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| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **DATA SHEETS FOR POWER TRANSFORMERS**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
| D04 | Sep. 2024 | AFC | H.Shakiba | M.Fakharian | M.Sadeghian |  |
| D03 | Apr. 2023 | AFC | H.Shakiba | M.Fakharian | A.M.Mohseni |  |
| D02 | Jul. 2022 | IFA | H.Shakiba | M.Fakharian | M.Mehrshad |  |
| D01 | May. 2022 | IFA | H.Shakiba | M.Fakharian | M.Mehrshad |  |
| D00 | Feb. 2022 | IFC | H.Shakiba | M.Fakharian | M.Mehrshad |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **Client Approval** |
| **Class:1** | | **Client Doc. Number: F0Z-709028** | | | | |
| **Status:** | **IDC: Inter-Discipline Check**  **IFC: Issued For Comment**  **IFA: Issued For Approval**  **AFD: Approved For Design**  **AFC: Approved For Construction**  **AFP: Approved For Purchase**  **AFQ: Approved For Quotation**  **IFI: Issued For Information**  **AB-R: As-Built for CLIENT Review**  **AB-A: As-Built –Approved** | | | | | |

**REVISION RECORD SHEET**

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| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
| **1** | X | X | X | X | X | **51** |  |  |  |  |  |
| **2** | X | X | X | X | X | **52** |  |  |  |  |  |
| **3** | X | X | X |  |  | **53** |  |  |  |  |  |
| **4** | X | X |  |  |  | **54** |  |  |  |  |  |
| **5** | X | X |  |  |  | **55** |  |  |  |  |  |
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| **7** | X | X |  |  |  | **57** |  |  |  |  |  |
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| **Technical Data Sheet for 1250 KVA Power Transformers** | | | |
| --- | --- | --- | --- |
| **Item** | **Description** | **Purchaser Requirement** | **Manufacturer Data** |
| **1.Generel** | | | |
| 1.1 | Manufacturer's Name | By Vendor |  |
| 1.2 | Transformer Tag Number | GCS-TR-001 & GCS-TR-002 |  |
| 1.3 | Quantity | 2 |  |
| 1.4 | Standard | IPS-M-EL-152 (3)  BK-GNRAL-PEDCO-000-EL-SP-0004 |  |
| 1.5 | Kind/Construction of Transformer | Oil Immersed,  Hermitically Sealed With Pillow Nitrogen  Separate High & Low Windings  Two Winding |  |
| 1.6 | Rated Power in Service Condition | 1250 kVA |  |
| 1.7 | Supply Frequency | 50 Hz ± 5 % |  |
| 1.8 | Winding Connection/Vector Group | Dyn11 |  |
| 1.9 | Location | Outdoor Under Shelter, Safe Area |  |
| 1.10 | Primary Winding Rated Voltage | 11kV |  |
| 1.11 | Secondary Winding Rated Voltage | 0.42 KV |  |
| 1.12 | Tapping Range | ±5%, ±2.5% & 0 , Off Load |  |
| 1.13 | Tapping Place | On HV Winding |  |
| **2. Environmental Conditions (Process Basis Of Design, BK-GNRAL-PEDCO-000-PR-DB-0001)** | | | |
| 2.1 | Ambient Temperature Range | 0 ~ 52°C |  |
| 2.2 | Installation Elevation | 12m (Above Sea Level) |  |
| 2.3 | Area Pollution Class | Class 4 (Very High) |  |
| 2.4 | Seismic Loads | Zone 3 UBC |  |
| 2.5 | Relative Humidity | 100% |  |
| 2.6 | Cooling System | ONAN |  |
| 2.7 | Primary Cooling Media | Mineral Oil |  |
| **3. Primary Winding Voltage Rating** | | | |
| 3.1 | Highest System Voltage | 12kV |  |
| 3.2 | Rated Lightning Impulse Withstand Voltage | 75kV |  |
| 3.3 | Rated Short Duration Power Frequency Withstand Voltage(rms) | 28kV |  |
| **4. Secondary Winding Voltage Ratings** | | | |
| 4.1 | Highest System Voltage | 1 kV |  |
