثقة من السفارة الكويتية في بلد المنشأ والخارجية الكويتية بدولة الكويت.
- (3) أن تكون الشركة المحلية / الأجنبية و المصنع المحلي / الأجنبي قد حققت أرباحاً في كل سنة عن آخر ثلاث سنوات مالية.
- (4) إذا لم يتحقق شرط الربح في السنة من الثلاث سنوات المذكورة في البند ثالثاً أعلاه، فإن على الشركة المحلية والمصانع المحلية تقديم كتاب البنك يبيدي استعداده لمنحها تسهيلات بنكية.

2. أسس ومعايير المتطلبات القانونية :

- كتاب من الشركة / المصنع يطلب من خلاله التأهيل مع كافة المرفقات والمستندات (المالية والقانونية والفنية) والتعهد بأن كافة المستندات والمرفقات صحيحة وخالية من التدليس.

2.1. المستندات القانونية المطلوبة للشركات / المصانع المحلية:

- صورة من عقد تأسيس الشركة / المصنع.
- صورة شهادة غرفة التجارة والصناعة بالكويت لهذه السنة.
- صورة السجل التجاري للشركة / المصنع
- صورة شهادة تسجيل لدى الجهاز المركزي للمناقصات العامة وتكون سارية.
- صورة شهادة نسبة العمالة الوطنية وتكون سارية.
- صورة رخصة الشركة / المصنع لدى وزارة التجارة والصناعة وتكون سارية .
- مستخرج وزارة التجارة والصناعة لمن له حق الادارة بالشركة / المصنع.
- براءة ذمة من قطاع خدمات العملاء من الوزارة.



2.2. المستندات القانونية المطلوبة للشركات والمصانع الأجنبية (مع الوكيل المحلي / مستقل بذاته:

2.2.1. في حال مستقل بذاته يتم تقديم:

- الكيان القانوني للشركة الأجنبية / للمصنع الأجنبي معتمد من الجهات الرسمية في بلد المنشأ، ومن ثم إعتماها من السفارة الكويتية أيضاً في بلد المنشأ والخارجية الكويتية بدولة الكويت وترجمتها إلى اللغة العربية من مكتب ترجمة معتمد داخل دولة الكويت.

2.2.2. في حال وجود وكيل محلي يتم التقديم:

- إتفاقية الوكالة بين الشركة الأجنبية / المصنع الأجنبي والوكيل المحلي معتمد من الجهات الرسمية في بلد المنشأ (الدولة الأجنبية) ومن ثم اعتمادها من السفارة الكويتية في بلد المنشأ واعتماد الاتفاقية من الجهات الرسمية في دولة الكويت (وزارة العدل / وزارة الخارجية) وترجمتها إلى اللغة العربية من مكتب ترجمة معتمد داخل دول الكويت.
- شهادة قيد الوكالة صادرة من وزارة التجارة والصناعة بين الشركة الأجنبية / المصنع الأجنبي والوكيل المحلي تكون سارية المفعول.
- كافة المستندات القانونية المطلوبة للشركات المحلية في حال تأهيل شركة أجنبية / مصنع أجنبي مع وكيل محلي لها داخل دولة الكويت.



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3. المستندات الفنية الواجب تقديمها :

(1) تقديم شهادات الفحص النوعي type test والتقارير الخاصة بها (مشابهة أو مماثلة لأي جهد من الجهود بين جهد 11 ك.ف. إلى جهد 33 ك.ف. بغض النظر عن أية اشتراطات فنية مذكورة في المواصفات الفنية للكراسة) على جميع الأجزاء (القضبان - القاطع - المفتاح الأرضي - صندوق الكيبل) تبين قيام المصنع بعمل الاختبارات النوعية بنجاح للوحات الضغط المتوسط والقاطع الكهربائي في مختبرات عالمية محايدة التالية:

(ANY MEMBER OF STL LIAISON - ASTA, CESI, CPRI, ESEF, JSTC, KEMA, KERI, PEHLA, SATS, STLNA, VEIKI OR, ZKU) OR (ANY INTERNATIONAL REPUTED ELECTRICAL TESTING ACCREDITATION AUTHORITY HAS CERTIFICATE ISO/IEC 17025- THE LABORATORY SHALL BE ACCREDITED WITH THE INTERNATIONAL STANDARD ISO/IEC 17025 BY AN ACCREDITATION BODY THAT IS IT SELF ACCREDITED IN ACCORDANCE WITH ISO/IEC 17011, EITHER THROUGH THE GCC ACCREDITATION CENTER OR THROUGH THE INTERNATIONAL LABORATORY ACCREDITATION COOPERATION (ILAC)). (TYPE TEST IN FACTORY IS NOT ACCEPTED).

