













A. TECHNICAL SPECIFICATIONS





No	Item	Description	Quantity	Reference Picture
1	Round Pole	<p>High tension round pole 11 m galvanized with all accessories.</p> <ul style="list-style-type: none"> • General Requirements: The materials shall be of first-class quality and designed for continuous satisfactory operation as continuity of supply is of prime importance and to operate satisfactorily under variation of load, voltage and short circuit or other conditions which may occur on the system provided that these variations are within the assigned rating of the apparatus. The materials used shall be suitable for the following climatic conditions. <ol style="list-style-type: none"> 1- Temperature 2- Sunshine temperature 3- Air humidity 4- Wind Velocity 5- Composition of Soil • materials and process: 400 Volts 3 phases, 4 wires with neutral solidly grounded. 50 Hz, the poles shall be made from longitudinally welded tube sections of hot rolled structural carbon steel in accordance with JIS-G-3444 or in accordance with BS-4360 or in accordance with any international equivalent standards like DIN 17100 with considering the design factor of safety for design of the poles shall be considered (2.0). • thickness of the pole: <ul style="list-style-type: none"> - bottom section: 4 mm - middle section: 4 mm - top section :3.5 mm <p>Total weight :155 KG Working Load (kgf): 285 KG Type: 85 microns</p>	2	





<p>2</p>	<p>250 KVA transformer</p>	<p>Distribution transformer 250 KVA (11/0.416 kv) outdoor ICE76 with two indicators for showing the transformer temperature</p> <ul style="list-style-type: none"> • Scope This specification covers the design, manufacturing, testing, supply, delivery, and performance requirements of three phase 11/0.416 kV outdoor type distribution transformers for use in the electricity distribution networks of Iraq. • Technical specification <ul style="list-style-type: none"> -Rated Voltage: HV 11 kV LV 416 V -Frequency 50 Hz -Number of Phases 3 Power ratings 100 kVA, 250 kVA, 400 kVA and 630 kVA -Type Oil immersed, hermetically sealed (bolted type) -Standard IEC 60076 Cooling Self-cooled (ONAN) -Voltage Variation Off-load tap changer with 5 positions in the HV winding giving + 2 x 2.5 %. -Windings Copper only -Core Grain orientated silicon steel, step-lap metered joints - HV and LV Bushings Outdoor type - -Vector Group Dyn 11 	<p>1</p>	
<p>3</p>	<p>Circuit box</p>	<p>Box for the circuit braker.</p> <ul style="list-style-type: none"> • Busbar type: made of cooper • size (80*60*20 cm) • with bus bar (10*30 mm) • volt gauge and Amp. + circuit braker 2*250 amp • circuit double setting vendor list according to the DOE plans. 	<p>1</p>	





4	Wire	<p>Copper wire 50 mm²</p> <ul style="list-style-type: none"> • GENERAL REQUIREMENTS: The material shall be of first-class quality and designed for continuous satisfactory operation as continuity of supply is of prime importance and to operate satisfactorily under variation of load, voltage and short circuit of other conditions which may occur on the system provided that these variations are within the designed rating of the apparatus. • The material used shall be suitable for the following climate and soil condition <ol style="list-style-type: none"> 1- Ambient temperature 2- Sun temperature 3- Air humidity 4- System Data a. Nominal voltage 400 Volts System 3 phases, 4 wires with neutral solidly grounded. Frequency 50 HZ. 	50	
5	Steel channel bracket	<p>Galvanized steel channel.</p> <ul style="list-style-type: none"> • Size: bracket (50*100*6) mm • Length: length 220 cm • Material: Stainless Steel • Design: Standard • Finishing: Polished 	3	
6	Steel angle 70 cm length	<p>Galvanized steel angle.</p> <ul style="list-style-type: none"> • Size: bracket (50*50*5) mm • Length: 70 cm length • Material: Stainless Steel • Design: Standard • Finishing: Polished 	2	




7	<p>Steel angle 220 cm length</p>	<p>Galvanized steel angle.</p> <ul style="list-style-type: none"> • Size: bracket (50*50*5 mm) mm • Length: 220 cm length • Material: Stainless Steel • Design: Standard • Finishing: Polished 	3	
8	<p>Pole clamp</p>	<ul style="list-style-type: none"> • High tension pole clamp • Type of material: stainless steel • Type of screw: galvanized screws • Shape: C shape for transformer base 	8	
9	<p>Pin insulator</p>	<p>Pin insulator with galvanized spindle- 11 KVA the pin insulator must be:</p> <ul style="list-style-type: none"> • High mechanical strength • Good performance of hydrophobicity and anti-pollution • Excellent electrical Performance • Small volume and light weight. 	9	
10	<p>Low tension pin insulator</p>	<p>Low tension pin insulator with accessories (1*180+1*140) for 11 m round pole</p>	8	