| 4.2 | Rated Lightning Impulse Withstand Voltage | 3 kV |  |
| 4.3 | Rated Short Duration Power Frequency Withstand Voltage(rms) | 1 kV |  |
| 4.4 | Primary Winding | Delta Winding |  |
| 4.5 | Secondary Winding | Star, (Solidly Grounded) |  |
| 4.6 | Insulation Type | By Vendor |  |
| 4.7 | Insulation Class | Class A (Shall Be Suggested By Vendor) |  |
| 4.8 | Average Winding Temperature Rise (55°C Ambient) | 65°C, Acc. to IEC 60076-2, Clause 4.2 |  |
| 4.9 | Top Oil Temperature Rise (55°C ambient) | 60°C, Acc. to IEC 60076-2, Clause 4.2 |  |
| 4.10 | Oil Preservation System | Not Applicable (Sealed Type) |  |
| 4.11 | Short Circuit Level of HV System | Primary: 25 kA |  |
| 4.12 | Short Circuit Withstand Duration | Primary: 1 S |  |
| 4.13 | Required Short Circuit Impedance @75°C | 5% |  |
| 4.14 | Zero Sequence Impedance | By Vendor |  |
| 4.15 | X/R Ratio at Principal Tap | By Vendor |  |
| 4.16 | Efficiency at Full Load & PF=0.8 Lag (100% Load) | By Vendor |  |
| 4.17 | Efficiency at Full Load & PF=0.8 Lag (75% Load) | By Vendor |  |
| 4.18 | Efficiency at Full Load & PF=0.8 Lag (50% Load) | By Vendor |  |
| **5. Primary Winding Characteristics** | | | |
| 5.1 | Reactance [Ω] | By Vendor |  |
| 5.2 | Resistance[Ω] @ 75°C | By Vendor. |  |
| **6. Secondary Winding Characteristics** | | | |
| 6.1 | Reactance[Ω] | By Vendor |  |
| 6.2 | Resistance[Ω] @ 75°C | By Vendor |  |
| **7.Tolerances** | | | |
| 7.1 | Voltage Ratio at Principal Tap & No-Load | ±0.5 % |  |
| 7.2 | Voltage Ratio at Other Tapping | ±0.5 % |  |
| 7.3 | Voltage | ±10 % |  |
| 7.4 | Frequency | ±5 % |  |
| 7.5 | Short Circuit Impedance at Principal Tap | ±10% of Declared Value |  |
| 7.6 | Short Circuit Impedance at Other Tapping | ±15% of Declared Value |  |
| 7.7 | Anticipated Unbalance Loading in Percent of Rated Power | 10 % |  |
| 7.8 | Core Construction | Laminated Silicon Steel |  |
| 7.9 | Flux Density in the Magnetic Circuit @Nominal Frequency & Voltage | By Vendor |  |
| 7.10 | No-Load Loss [W] | By Vendor |  |
| 7.11 | Full Load Total Loss [W] | By Vendor |  |
| 7.12 | Inrush Current | By Vendor |  |
| 7.13 | Short Circuit Loss | By Vendor |  |
| 7.14 | I2R Loss at Rated Current & Principal Tap | By Vendor |  |
| 7.15 | Stray Load Loss at Rated Current & Principal Tap | By Vendor |  |
| 7.16 | 11 kV Cables Size & Number | Note 1 |  |
| 7.17 | External Terminations, Primary Side (Exposed Bushings/Cable Box) | Cable Box |  |
| 7.18 | 0.42 kV Cable Size & Number | Note 1 |  |
| 7.19 | Type & Size of Cable Glands (Power Cable) | By Vendor |  |
| 7.20 | Type & Size of Cable Glands (Control Cable) | By Vendor |  |
| 7.21 | Bushing Type | Acc .to IPS 152 |  |
| 7.22 | Dimension (W X D X H) [mm] | By Vendor |  |
| 7.23 | Weight [kg] | By Vendor |  |
| 7.24 | Weight of Transformer Without Oil | By Vendor |  |
| 7.25 | Noise Level (at 1m From Transformer) [db] | Less Than 85 dB(A) |  |
| 7.26 | Oil Volume [liter] | By Vendor |  |
| 7.27 | Oil Weight [kg] | By Vendor |  |
| 7.28 | Oil Characteristics (Name/ Type/ Flash Point) | Acc. to IEC 60296 |  |
| **8.Auxiliary Equipment** | | | |
| 8.1 | Top Oil Thermometer  (in Thermometer Pocket) | Required (Can Be Measured at Low Oil Level) |  |
| 8.2 | Thermostat for Oil Temperature | Dial Type / with Alarm & Trip Switches |  |