(2) تقديم المخططات القياسية (Fully dimensional drawings) للمعدة مع ذكر تفاصيل تبين جميع أجزائها.

(3) يجب على المصنّع الالتزام بمواصفات و شروط وزارة الكهرباء و الماء المذكورة في كراسة التأهيل.

(4) يجب على المصنّع استيفاء و استكمال جميع الجداول الفنية و البيانات المطلوبة والمستندات الفنية في كراسة التأهيل بالكامل دون نقصان مع توفير جميع المستندات الفنية المطلوبة و يحق للوزارة طلب أي نسخة أصلية للتأكد من مطابقتها لنسخ المستندات المرفقة.



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4. المستندات الفنية للاسترشاد في الدراسة الفنية (في حالة توفرها):

- (1) تقديم كتالوجات تبين مراحل تصنيع المعدة المراد تأهيلها و نبذة من تاريخ المصنع و مكانه و تفاصيل المواد الأولية المكونة للمادة.
- (2) تقديم معلومات عن الخبرة السابقة للمصنع في مجال التأهيل مع ذكر عدد و قيمة الأعمال المنفذة و الجاري تنفيذها و تقديم شهادات موثقة من العملاء تثبت كفاءة المصنع في تصنيع المواد و أن يكون مدون بها رقم العقد و اسم المشروع و قيمتها المالية و مدة التوريد و بداية التعاقد و انتهاء التنفيذ.

5. تعليمات عامة:

- (1) جميع الوثائق و المستندات المقدمة من المصانع (خارج دولة الكويت) يجب أن تكون مصدقة و موثقة من جهات الاختصاص و من سفارة دولة الكويت في بلد المنشأ لإثبات صحتها و سريان مفعولها.
- (2) يجب أن تكون جميع المستندات و البيانات المقدمة من قبل المصانع واضحة و متسلسلة.

ملاحظة: يتم تقديم شهادات اختبار النوع (type test certificate) للوحات الضغط المتوسط 11 ك.ف والقاطع الكهربائي 11 ك.ف في مناقصات قطاع شبكات التوزيع الكهربائية وذلك عند تقديم العطاء في المناقصة على ان تكون هذه الشهادات صادرة من المختبرات التالية:

[ANY MEMBER OF STL LIAISON - ASTA, CESI, CPRI, ESEF, JSTC, KEMA, KERI, PEHLA, SATS, STLNA, VEIKI OR, ZKU] OR [ANY INTERNATIONAL REPUTED ELECTRICAL TESTING ACCREDITATION AUTHORITY HAS CERTIFICATE ISO/IEC THE LABORATORY SHALL BE ACCREDITED WITH 17025- THE INTERNATIONAL STANDARD ISO/IEC 17025 BY AN ACCREDITATION BODY THAT IS IT SELF ACCREDITED IN ACCORDANCE WITH ISO/IEC 17011, EITHER THROUGH THE GCC ACCREDITATION CENTER OR THROUGH THE INTERNATIONAL LABORATORY ACCREDITATION COOPERATION (ILAC)].

والتي تبين اجتيازه لكافة الاختبارات المنصوص عليها في معايير اللجنة الكهروتقنية الدولية (IEC) حسب مواصفات الوزارة المستخدمة في الشبكة الكهربائية في دولة الكويت مع تقديم الكتالوجات الفنية الخاصة ب لوحات الضغط المتوسط 11 ك.ف والقاطع الكهربائي 11 ك.ف.

TECHNICAL SPECIFICATIONS OF EQUIPMENT**11 KV SWITCHGEAR****1. GENERAL:****1.1 MINISTRY SYSTEM:**

The equipment covered by this specification is for extending the ministry existing distribution system and shall be suitable in all respects for connection to the existing system, characteristics of which are:-

System voltage	: 11 KV	415 volts
System Highest Voltage	: 12KV	457 volts.
Frequency	: 50 Hz	50 Hz.
Neutral Point	: Solidly earthed or through 10.5 Ohms Resistance	Solidly earthed.
Maximum fault level	: 31.5KA	50 KA
Maximum fault duration	: 1.25 sec.	0.5 seconds.

1.2 CLIMATIC CONDITIONS:

THE EQUIPMENT IS FOR CONTINUOUS SERVICES IN KUWAIT AND THE CLIMATIC CONDITIONS UNDER WHICH IT WILL OPERATE ARE TO BE CONSIDERED THROUGHOUT THE DESIGN.

Climatic conditions in Kuwait are rigorous and the Summer season during which the equipment will function under continuous maximum load condition is long and shall be considered to fall during the period starting from 15th of April till 15th of November. The remainder of the year shall be considered as winter season since Autumn and Spring seasons are very short in Kuwait.