11	Linkage fuse	Linkage fuse 11 Kv with fuse holder with element fuse according to DOE sample	1	
12	Lighting arrester	lighting arrester 11 KV (10 KA) with base	1	
13	Cable 1*70	<p>cables size (1*70) mm² copper PVC, 0.6K/1 with two cover layers</p> <ul style="list-style-type: none"> • The insulator must have high insulation resistance. • It should have high dielectric strength so that it does not allow the leakage current to pass through it. • The material must have good mechanical strength. • The dielectric material should be capable of operating at high temperature. • It should have low thermal resistance. • It should have a low power factor 	10	
14	Cable 1*95	<p>cable size (1*95) mm² copper PVC with two cover layers</p> <ul style="list-style-type: none"> • The insulator must have high insulation resistance. • It should have high dielectric strength so that it does not allow the leakage current to pass through it. • The material must have good mechanical strength. • The dielectric material should be capable of operating at high temperature. • It should have low thermal resistance. • It should have a low power factor. 	60	




15	Cable 1*150	<p>cable size (1*150) mm² copper PVC with two cover layers</p> <ul style="list-style-type: none"> • The insulator must have high insulation resistance. • It should have high dielectric strength so that it does not allow the leakage current to pass through it. • The material must have good mechanical strength. • The dielectric material should be capable of operating at high temperature. • It should have low thermal resistance. • It should have a low power factor 	30	
16	Copper terminal	<p>Copper terminal size (50) mm²</p> <ul style="list-style-type: none"> • Using for the connection of cables size (1*50) mm² 	7	
17	Copper terminal	<p>copper terminal size (70) mm²</p> <ul style="list-style-type: none"> • Using for the connection of cables size (1*70) mm² 	4	
18	Copper terminal	<p>copper terminal size (95) mm²</p> <ul style="list-style-type: none"> • Using for the connection of cables size (1*95) mm² 	8	





19	Copper terminal	<p>copper terminal size (150) mm²</p> <ul style="list-style-type: none"> Using for the connection of cables size (1*150) mm² 	8	
20	Connection tools	Connection tools aluminium\copper (35-150 mm)	11	
21	Connection tools	Connection tools aluminium\copper (120-35 mm)	1	
22	High tension Aluminium binding wire	<p>High tension aluminium binding wire 95 mm² (SWG-9)</p> <ul style="list-style-type: none"> The material used to manufacture the aluminium binding wire shall be O grade with the following properties: The tensile strength of the binding wire shall be not more than 90N/mm² 	5	

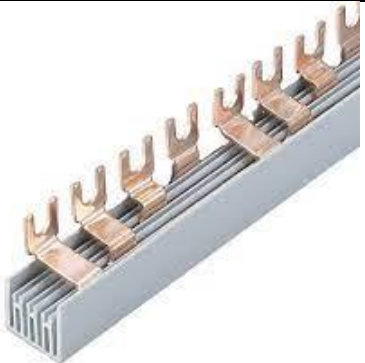
23	low tension Aluminium binding wire	<p>Low tension aluminium binding wire 95 mm² (SWG-11)</p> <ul style="list-style-type: none"> The binding wires shall be round smooth uniform and without any sharp edges that may cause injuries. The binding wire shall be suitable for manual application without use of a plier. 	2.4	
24	Plastic tape cable tie	Black plastic tape cable tie size (120-50) cm Europe origin	0.4	
25	Copper earth rod	<p>Copper earth rod 1.5 m.l 16 mm diameter with accessories</p> <ul style="list-style-type: none"> The earth rods shall have a nominal outside diameter of 13 mm and a nominal length of 1 50 mm. The rod shall consist of a steel core of minimum grade AS 3679.1-250. The copper sheath shall be either molecularly bonded or extruded so as to maintain intimate contact with the steel core of the earth rod. The application of the copper sheath shall prevent any electrolytic action to be initiated by moisture ingress between the copper and the steel. 	3	
26	Earthing requirements	<p>earthing requirements (salt + sand + water + wood charcoal) GEM</p> <ul style="list-style-type: none"> The earthing electrode should be situated at a place at least 1.5 meters away from the building (outside) whose installation system is being earthed The minimum sectional area of earth lead wired should not be 	2	

