Questionnaire No.\_\_\_\_\_\_

For SF6 gas-insulated switchgear, GIS-110

Manufacturer: **“ZETO Gas-technologies” Ltd**

Oktyabrsky Avenue 79, Velikie Luki town

182100 Pskov Region

Phone: (81153) 6-38-19; 6-38-02

Fax: (81153) 6-38-45, 6-37-80

e-mail: contract@zeto.ru

# Buyer’s postal address and bank details:

Customer\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Code/phone\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fax \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of company’s director\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of installation site\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Delivery terms\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SF6 gas-insulated switchgear, GIS-110, consists of YATE-110 bays. Each YATE bay represents a set of modules: circuit breaker, combined disconnector-earthing switch, fast-act earthing switch, current transformer, coupling elements, cable inputs or air bushings, busbars, all installed in a single metal enclosure filled up with SF6.

Climatic category corresponds with GOST 15150 and GOST 15543. Climatic version is U (installation in mild climate), arrangement category is 2.

Operating conditions are the following::

- altitude – not more than 1000m;

- upper value of ambient air temperature - plus 40°С;

- lower value of ambient air temperature - minus 45°С;

- atmospheric pollution degree – II\* under GOST 9920;

- wind speed up to 40 m/sec;

- seismic ability up to 9 points under MSK-64 scale.

The standard supply set includes:

- GIS bays (according to electrical diagram, and quotation);

- sets for bays’ mounting;

- one set of spare parts;

- cubicles;