THE FOLLOWING ARE PREVAILING ATMOSPHERIC CONDITIONS BASED ON THE LATEST RECORDS:

Ambient temperature in shade	:	Maximum 55 Degrees C (summer day)
Ambient temperature in shade	:	Minimum – 6 Degree C (winter
night) Maximum sun radiation temperature as measured with a black bulb thermometer	:	85 Degrees C.
Average maximum ambient temperature	:	45 Degrees C.

Periods of high humidity are common and a humidity of 100% has been recorded at 30 degrees centigrade. However, high temperature is normally accompanied with low humidity. Violent sand and dust storms occur with wind speeds up to 120 km/hour (Gust 160 km/hour), and even on comparatively still days, fine dust is carried in suspension in atmosphere. The average rainfall is of the order of 15 cms., but this may be concentrated in 2 or 3 severe downpours.

The equipment required under these specifications shall give continuous and trouble-free service under the arduous conditions mentioned above.

1.1 GENERAL STANDARD SPECIFICATIONS:

A) All materials and equipment shall comply as a minimum with:

- i) The latest relevant recommendations of the International Electro-Technical Commission (I.E.C) if available.
- ii) If (i) above is not available, with the latest relevant British Standard Specifications (B.S.S).

This applies to quality of material and testing ... etc... If standard as mentioned above contradict with this specification then the requirements of this specification shall apply.

- B) Manufacturers who manufactures equipment based on standards other than those mentioned under item “A” above must confirm that such standards meet the requirements under “A” as a minimum and must also prove this by type test certificate.
- C) What is mentioned under item, “A” and “B” above applies to wherever B.S.S. is mentioned in the different clauses of this specification.

2. TECHNICAL SPECIFICATIONS:

2.1 Switchgear:

The switchboard shall be of the conventional indoor totally enclosed metal-clad type with either horizontal or vertical draw out, vacuum circuit breaker. The busbars shall be of hard drawn high conductivity copper bars, air insulated and Heat Shrink Sleeve covered for busbar Insulation (painting on busbar is not acceptable). Suitable moulding should be used to shroud the joints. Size of busbars shall be clearly stated. The switchboard shall be of robust construction and shall be unaffected, in whole or in part, by the forces imposed by short circuits or other fault currents, operation, installation, vibration or changes in temperature. The switchgears must be capable of withstanding 11 KV line to earth fault current indefinitely under emergency conditions. The switchgear shall be strictly in accordance with IEC/BS EN 62271-200 unless specified otherwise herein. The busbars on all switchboards shall be arranged to permit future extension at each end. Phase rotation and colour markings shall be in accordance with BS 158. All instruments, instrument transformers, other components and compounds used in the switchgear and in the circuit breakers shall comply with the appropriate and latest British Standard Specification or at least equivalent to it. The switchgear shall be fully interchangeable. The switchboard shall be arranged for bottom entry of 11 KV cables and pilot cables. Fixing bolts of all of the removable covers of the switchgear shall be fixed through welded nuts. The circuit breaker compartment of the panel shall be provided with front door.

The circuit breakers shall have 3 positions, viz., SERVICE, TEST and ISOLATED. In the test position, it should be possible to close the door of the circuit breaker chamber.

Due to limited area available at substations, the overall dimensions of single panel shall not exceed the following:

HEIGHT	: 2200 mm
WIDTH	: 700 mm
BASE DEPTH	: 1600 mm
TOTAL DEPTH	: 2000 mm

2.2 Earthing Gear:

Provision shall be made for earthing of the power cables of each unit. The earthing arrangement shall be one of the following:

- a) Through the circuit breaker by the method of transfer position without the necessity of any loose attachments or devices (i.e. integral earthing).
- b) Through a fault making earth switch fully interlocked. The switch shall be of the quick-make- break type. Visual checking of the earthing switch shall be possible through transparent covers. However, the earthing switch chamber shall be vermin proof and dust protected.

Operation of earthing switch must be from the front of switchgear with CB compartment door closed.

Earthing devices shall be fully interlocked with the circuit breaker and shall be capable of closing on full short circuit current corresponding to 31.5 kA at 12 KV without sustaining any damage or endangering the operator. The short time current rating must not be less than 31.5 kA for 3 seconds. Type test certificate for earthing devices should be submitted by manufacturer. Earthing device shall be operated from front of the panel and to be marked clearly.