| 8.3 | Oil Level Gauge | Magnetic Dial or Glass Type |  |
| 8.4 | Oil Filling Plug, Drain Valve, Isolating Valve | Required |  |
| 8.5 | Oil Level Indicator With Contacts (Low & High) | Required (Magnetic Type) |  |
| 8.6 | Winding Temperature Indicator with Alarm & Trip Contacts | Required (Shall be Located Close to Low Voltage Windings) |  |
| 8.7 | Oil Drain / Sampling Device | Required |  |
| 8.8 | Air Dehydrating Breathed | Not Required |  |
| 8.9 | Neutral Current Transformer | Core 1: 2000/1A, 5P10 ,10VA |  |
| 8.10 | CT to be Supplied by (Transformer Manufacturer/Purchaser) | Transformer Manufacturer |  |
| 8.11 | Earth Terminal | Two Terminals on The Bottom of Tank |  |
| 8.12 | Upper Filter Connection With Standard Seal Valve & a Plug Serving | Required |  |
| 8.13 | Pressure Relief Valve with Contact (Shall be Operated by Internal Pressure of Nitrogen) | Required |  |
| 8.14 | Gas Pressure & Vacuum Indicator for Internal Pressure of Nitrogen Gas | Required |  |
| 8.15 | Terminal Box With Gland Plate | Required |  |
| 8.16 | Instrument and CT Secondary Terminal Box | Required (Min IP55) |  |
| 8.17 | Arching Horn | Not Required |  |
| 8.18 | Drain Valve | Required |  |
| 8.19 | Lifting and Pulling Eyes | Required |  |
| 8.20 | Lugs | Fixed to Tanks for Lifting the Complete Transformer |  |
| 8.21 | HV Terminal Box with Gland Plate | Required (Min IP55) |  |
| 8.22 | LV Terminal Box with Gland Plate | Required (Min IP55) |  |
| 8.23 | Wheels, Bidirectional (Turnable by 90°) | Required |  |
| 8.24 | Transformer Radiator | By Vendor (Welded/Bolted) |  |
| 8.25 | Transformer Cover | To be Welded to Tank With a Continuous Weld |  |
| 8.26 | Thickness of Radiator Plate | By Vendor |  |
| 8.27 | Thickness of Tank Wall, Base & Cover | By Vendor |  |
| 8.28 | Tank Painting Specification | By Vendor |  |
| 8.29 | Radiator Painting Specification | By Vendor |  |
| 8.30 | Tank and Radiator Color | By Vendor |  |
| 8.31 | Radiator Connection | Detachable & Shall be Bolted to Tank |  |
| 8.32 | Rating Plate | Stainless Steel |  |
| 8.33 | Accessory Equipment Contacts Current / Voltage Rating | 5A / 250VAC |  |
| 8.34 | Accessory Equipment Contacts Type | Dry Type –DPDT/ 230VAC |  |
| 8.35 | Routine Tests Including | IEC60076 |  |
| 8.36 | a) Measurement of Winding Resistance | Witness & Report |  |
| 8.37 | b) Measurement of Voltage Ratio & Check of Voltage Vector Relationship | Witness & Report |  |
| 8.38 | c) Measurement of Impedance Voltage (Principal Tapping) Short-Circuit Impedance & Load Loss | Witness & Report |  |
| 8.39 | d) Measurement of No-Load Loss & Current | Witness & Report |  |
| 8.40 | e) Impedance & Load Losses at Rated Current on Principal Tap | Witness & Report |  |
| 8.41 | f) Applied Potential & Induced Potential Tests | Witness & Report |  |
| 8.42 | g) Dielectric tests | Witness & Report |  |
| 8.43 | Type Test | Test Report on the Same Design Transformer is Required |  |
| 8.44 | Painting & Finish | Manufacture Standard |  |
| 8.45 | Test Report on CTs | * turns ratio error * Excitation Characteristics * Secondary resistance * Verification of low leakage flux |  |
| 8.46 | Special Tools if Any | By Vendor |  |
| 8.47 | Deviation from This Specification if Any | By Vendor |  |

Note 1: Cable size shall be according to “BK-GCS-PEDCO-120-EL-LI-0002”.