- SF6 for the first filling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **GIS basic parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter name** | | **Value** | | | | | | | | | | | | **Quotation** | | | |
| 1 | Rated voltage, kV | | 110 | | | | | | | | | | | |  | | | |
| 2 | Maximum operating voltage, kV | | 126 | | | | | | | | | | | |  | | | |
| 3 | Rated frequency, Hz | | 50 | | | | | | | | | | | |  | | | |
| 4 | Rated current of collected busbars, A | | 3150 | | | | | | | | | | | |  | | | |
| 5 | Rated current of other modules, A | | 2500 | | | | | | | | | | | |  | | | |
| 6 | Rated peak of short-time withstand current, kA | | 102 | | | | | | | | | | | |  | | | |
| 7 | Short-time withstand current, kA | | 40 | | | | | | | | | | | |  | | | |
| 8 | Duration of short-time withstand current, sec:  - for main circuit  - for earthing circuit | | 3  1 | | | | | | | | | | | |  | | | |
| 9 | Annual gas leakage, % of mass, not more | | 0,5 | | | | | | | | | | | |  | | | |
| 10 | Single0line diagram according “Principle diagrams for electrical switchgears of substations for 35-750kV” by STO OJSC :Federal grid of Russia” | | Diagram number according to operating manual or special design | | | | | | | | | | | |  | | | |
| 11 | Number of bays | | According to electrical diagram | | | | | | | | | | | |  | | | |
|  |  | |  | | | | | | | | | | | |  | | | |
| **Circuit breaker’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | | | | | | **Quotation** | | | |
| 1 | Breaker’s type | VGO-110 | | | | | | | | | | | | |  | | | |
| 2 | Rated current, A | 3150 | | | | | | | | | | | | |  | | | |
| 3 | Rated breaking current, kA | 40 | | | | | | | | | | | | |  | | | |
| 4 | Rated making current, kA, not more:  - maximum peak  - initial acting value of aperiodic constant | 102  40 | | | | | | | | | | | | |  | | | |
| 5 | Rated supply voltage for drive’s electric motor, W | a.c. single-phase 230 | | | | | | | | | | | | |  | | | |
| d.c. 220 | | | | | | | | | | | | |
| 6 | Supply current of drive’s electric motor (starting), A, not more | 4,5/18 | | | | | | | | | | | | |  | | | |
| 7 | Rated power of basic heating, W, not more | 300 | | | | | | | | | | | | | | | | |
| 8 | Rated power of anti-condensation (constant) heating in drive, W | 25 | | | | | | | | | | | | | | | | |
| 9 | Drive’s type | Spring-hydraulic | | | | | | | | | | | | | | | | |
| 10 | Device for manual drive’s charging | Applicable/not | | | | | | | | | | | |  | | | | |
|  |  |  | | | | | | | | | | |  | | | | | |
| **Disconnector-earthing switch’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | | | | | | **quotation** | | | |
| 1 | Type of disconnector-earthing switch | RZGO-110/ZGO-110 | | | | | | | | | | | | |  | | | |
| 2 | Rated supply voltage for drive’s electric motor, W | a.c. 400/230 | | | | | | | | | | | | |  | | | |
| d.c. 220 | | | | | | | | | | | | |
| 3 | Supply current of drive’s electric motor (starting), A, not more | 0,63/2,5 (at ~U) | | | | | | | | | | | | |  | | | |
| 2,4/9,6 (at = U) | | | | | | | | | | | | |
| 4 | Charging current of collected busbars opened by disconnector, А | 0,1 | | | | | | | | | | | | |  | | | |
| 5 | Duration of opening/closing operations, sec | 2,3/2,3 | | | | | | | | | | | | |  | | | |
|  |  |  | | | | | | | | | | |  | | | | | |
| **Fast-acting earthing switch’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | | | | | | **quotation** | | | |
| 1 | Type of fast-acting earthing switch | BZGO-110 | | | | | | | | | | | | |  | | | |
| 2 | Self-making/breaking time, sec | 0,3/0,3 | | | | | | | | | | | | |  | | | |
| 3 | Rated supply voltage of electric motor, V | a.c. 400/230 | | | | | | | | | | | | |  | | | |
| d.c. 220 | | | | | | | | | | | | |
| 4 | Supply current of drive’s electric motor (starting), A, not more | 1, 3/5,2 (at ~U) | | | | | | | | | | | | |  | | | |
| 4,2/16,8 (at =U) | | | | | | | | | | | | |
|  |  |  | | | | | | | | | | |  | | | | | |
| **Current transformer’s parameters\*** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | **Quotation** | | | | | | | | |
| 1 | Transformer’s type | TTGO-110 | | | | | | | | | | | | | | | | |
| 2 | Rated primary current, A | 300-2500 | | | | | | | |  | | | | | | | | |
| 3 | Rated secondary current, A | 1; 5 | | | | | | | |  | | | | | | | | |
| 4 | Accuracy class of measuring windings | 0,1; 0,2; 0,5; 0,2S; 0,5S | | | | | | | |  | | | | | | | | |
| 5 | Accuracy class for protection windings | 5Р; 10Р | | | | | | | |  | | | | | | | | |
| 6 | Rated secondary load for cosϕ=0,8, В. А | 3-100 | | | | | | | |  | | | | | | | | |
| 7 | Rated secondary load for cosϕ=1, В. А | 0,5-2,5 | | | | | | | |  | | | | | | | | |
| 8 | Rated ultimate multiplicity | Up to 40 | | | | | | | |  | | | | | | | | |
| 9 | Safety ratio of equipment | Under GOST 7746 | | | | | | | |  | | | | | | | | |
| 10 | Short-time withstand current, kA | 40 | | | | | | | |  | | | | | | | | |
| 11 | Rated peak of short-time withstand current, kA | 102 | | | | | | | |  | | | | | | | | |
| 12 | Duration of short-time withstand current, sec | 3 | | | | | | | |  | | | | | | | | |
|  | \* it is allowed to equip GIS with integrated current transformers, parameters of which are specified in quotation | | | | | | | | | | | | | | | | | |
|  |  |  | | | | | | | | | | |  | | | | | |
| **Voltage transformer’s parameters** | | | | | | | | | | | | | | | | | | |
| № | **Rated parameters of voltage transformers** | | | | | | | | | | | | | | | | | |
| 1 | Rated voltage of primary winding, kV | 110/√ 3 | | | | | | | | | | | | | | | | |
| 2 | Maximum operating voltage of primary winding, kV | 126/√ 3 | | | | | | | | | | | | | | | | |
| 3 | Rated voltage of basic secondary winding, V | 100/√3 | | | | | | | | | | | | | | | | |
| 4 | Rated voltage of additional secondary winding, V | 100 | | | | | | | | | | | | | | | | |
| 5 | Power-frequency test voltage, kV | 230 | | | | | | | | | | | | | | | | |
| 6 | Lightning test voltage, kV | 550 | | | | | | | | | | | | | | | | |
| 7 | Parameters of secondary windings are chosen from the table | standard version 1 | | | | | | | | | | | | | | | | |
| Accuracy class | | | | | | | | Secondary load | | | | | | | | |
|  | | |  | | |  | |  |  | | | | | |  | |
| 0,2 | | | - | | | - | | 50 | - | | | | | | - | |
| - | | | 0,5 | | | - | | - | 100 | | | | | | - | |
| - | | | - | | | 3Р | | - | - | | | | | | 300 | |
| standard version 2 | | | | | | | | | | | | | | | | |
| Accuracy class | | | | | | | | Secondary load | | | | | | | | |
|  | | | |  | | | |  | | | | | |  | | |
| 0,2 | | | | - | | | | 150 | | | | | | - | | |
| - | | | | 3Р | | | | - | | | | | | 300 | | |
| special design | | | | | | | | | | | | | | | | |
| Accuracy class | | | | | | | Secondary load | | | | | | | | | |
|  | |  | | |  | |  | | |  | | | | | |  |
| 0,2 | | - | | | - | |  | | | - | | | | | | - |
| - | | 0,5 | | | - | | - | | |  | | | | | | - |
| - | | - | | | 3Р | | - | | | - | | | | | |  |
| 8 | ultimate power of voltage transformers, VA | 630 | | | | | | | | | | | | | | | | |
|  |  |  | | | | | | | |  | | | | | | | | |
| **Cable terminal’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | | | | | | | | | |
| 1 | Rated voltage, kV | 110 | | | | | | | | | | | | | | | | |
| 2 | Maximum operating voltage, kV | 126 | | | | | | | | | | | | | | | | |
| 3 | Rated frequency, Hz | 50 | | | | | | | | | | | | | | | | |
| 4 | Rated current, A | 2500 | | | | | | | | | | | | | | | | |
|  |  |  | | | | | | | | | | |  | | | | | |
| **Surge arrestor’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | **quotation** | | | | | | | | |
| 1 | Maximum operating sustained voltage stress, kVВ\*  - not less  - not more | 73  88 | | | | | | | |  | | | | | | | | |
| 2 | Carrying capacity current, А | 550 | | | | | | | |  | | | | | | | | |
| 3 | Rated discharge current (8/20 µsec impulse), KА | 10 | | | | | | | |  | | | | | | | | |
|  | \* it is possible to supply surge arrestors with other values of maximum operating voltage, at this all other voltage parameters are correspondingly changed | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | |
| **Parameters of “SF-6-air” coupling** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | **Quotation** | | | | | | | | |
| 1 | Coupling type | VVE-110 | | | | | | | |  | | | | | | | | |
| 2 | Type of external insulation | porcelain | | | | | | | |  | | | | | | | | |
| Composite | | | | | | | |
| 3 | Climatic category and arrangement category under GOST 15150 | UKHL1 | | | | | | | |  | | | | | | | | |
| U1 | | | | | | | |
| 4 | Upper value of ambient air temperature, °С | Plus 40 | | | | | | | |  | | | | | | | | |
| 5 | Lower value of ambient air temperature, °С | Minus 60 | | | | | | | |  | | | | | | | | |
| 6 | Wind speed without icing, m/sec | 40 | | | | | | | |  | | | | | | | | |
| 7 | Wind speed at icing, m/sec | 15 | | | | | | | |  | | | | | | | | |
| 8 | Ice thickness, mm | 20 | | | | | | | |  | | | | | | | | |
| 9 | Horizontal wire tension applied to contact terminal along phase, N | 2000 | | | | | | | |  | | | | | | | | |
| 10 | Horizontal wire tension corresponding to 40m/sec wind speed applied to contact terminal across phase, N | 267 | | | | | | | |  | | | | | | | | |
| **Current conductor’s parameters** | | | | | | | | | | | | | | | | | | |
| **N** | **Parameter** | **Value** | | | | | | | | | | | | | | **Quotation** | | |
| 1 | Conductor’s type | TTG-110 | | | | | | | | | | | | | |  | | |
| 2 | Rated voltage, kV | 110 | | | | | | | | | | | | | |  | | |
| 3 | Rated current, A | 2500 | | | | | | | | | | | | | |  | | |
| 4 | Climatic category and arrangement category under GOST 15150 | UKHL1 | | | | | | | | | | | | | |  | | |
| U1 | | | | | | | | | | | | | |
| 5 | Insulation pollution degree under GOST 9920 | II\* | | | | | | | | | | | | | |  | | |
|  |  |  | | | | | | | | | | | | | |  | | |