2.3 Duty of Plant:

a) Rating:

All current carrying parts of the switchgear including current transformers, isolating contacts, busbars, connections and joints shall be capable of carrying their specified rated current continuously under Kuwait Climatic conditions and the temperature rise in Kuwait shall comply with IEC/BS EN 62271-100 and BS 159 and any other applicable relevant British Standard Specification. manufacturer shall state the B.S.S. ratings alongside the Kuwait rating in each case.

b) Circuit Breakers:

The circuit breaker shall be of the vacuum type and shall have guaranteed rupturing capacity of not less than 31.5 kA at 12 KV and must conform to IEC/BS EN 62271-100 taking into account the climatic conditions of Kuwait. The circuit breaker should be capable of carrying full short circuit current associated with the above fault level at 12 KV

for a duration of 3 seconds without any damage and shall have :-

- i) The vacuum shall serve as an arc extinguishing as well as insulating media.
- ii) The manufacturer should explain clearly how the degree of vacuum is maintained and whether the C.B. is suitable for periodical checking of vacuum.
- iii) The loss of vacuum per year, if applicable has to be given in guarantee schedule.
- iv) All live parts of C.B should be completely insulated when it is plugged in service position.

One circuit breaker shall be tested for 95 KV. Impulse withstand voltage.

The manufacturer shall submit a short circuit type test certificate (for the above rupturing capacity) for the switchgear panels [match or similar for any voltage between (11 KV to 33 KV) irrespective to any technical parameters stipulated in PQ document] shall undergo type tests as stipulated in the relevant IEC/BS, which shall be carried out in full compliance with the standard [as clause 1. general (MINISTRY SYSTEM, CLIMATIC CONDITIONS, STANDARD SPECIFICATION)] from an independent acknowledged international testing laboratory (Type test certificates issued from independent acknowledged international testing laboratory (ANY MEMBER OF STL LIAISON - ASTA, CESI, CPRI, ESEF, JSTC, KEMA, KERI, PEHLA, SATS, STLNA, VEIKI or, ZKU)) or (any international reputed electrical testing accreditation authority has certificate ISO/IEC 17025-The laboratory shall be accredited with the international standard ISO/IEC 17025 by an Accreditation Body that is itself accredited in accordance with ISO/IEC 17011, either through the GCC Accreditation Center or through the International Laboratory Accreditation Cooperation (ILAC)). (type test in factory is not accepted).

The following type tests shall be carried out.

c) **Normal Rating:**

630 Amps shall be normal continuous rating under Kuwait worst temperature conditions.

2.4 **Operation:**

Hand charged spring closing mechanism shall be provided. An indicator shall be fitted clearly indicating whether the spring is in the “charged” or “uncharged” state. Closing to be affected by means of a 50 V. D.C. spring coil, through a local barrel type control switch.

The construction of the control switch shall be such that all the contacts are properly shielded and dust protected. Means of manual closing shall also be provided. Mechanism shall be fitted with a local manual spring release push button shrouded to prevent inadvertent operation and provided with means of padlocking.

Tripping shall be by means of a 50 volts D.C. shunt trip coil. Manual trip also is to be provided.

Mechanical ON/OFF indicator shall be provided. The charging and operating mechanism chamber shall be dust protected.

Mechanical operation counters shall be provided in all circuit breakers.

2.5 Live Parts Isolation and Shutters:

Each switchboard must be provided with approved means of isolation of circuit breakers and circuits, and to be complete with automatic shutters to screen off all live parts. The shutters for the feeder and busbar spouts shall be operated independently and must be suitable for the arduous Kuwait conditions without any deformation. The switchgear must be fully interlocked to prevent unauthorized or mal- operation. Safety of personnel and continuity of supply are the prime considerations. Locks, each with two keys shall be included in the design:

- a- Locking out circuit in the isolated position.
- b- Locking circuit breaker control.
- c- Locking movable shutters screening live parts.

To facilitate phase out of any incoming circuits against busbar, arrangements shall be provided to enable easy manual opening or closing of any of the above shutters independently with the circuit breaker withdrawn and provision of locking of these shutters independently in the “open” and “closed” positions.

To facilitate testing, device shall be provided for keeping shutters in an open position when moving portion (trolley) is withdrawn. This device shall be cancelled in insertion of moving portion, ensuring that regular automatic operation of shutter is restored.

2.6 Racking Equipment:

The racking equipment shall be an integral part of the circuit breaker.

A wheeled carriage for the removal of the circuit breaker from a switchboard shall be an integral part of the circuit breaker (cassette type circuit breakers shall not be accepted). Suitable external guide rails shall be provided for fixing in the substation floor in front of the switchgear for guiding the circuit breaker during its removal from the board.

2.7 Cable Boxes:

a) Power Cables:

Each cable dividing box on the feeder units shall be suitable to receive 3x300 sq. mm. AL or CU/SC/XLPE/SC/SWA/PVC 11 KV cable by Bi-metallic cable lugs and Brass Compression Cable Glands outdoor type (type CW size 90) to BS 6121 part 1 complete with a heat shrinkable sleeve. The earth tag of the cable gland shall be 5 mm. thick provided

with a threaded hole and the necessary washers and bolt for connection of the copper earth strip. The gland is to be connected to the Main Earth Bar through a copper strip not less than 5x30 mm.