Note 2: All required accessories shall be considered by vendor.

| **Technical Data Sheet for 800 KVA Power Transformer** | | | |
| --- | --- | --- | --- |
| **Item** | **Description** | **Purchaser Requirement** | **Manufacturer Data** |
| **1.Generel** | | | |
| 1.1 | Manufacturer's Name | By Vendor |  |
| 1.2 | Transformer Tag Number | GCS-TR-003 (Fire Water Transformer) |  |
| 1.3 | Quantity | 1 |  |
| 1.4 | Standard | IPS-M-EL-152 (3)  BK-GNRAL-PEDCO-000-EL-SP-0004 |  |
| 1.5 | Kind/Construction of Transformer | Oil Immersed,  Hermitically Sealed With Pillow Nitrogen  Separate High & Low Windings  Two Winding |  |
| 1.6 | Rated Power in Service Condition | 800 kVA |  |
| 1.7 | Supply Frequency | 50 Hz ± 5 % |  |
| 1.8 | Winding Connection/Vector Group | Dyn11 |  |
| 1.9 | Location | Outdoor Under Shelter, Safe Area |  |
| 1.10 | Primary Winding Rated Voltage | 11kV | D04 |
| 1.11 | Secondary Winding Rated Voltage | 3.45 KV |  |
| 1.12 | Tapping Range | ±5%, ±2.5% & 0 , Off Load |  |
| 1.13 | Tapping Place | On HV Winding |  |
| **2. Environmental Conditions (Process Basis Of Design, BK-GNRAL-PEDCO-000-PR-DB-0001)** | | | |
| 2.1 | Ambient Temperature Range | 0 ~ 52°C |  |
| 2.2 | Installation Elevation | 12m (Above Sea Level) |  |
| 2.3 | Area Pollution Class | Class 4 (Very High) |  |
| 2.4 | Seismic Loads | Zone 3 UBC |  |
| 2.5 | Relative Humidity | 100% |  |
| 2.6 | Cooling System | ONAN |  |
| 2.7 | Primary Cooling Media | Mineral Oil |  |
| **3. Primary Winding Voltage Rating** | | | |
| 3.1 | Highest System Voltage | 12kV |  |
| 3.2 | Rated Lightning Impulse Withstand Voltage | 75kV |  |
| 3.3 | Rated Short Duration Power Frequency Withstand Voltage (rms) | 28kV |  |
| **4. Secondary Winding Voltage Ratings** | | | |
| 4.1 | Highest System Voltage | 3.6 kV |  |
| 4.2 | Rated Lightning Impulse Withstand Voltage | 20 kV |  |
| 4.3 | Rated Short Duration Power Frequency Withstand Voltage(rms) | 10 kV |  |
| 4.4 | Primary Winding | Delta Winding |  |
| 4.5 | Secondary Winding | Star, (Solidly Grounded) |  |
| 4.6 | Insulation Type | By Vendor |  |
| 4.7 | Insulation Class | Class A (Shall Be Suggested By Vendor) |  |
| 4.8 | Average Winding Temperature Rise (55°C Ambient) | 65°C, Acc. to IEC 60076-2, Clause 4.2 |  |
| 4.9 | Top Oil Temperature Rise (55°C ambient) | 60°C, Acc. to IEC 60076-2, Clause 4.2 |  |
| 4.10 | Oil Preservation System | Not Applicable (Sealed Type) |  |
| 4.11 | Short Circuit Level of HV System | Primary: 25 kA |  |
| 4.12 | Short Circuit Withstand Duration | Primary: 1S |  |
| 4.13 | Required Short Circuit Impedance @75°C | 5% |  |
| 4.14 | Zero Sequence Impedance | By Vendor |  |
| 4.15 | X/R Ratio at Principal Tap | By Vendor |  |
| 4.16 | Efficiency at Full Load & PF=0.8 lag (100% Load) | By Vendor |  |
| 4.17 | Efficiency at Full Load & PF=0.8 lag (75% Load) | By Vendor |  |