		<p>less than 0.02 sq. inch and not more than 0.1 sq.inch.</p> <ul style="list-style-type: none"> For effective earthing, loose earth and coal salt mixture should be filled around the earth electrode. All the joints in the earth wire should be firmly done with nuts and bolts of the same material as of earth wire. 		
27	Strap	<p>Stainless steel strap</p> <ul style="list-style-type: none"> Standard diameter used for transformers connection 	4	
28	Strap	<p>Stainless steel buckle</p> <ul style="list-style-type: none"> Standard diameter used for transformers connection 	4	
29	galvanized screw size 210*16 mm	<p>Galvanized screw</p> <ul style="list-style-type: none"> size 210*16 mm for the transformer base. 	4	

30	galvanized screw size 160*16 mm	<p>Galvanized screw</p> <ul style="list-style-type: none"> size 160*16 mm for fixing the transformer on the base. 	4																																																																
31	galvanized screw size 12*30	<p>Galvanized screw</p> <ul style="list-style-type: none"> size 12*30 mm for fixing the box 	4																																																																
32	cement	<p>Cement bag 50 kg</p> <ul style="list-style-type: none"> Ordinary Portland cement The specification must be according to (IQS 5-1984) <table border="1" data-bbox="331 1218 874 1570"> <thead> <tr> <th>Physical Properties</th> <th>Specification</th> <th>Test Results</th> <th>Limit of IQS 5/1984^[9]</th> </tr> </thead> <tbody> <tr> <td>Specific surface area (Blaine method), (m²/kg)</td> <td rowspan="4">R.G.D 198/1990^[9]</td> <td>430</td> <td>230 m²/kg lower limit</td> </tr> <tr> <td>Setting time (vacate apparatus)</td> <td>1:10</td> <td>Not less than 45min</td> </tr> <tr> <td>Initial setting, hrs.min</td> <td>3:10</td> <td>Not more than 10 hrs</td> </tr> <tr> <td>Final setting, hrs.min</td> <td></td> <td></td> </tr> <tr> <td>Compressive strength MPa</td> <td rowspan="3">R.G.D 472/1993^[10]</td> <td>20.0</td> <td>15 MPa lower limit</td> </tr> <tr> <td>For 3-day</td> <td>30.0</td> <td>23 MPa lower limit</td> </tr> <tr> <td>For 7-day</td> <td></td> <td></td> </tr> <tr> <td>Expansion by Autoclave method</td> <td></td> <td>0.38</td> <td>0.8 % upper limit</td> </tr> <tr> <th>Oxides composition</th> <th>Specification</th> <th>Content %</th> <th>Limits of IQS 5/1984.</th> </tr> <tr> <td>CaO</td> <td rowspan="10">R.G.D 472/1993^[10]</td> <td>61.5</td> <td>-</td> </tr> <tr> <td>SiO₂</td> <td>21.87</td> <td>-</td> </tr> <tr> <td>Al₂O₃</td> <td>4.81</td> <td>-</td> </tr> <tr> <td>Fe₂O₃</td> <td>3.04</td> <td>-</td> </tr> <tr> <td>MgO</td> <td>3.40</td> <td>5 % Max.</td> </tr> <tr> <td>SO₃</td> <td>2.35</td> <td>2.8 % Max.</td> </tr> <tr> <td>L.O.I</td> <td>1.53</td> <td>4 % Max.</td> </tr> <tr> <td>Insoluble material</td> <td>1.5</td> <td>1.5 % Max.</td> </tr> <tr> <td>Lime Saturation Factor, (L.S.F)</td> <td>0.8</td> <td>(0.66-1.02)</td> </tr> </tbody> </table>	Physical Properties	Specification	Test Results	Limit of IQS 5/1984 ^[9]	Specific surface area (Blaine method), (m ² /kg)	R.G.D 198/1990 ^[9]	430	230 m ² /kg lower limit	Setting time (vacate apparatus)	1:10	Not less than 45min	Initial setting, hrs.min	3:10	Not more than 10 hrs	Final setting, hrs.min			Compressive strength MPa	R.G.D 472/1993 ^[10]	20.0	15 MPa lower limit	For 3-day	30.0	23 MPa lower limit	For 7-day			Expansion by Autoclave method		0.38	0.8 % upper limit	Oxides composition	Specification	Content %	Limits of IQS 5/1984.	CaO	R.G.D 472/1993 ^[10]	61.5	-	SiO ₂	21.87	-	Al ₂ O ₃	4.81	-	Fe ₂ O ₃	3.04	-	MgO	3.40	5 % Max.	SO ₃	2.35	2.8 % Max.	L.O.I	1.53	4 % Max.	Insoluble material	1.5	1.5 % Max.	Lime Saturation Factor, (L.S.F)	0.8	(0.66-1.02)	4	
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33		gravel and sand	<p>gravel and sand</p> <ul style="list-style-type: none"> Fine gravel (4-8) mm, and medium size of sand (0.42-2.0) mm must be used 	1.5																																																															