Each cable dividing box on the transformer units shall be suitable to receive 3x300 sq. mm. AL or CU/SC/XLPE/SC/SWA/PVC 11 KV cable by copper cable lugs and Brass Compression Cable Glands outdoor type (type CW size 90) to BS 6121 part 1 complete with a heat shrinkable sleeve. The earth tag of the cable gland shall be 5 mm. thick provided with a threaded hole and the necessary washers and bolt for connection of the copper earth strip. The gland is to be connected to the Main Earth Bar of the transformer tank through a copper strip not less than 5x30 mm.

Note / cable connected by 11 KV Heat Shrinkable Termination Kits comprising of non-tracking stress control tubing, insulation sleeves, etc. suitable for 3x185 - 3x300 sq. mm. AL or CU/SC/XLPE/SC/SWA/PVC 11 KV cable along with Heat Shrinkable Right Angle Boots or Straight Boots.

The vertical distance between the cable crutch and the cable connection terminals shall not be less than 570 mm in any case for all feeder/transformer cable dividing box. The gland plate for the power cable should be at least 350 mm above the ground level.

The terminations shall be covered to render electrical protection and safety to personnel.

The boxes shall be designed with ample dimensions with **removable bottom gland plate and back cover** to facilitate jointing and to allow crossing of cores without damage to insulation. The boxes and terminations shall be subject to the approval of MEW. All the boxes shall be bolt-on-type.

b) Multicore Cable Cabinet:

The 11 kV switchgear shall be provided with multicore cable cabinet on the back of each panel. The cabinet shall be capable to receive either 16-core, polyethylene insulated and sheathed, "steel wire armoured and overall PVC sheathed" pilot cables or multicore cable from (common integrated safety device and/or pressure relief valve from transformer room, in case of oil immersed transformer or from Thermal Relay in case of Cast Resin Transformer).

Each Multicore cable cabinet shall be designed with suitable terminal blocks.

Each Multicore cable cabinet shall be designed with super deluge proof compression type of brass cable gland of suitable size for control cables with earth tag which shall be connected to the Main Earth Bar.

2.8 Current Transformers:

Current Transformers may be either air insulated type or cast resin type. Current transformers shall be so rated that they will not sustain any damage by the through fault currents expected on a system level of 31.5 kA at 12 KV. All secondary windings shall be one ampere unless otherwise specified. **All the secondary wires** of the current transformers shall be brought to an accessible terminal block in the control panel.

All current transformers shall comply with the relevant British Standard specification and the current transformers for Solkor protection shall conform to the conditions stated below under "Protection".

Current transformers shall be capable of withstanding full short circuit current for 3 seconds without distress or damage.

Proper barrier is to be fixed in between the C.T. Chamber and the cable termination box.

2.9 Circuits:

Each circuit breaker will control either (a) a feeder circuit or (b) a power transformer circuit.

2.10 Protection:

a) Feeder Circuits.

Each feeder circuit shall be protected by "UNIT FEEDER PROTECTION" comprising of Solkor RF 5 KV feeder protection. It should be possible to set the relay in both Solker R or Rf mode. The relay should be supplied in a 1V size flush mounting Vedette style case with built in test facility. The current transformers

shall be of ratio 400/300/1A, of 15 VA capacity and class X accuracy, and they shall have characteristics matching with the current transformers already connected to the system. A separate 400/1 current transformer of class 1 accuracy shall be provided for metering purposes, and also a Current Transducer for Current signal to Telemetry system. Attention is drawn to the requirements for the satisfactory operation of Solkor RF feeder protection published by Reyrolle (Siemens Protection Devices Ltd), in their Technical report No. 990/TIR/005/02 titled "Current transformer Requirements for Reyrolle Protection Relays " or similar matching relay.

The through fault current shall be 31.5 kA at 12 KV. The manufacturer shall submit a "Magnetization Characteristics Curve" and "Ratio Error Curve" under the burden conditions applying to the Solkor "RF" protection over the range of through fault current. MEW is to approve the characteristics curves for the current transformers.

Alternatively, unit feeder protection (other than Solkor RF feeder protection) manufactured by other companies. However, the unit feeder protection should match with the Solkor RF of M/s. A. Reyrolle.

For feeder circuits the existing Solkor "R" 5 KV relays can be used with the new type Solkor "RF" 5 KV relays by means of changing four links internally in the Solkor "RF" relay.

b) Transformer Circuits:

1. Each transformer shall be protected by non-directional 4-pole inverse definite minimum time lag (IDMTL) over current and earth fault protection relays with high set instantaneous over current and earth fault elements (51/51N&50/50N) including other IEC inverse curves.