| 4.18 | Efficiency at Full Load & PF=0.8 lag (50% Load) | By Vendor |  |
| **5. Primary Winding Characteristics** | | | |
| 5.1 | Reactance [Ω] | By Vendor |  |
| 5.2 | Resistance[Ω] @ 75°C | By Vendor. |  |
| **6. Secondary Winding Characteristics** | | | |
| 6.1 | Reactance[Ω] | By Vendor |  |
| 6.2 | Resistance[Ω] @ 75°C | By Vendor |  |
| **7.Tolerances** | | | |
| 7.1 | Voltage Ratio at Principal Tap & No-Load | ±0.5 % |  |
| 7.2 | Voltage Ratio at Other Tapping | ±0.5 % |  |
| 7.3 | Voltage | ±10 % |  |
| 7.4 | Frequency | ±5 % |  |
| 7.5 | Short Circuit Impedance at Principal Tap | ±10% of Declared Value |  |
| 7.6 | Short Circuit Impedance at Other Tapping | ±15% of Declared Value |  |
| 7.7 | Anticipated Unbalance Loading in Percent of Rated Power | 10 % |  |
| 7.8 | Core Construction | Laminated Silicon Steel |  |
| 7.9 | Flux Density in the Magnetic Circuit @Nominal Frequency & Voltage | By Vendor |  |
| 7.10 | No-Load Loss [W] | By Vendor |  |
| 7.11 | Full Load Total Loss [W] | By Vendor |  |
| 7.12 | Inrush Current | By Vendor |  |
| 7.13 | Short Circuit Loss | By Vendor |  |
| 7.14 | I2R Loss at Rated Current & Principal Tap | By Vendor |  |
| 7.15 | Stray Load Loss at Rated Current & Principal Tap | By Vendor |  |
| 7.16 | 11 kV Cables Size & Number | Note 1 |  |
| 7.17 | External Terminations, Primary Side (Exposed Bushings/Cable Box) | Cable Box |  |
| 7.18 | 3.3 kV Cable Size & Number | Note 1 |  |
| 7.19 | Type & Size of Cable Glands (Power Cable) | By Vendor |  |
| 7.20 | Type & Size of Cable Glands (Control Cable) | By Vendor |  |
| 7.21 | Bushing Type | Acc .to IPS 152 |  |
| 7.22 | Dimension (W X D X H) [mm] | By Vendor |  |
| 7.23 | Weight [kg] | By Vendor |  |
| 7.24 | Weight of Transformer Without Oil | By Vendor |  |
| 7.25 | Noise Level (at 1m from Transformer) [db] | Less Than 85 dB(A) |  |
| 7.26 | Oil Volume [liter] | By Vendor |  |
| 7.27 | Oil Weight [kg] | By Vendor |  |
| 7.28 | Oil Characteristics (Name/ Type/ Flash Point) | Acc. to IEC 60296 |  |
| **8.Auxiliary Equipment** | | | |
| 8.1 | Top Oil Thermometer (in Thermometer Pocket) | Required (Can Be Measured at Low Oil Level) |  |
| 8.2 | Thermostat for Oil Temperature | Dial Type / with Alarm & Trip Switches |  |
| 8.3 | Oil Level Gauge | Magnetic Dial or Glass Type |  |
| 8.4 | Oil Filling Plug, Drain Valve, Isolating Valve | Required |  |
| 8.5 | Oil Level Indicator With Contacts (Low & High) | Required (Magnetic Type) |  |
| 8.6 | Winding Temperature Indicator with Alarm & Trip Contacts | Required (Shall be Located Close to Low Voltage Windings) |  |
| 8.7 | Oil Drain / Sampling Device | Required |  |
| 8.8 | Air Dehydrating Breathed | Not Required |  |
| 8.9 | Neutral Current Transformer | Core 1: 630/1A, 5P10 ,10VA  Core 2: 630/5A, Class X |  |