<p>34</p>	<p>Circuit breaker 630 A 3ph</p>	<p>Circuit breaker 630 A 3ph</p> <ul style="list-style-type: none"> Type used: ABB, schneider, Seimens or similar. rated current: 400 A at 40 °C rated operational voltage: 690 V AC 50/60 Hz Network type: AC Network frequency: 50/60 HZ Performance level: F 36 kA 415 V AC rated impulse withstands voltage 8 kV Number of Phases: 3 Phase 	<p>2</p>	
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<p>36</p>	<p>Circuit breaker 250 A 3ph</p>	<p>Circuit breaker 250 A 3ph</p> <ul style="list-style-type: none"> Type used: ABB, schneider, Seimens or similar rated current: 250 A at 40 °C rated operational voltage: 690 V AC 50/60 Hz Network type: AC Network frequency: 50/60 HZ Performance level: F 36 kA 415 V AC rated impulse withstands voltage 8 kV Number of Phases: 3 Phase 	<p>2</p>	

37	Circuit breaker 100 A 3ph	<p>Circuit breaker 100 A 3ph A</p> <ul style="list-style-type: none"> Type used: ABB, schneider, Seimens or similar rated current: 100 A at 40 °C rated operational voltage: 690 V AC 50/60 Hz Network type: AC Network frequency: 50/60 HZ Performance level: F 36 kA 415 V AC rated impulse withstands voltage 8 kV Number of Phases: 3 Phase 	2	
38	ATS 630 A 3ph	<p>ATS 630 A 3ph</p> <ul style="list-style-type: none"> Frame Current: 630 A Rated Operating Current (Optional): 500A, 630A Breaking Current: 35 KA Rated Operating Voltage: 400V AC Frequency: 50/60 Hz 	2	
39	changeover switch 400 A 3ph	<p>changeover switch 400 A 3ph</p> <ul style="list-style-type: none"> Type of material Metallic Installation site Indoors Fixing method Floor/Wall Normal service conditions Ambient temperature from -5°C to +40°C Atmospheric conditions - relative humidity 50% at 40°C 90% at 20°C 	2	
40	changeover switch 250 A 3ph	<p>changeover switch 250 A 3ph</p> <ul style="list-style-type: none"> Type of material Metallic Installation site Indoors Fixing method Floor/Wall Normal service conditions Ambient temperature from -5°C to +40°C Atmospheric conditions - relative humidity 50% at 40°C 90% at 20°C 	2	

41	Main Bus bar 900 A 3ph	Main Bus bar 900 A 3ph <ul style="list-style-type: none"> • Special type used only for transformer wire connection 	1	
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B. WARRANTY & DOCUMENTS:

The Contractor shall submit a detailed program covering the design, manufacture and testing of the Distribution Transformers within one month of receipt of the contract award. Reports shall subsequently be submitted at intervals, outlining progress. The Employer or its nominated entity shall always have free entry, while work on the contract is being performed, to all parts of the manufacturer’s works which concern the processing of the work. The manufacturer shall afford the Employer without charge, all reasonable facilities to verify that the equipment being furnished is in accordance with this specification.

C. GENERAL REMARKS AND SPECIAL CONDITION

- The transformer shall be tested according to the directions and rules of the “Directorate of Electricity” and shall be transported to the Monastery after the testing.
- The transformer will not be taken over without “passed” result test.
- Testing result shall be delivered with transformer to the site.
- The price shall include all the required tests according to directions and rules of Directorate of electricity.