2. The relays shall be of modern numerical type, with proven field experience. Considering inter changeability of relays, all relays shall be of multi characteristics type.
3. Relays shall have adjustable settings for both operating current and time, the design of the relays being such that the setting adjustments can be carried out on load without taking the relay out of service.
4. The normal current (In) for the relays shall be 1 amp and the rated tripping & relay supply shall be 50 V.D.C.
5. Relays shall be of the drawout flush mounted type with rear connections, mounted on the control cubicle doors of the switchgear.
6. Relays shall be hand reset latched type and shall be capable of being reset without the necessity of opening the case. The relay cases shall incorporate efficient dust seals.
7. Relays shall be provided with LED indicators which shall be visible from the front of the switchgear without opening the doors. LED brightness shall be such that they are clearly visible in normal artificial lighting levels.
8. Self-reset relays shall have an indication of operation until hand reset.
9. All relay contracts shall be silver plated and shall be capable of breaking the maximum current which can occur in the protection circuit in which the relay is located.
10. Test plugs or blocks shall be provided to allow relay testing and calibration from the front of the panel without disconnecting wirings. Relay terminals connected to the current transformers shall be automatically short circuited, when the relays are withdrawn.
11. The relays shall be thermally rated such that the operating time of the relay at the highest practical current levels on any combination of current and time multiplier setting shall not exceed the thermal withstand time of the relay.
12. The relays shall conform to the relevant requirements of IEC standard 60255

Trip contacts from CISC/Buchholz, oil thermometer and PRV from the transformer (in case of Oil Immersed Transformer) shall be wired for tripping the circuit breaker through suitable three auxiliary trip relays with a 50 V.D.C. supply and mechanical hand reset flag indication, or trip contacts from Thermal Relay (in case of Cast Resin Transformer) shall be wired for tripping the circuit breaker through the same auxiliary trip relay.

2.11 Auxiliary Switches:

Auxiliary switches shall be provided to interrupt the D.C. supply to trip coil and the three auxiliary trip relays immediately after their operation has been completed.

All necessary auxiliary switches for indication, protection control, supervisory and other services, plus two spare ways normally open and two spare ways normally closed shall be provided on each C.B. panel. These switches shall be wired to a suitable terminal box on the back of panels.

All switches shall be of robust pattern with wiping contacts and shall be fitted in easily accessible positions adequately protected.

2.12 Healthy Trip Indication:

15 Watt 50 V. D.C. lamp with series limiting resistance operated through a spring loaded push test switches shall be provided.

2.13 Group Alarm:

The automatic and manual tripping of each C.B. in the substation shall close a two wire circuit to operate the remote alarm and indication relay, located in concerned control center. Re-set of the alarm indication shall be done by the C.B. trip and close control switch.

2.14 Miniature Circuit Breaker for Control Circuit:

All MCBs used in 11 KV switchgear control circuit shall be fitted with auxiliary contacts wired to terminals for MCB tripped alarm.

2.15 Instruments:

Dial type switchboard pattern, flush mounted, M I ammeters shall be provided where stated in the attached schedule of equipment. A moving iron switchboard pattern ammeter shall be connected to yellow phase and shall have a reversible scale graduated to suit C.T.'s double ratio for loose transformer panel.

2.16 Test Terminal Blocks:

Over current and earth leakage transformer secondary wiring shall be connected through terminal block provided with change-over links to permit easy ratio change and testing.

The terminal block shall be mounted in front of the panels and suitable insulated and provided with a detachable dust proof cover.

2.17 Pilot cable Terminations:

The pilot cable shall be terminated at the rear of its 11 KV C.B. panel, in a suitable terminal cabinet arranged to give easy access to the terminations and fitted with suitable cable glands with earth tag as specified. Each terminal block shall be of the circuit selector type with insulated bridging plugs.

The terminal block shall be arranged to receive multi-core cable and switchboard services. Bus-wires between terminal cabinets shall be provided to enable circuit routing and selection.

The multi-core pilot cable provides the following services:

- i) One pair : of 2.5 sq. mm. conductors for Solkor feeder protection pilot Cores.
- ii) Two pairs: (do) inter-trip and interlock circuits.
- iii) Two pairs: of 0.625 sq. mm. conductor for substation telephone services, Marked T1, T2, T3 & T4.
- iv) Three pairs: (do) remote alarm and indication circuits with one core Common return and five separate route circuits.

Each feeder panel is provided with the following services:

- i) One pair : Solkor protection circuit.
- ii) One pair : Inter-trip circuit.

Each substation switchboard shall be provided with the following marshalled through a terminal block located at the rear of transformer C.B. panel:

- One pair : 50 V. D.C. supply from tripping battery to the switchboard.