| 8.10 | CT to be Supplied by (Transformer Manufacturer/Purchaser) | Transformer Manufacturer |  |
| 8.11 | Earth Terminal | Two Terminals on The Bottom of Tank |  |
| 8.12 | Upper Filter Connection With Standard Seal Valve & a Plug Serving | Required |  |
| 8.13 | Pressure Relief Valve with Contact (Shall be Operated by Internal Pressure of Nitrogen) | Required |  |
| 8.14 | Gas Pressure & Vacuum Indicator for Internal Pressure of Nitrogen Gas | Required |  |
| 8.15 | Terminal Box With Gland Plate | Required |  |
| 8.16 | Instrument and CT Secondary Terminal Box | Required (Min IP55) |  |
| 8.17 | Arching Horn | Not Required |  |
| 8.18 | Drain Valve | Required |  |
| 8.19 | Lifting and Pulling Eyes | Required |  |
| 8.20 | Lugs | Fixed to Tanks for Lifting the Complete Transformer |  |
| 8.21 | HV Terminal Box with Gland Plate | Required (Min IP55) |  |
| 8.22 | MV Terminal Box with Gland Plate | Required (Min IP55) |  |
| 8.23 | Wheels, Bidirectional (Turnable by 90°) | Required |  |
| 8.24 | Transformer Radiator | By Vendor (Welded/Bolted) |  |
| 8.25 | Transformer Cover | To be Welded to Tank With a Continuous Weld |  |
| 8.26 | Thickness of Radiator Plate | By Vendor |  |
| 8.27 | Thickness of Tank Wall, Base & Cover | By Vendor |  |
| 8.28 | Tank Painting Specification | By Vendor |  |
| 8.29 | Radiator Painting Specification | By Vendor |  |
| 8.30 | Tank and Radiator Color | By Vendor |  |
| 8.31 | Radiator Connection | Detachable & Shall be Bolted to Tank |  |
| 8.32 | Rating Plate | Stainless Steel |  |
| 8.33 | Accessory Equipment Contacts Current / Voltage Rating | 5A / 250VAC |  |
| 8.34 | Accessory Equipment Contacts Type | Dry Type –DPDT/ 230VAC |  |
| 8.35 | Routine Tests Including | IEC60076 |  |
| 8.36 | a) Measurement of Winding Resistance | Witness & Report |  |
| 8.37 | b) Measurement of Voltage Ratio & Check of Voltage Vector Relationship | Witness & Report |  |
| 8.38 | c) Measurement of Impedance Voltage (Principal Tapping) Short-Circuit Impedance & Load Loss | Witness & Report |  |
| 8.39 | d) Measurement of No-Load Loss & Current | Witness & Report |  |
| 8.40 | e) Impedance & Load Losses at Rated Current on Principal Tap | Witness & Report |  |
| 8.41 | f) Applied Potential & Induced Potential Tests | Witness & Report |  |
| 8.42 | g) Dielectric tests | Witness & Report |  |
| 8.43 | Type Test | Test Report on the Same Design Transformer is Required |  |
| 8.44 | Painting and Finish | MFR Standard |  |
| 8.45 | Test Report on CTs | * turns ratio error * Excitation Characteristics * Secondary resistance * Verification of low leakage flux |  |
| 8.46 | Special Tools if Any | By Vendor |  |
| 8.47 | Deviation from This Specification if Any | By Vendor |  |

Note 1: Cable size shall be according to “BK-GCS-PEDCO-120-EL-LI-0002”.

Note 2: All required accessories shall be considered by vendor.