NB: All outgoing circuits to the services, inside the substation shall be 2.5 sq. mm. stranded copper cables inside galvanized conduit.

2.18 Shutters for Busbars and Circuit Breakers:

For the safety in operation and maintenance of 11 KV switchgear panel, the Busbar shutters shall be identified with red colour and the feeder shutters with White colour. Also the shutters shall be clearly marked with Busbar and Feeder respectively. Using stickers for marking is not acceptable. The shutters for Busbar and cable shall be operated independently and not together. Phases identification R, Y, B in colors shall be marked. Phases to be identified with color coded mark for Red, Yellow, and Blue. Using color stickers is also not acceptable.

2.19 Pressure Release Flappers:

The switchgear shall be provided with separate pressure release flappers at suitable locations of various compartments to release the overpressure resulting from flashover that may occur.

The pressure release flappers should be fast acting and should operate in less than 10 milli-seconds. Evidence of testing on at least one chamber at International laboratory to be provided.

2.20 HV Indicator and Phase Comparator:

Each panel on 11 KV switchgear shall be equipped with three phase capacitive voltage indicating device on the front of its operating panel to detect the presence or absence of operating voltage in the cables.

This capacitive coupled device to be provided with the provisions for checking the synchronization of phases and should comply with IEC 61243-5.

3. TYPE TESTS ON EQUIPMENT:

One complete 4-Panel switchboard comprising of 2 feeder panels and 2 transformer panels [match or similar for any voltage between (11 KV to 33 KV) irrespective to any technical parameters stipulated in PQ document] shall undergo type tests as stipulated in the relevant IEC/BS, which shall be carried out in full compliance with the standard [as clause 1. general (MINISTRY SYSTEM, CLIMATIC CONDITIONS, STANDARD SPECIFICATION)] from an independent acknowledged international testing laboratory (Type test certificates issued from independent acknowledged international testing laboratory (ANY MEMBER OF STL LIAISON - ASTA, CESI, CPRI, ESEF, JSTC, KEMA, KERI, PEHLA, SATS, STLNA, VEIKI or, ZKU)) or (any international reputed electrical testing accreditation authority has certificate ISO/IEC 17025-The laboratory shall be accredited with the international standard ISO/IEC 17025 by an Accreditation Body that is itself accredited in accordance with ISO/IEC 17011, either through the GCC Accreditation Center or through the International Laboratory Accreditation Cooperation (ILAC)). (type test in factory is not accepted).

The following type tests shall be carried out.

- a) Mechanical performance test; the operating mechanism shall be in service during this test.
- b) Temperature rise test.
- c) Making capacity and breaking capacity tests.
- d) Short- time current test.
- e) Impulse test.

Internal Arc Test:

- All switchgear shall be designed and tested for internal arc protection, generally in accordance with IEC 62271-200.
- The level of protection shall be such as to protect authorized personnel, in the event of an internal arc within the switchgear. Accessibility type A shall apply. The classification of Internal Arc certification is AFLR.
- It is not sufficient for tests to prove only that the pressure relief flaps open correctly. The manufacturer shall certify the performance in terms of the Criteria stated in Annexure-A. (IEC 62271-200).
- The applicable fault level shall be a minimum of 31.5 KA, The time duration of arc shall not be less than 1.0 second.

4. DATA TO BE SUBMITTED:

The manufacturer of the 11 KV switchgear shall submit the following technical data for the pre-qualification study.

- 4.1 All the technical schedules filled correctly and fully.
- 4.2 The manufacturer of the 11 KV switchgear should mention the factory name and country of origin of vacuum interrupter.
- 4.3 General layout of 11 KV switchgear showing the front elevation, side elevation and plan complete with all major parts and with dimensions.
- 4.4 General layout of 11 KV switchgear showing constructional details of major components dimensions (Scale not less than 1:10).
- 4.5 Single line diagrams, controls circuits, wiring diagrams, list of inputs/outputs for remote monitoring & control (where applicable) for each switchgear unit described in the specification.
- 4.6 Type test certificate along with complete type test reports for the switchgear as clause (3) (TYPE TESTS ON EQUIPMENT).
- 4.7 Manufacturer's original catalogues and other technical literatures.
- 4.8 Other evidences/documents as specified in different clauses of the specification

دولة الكويت

STATE OF KUWAIT

Ministry of Electricity, Water, and Renewable Energy

وزارة الكهرباء والماء والطاقة المتجددة

SCHEDULE "A"

TECHNICAL SCHEDULE & GUARANTEED PARTICULARS FOR 11 KV SWITCHGEAR

This schedule must be completed in full, signed and stamped.

S.No.	Description	Unit	Particulars
	<u>I – Busbars:</u>		
1.	Kuwait continuous current carrying capacity (55 Deg. C)	Amps	
2.	BSS continuous current carrying capacity (standard rating)	Amps	
3.	Designed current density	Amps/sq.mm	
4.	Cross-sectional area of copper and Dimensions of section	Sq.mm.	
5.	Minimum distance between phase and earth	mm	
6.	Type and details of busbar support Insulators		
7.	Thickness of PVC cover	mm	
8.	Maximum temperature rise at normal rating and frequency	Deg. C.	
9.	Type of busbars insulation		
	<u>II – Weights:</u>		
1.	Approximate weight of heaviest part of Switchgear to be lifted during erection	Kgs	
2.	Weight of circuit breaker unit	Kgs	
3.	Weight of one complete panel (including C.B.)	Kgs	
	<u>III – Dimensions:</u>		
1.	One complete panel width x height x depth	Cms	
2.	Space required for complete withdrawal of C.B	Cms	
3.	Minimum space required between the wall and The rear of switchgear	Cms	
4.	Manufacturer's type reference No.		

SIGNED : _____
(MANUFACTURER)

SIGNED : _____
(LOCAL AGENT)
(if applicable)

NAME : _____

NAME : _____

ADDRESS : _____

ADDRESS : _____

DATE : / /20

DATE : / /20

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This schedule must be completed in full, signed and stamped.

S.No.	Description	Unit	Particulars
	<u>IV- 11 KV Circuit Breaker:</u>		
	<u>Manufacturer's Type Ref No:</u>		
1.	Type indoor or outdoor		Indoor metal-clad
2.	Rated voltage	KV	
3.	Kuwait normal continuous rating at normal voltage and frequency	Amps	
4.	IEC/BSS normal continuous rating at normal voltage and frequency (Standard rating)	Amps	
5.	Maximum temperature rise of contacts at normal rating and frequency.	Deg. C.	
6.	Method of closing		Spring mechanism
7.	Normal voltage of tripping coil.	DC V.	50
8.	Normal voltage of closing coil	DC V.	50
9.	Normal current of tripping coil	Amps	
10.	Minimum voltage of tripping coil	DC V	
11.	Normal current of tripping coil in case of minimum voltage	Amps	
12.	<u>Breaking capacity:</u>		
	a) Symmetrical current	K. Amps	
	b) Asymmetrical current	Peak K Amps	
13.	Making current	K. Amps	
14.	<u>Short time current:</u>		
	a) 1 second.	K. Amps	
	b) 3 seconds.	K. Amps.	
15.	No. of series breakers per phase		

SIGNED : _____
(MANUFACTURER)

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(LOCAL AGENT)
(if applicable)

NAME : _____

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This schedule must be completed in full, signed and stamped.

S.No.	Description	Unit	Particulars
16.	Does the magnetic effect of load current increase the contact pressure	Yes/No	
17.	Are phases completely separated	Yes/No	
18.	Voltage drop across the main contact at normal full load current		
19.	Type of main contacts		
20.	Type of arcing contacts and arc controls device		
21.	a) Arc duration time	m. sec.	
	b) Opening time	m. sec.	
	c) Closing time	m. sec.	
22.	<u>Minimum clearance:</u> a) Between phases b) Between phases and earth c) Between contacts when in the open position.		
23.	Materials used for the circuit breaker lifting rod		
24.	Materials used for phase separation		
25.	Materials used for circuit breaker bushing insulators and minimum clearance to earth		
26.	Materials used for spout insulators		
27.	Type of plug in contacts and method adopted to exclude gas formation in spout insulators.		
28.	<u>Short time current rating of 11 KV earthing switch:</u> a) 1 second b) 3 seconds	KA KA	

SIGNED : _____
(MANUFACTURER)

NAME : _____

ADDRESS : _____

DATE : / /20

SIGNED : _____
(LOCAL AGENT)
(if applicable)

NAME : _____

ADDRESS : _____

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TECHNICAL SCHEDULE & GUARANTEED PARTICULARS FOR 11 KV SWITCHGEAR

This schedule must be completed in full, signed and stamped.

S.No.	Description	Unit	Particulars
29.	Minimum clearance in vacuum between contacts when in the open position.	mm	
30.	Material used for circuit breaker pole cylinder.		
31.	Impulse voltage withstand of C.B.	KV	
32.	Maximum vacuum loss per year	%	
33.	Protection Degree of 11 KV SWITCHGEAR	IP (class)	

SIGNED : _____
(MANUFACTURER)

NAME : _____

ADDRESS : _____

DATE : / /20

SIGNED : _____
(LOCAL AGENT)
(if applicable)

NAME : _____

ADDRESS : _____

DATE : / /20