Extended supply (at special request)

|  |  |  |  |
| --- | --- | --- | --- |
| N | **Name** | **Variant** | **Quotation** |
|  | Extended kit of spare parts | - group kit of spare parts-1 (see annex 1) |  |
| - group kit of spare parts-2 (see appendix 2) |  |
| - group set of spare parts-3 (see appendix 3) |  |
|  | Gas equipment | Gas-filling equipment 3-393-R001 (DILO) |  |
| Gas leakage detector 3-033-R002 (DILO) |  |
| Humidity measuring device 3-037-R001 (DILO) |  |
|  | SF6 service cart | Series Piccolo (DILO) |  |
|  | SF6 volume | SF6 of enhanced purity under specification TU 6-02-1249-83 Solvay, Germany (tank of 56kg) |  |
|  | N volume | No of first degree under GOST 9293-74 (tank of 6,7kg) |  |

Diagnosing equipment for GIS-110 (at special request)

|  |  |  |  |
| --- | --- | --- | --- |
| N | **Name** | **Variant** | **Quotation** |
|  | Breaker’s switching operation counter | «АВМ-ВК» by “ASU VEI” Ltd. |  |
|  | Partial discharge monitoring | Acoustic method by “ASU VEI” Ltd. |  |
| Super-high frequency method by “DIMRUS” Ltd. |  |
| Super-high frequency method by Qualitrol |  |
| Other (customer’s request) |  |
|  | SF6 monitoring | Monitoring of SF6 temperature and density by “ASU VEI” Ltd. |  |
| Monitoring of SF6 temperature, humidity and density by “ASU VEI” Ltd. |  |

**All lines must be filled in!**

Customer’s special requests:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Company’s stamp \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(name, position, phone)

Annex 1

Kit of spare parts-1

GIS bays:

– motor for spring charging, VILE.652313.022 – 1 pc.

– opening coil, VILE.677112.008 – 1 pc.

– closing coil, VILE.677112.008 – 1 pc.

– Anti-condensation heater, VILE.681872.013 – 1 pc.

– SF6 density monitor, liquid, outdoor, model 233.52.100 (WIKA) – 1 pc.

– set of block-contacts for breaker (rotary switch) F11-27/29-Z2 – 1 pc.

– set of block-contacts for disconnector, VILE.685112.035 – 1 pc.

– set of block-contacts for earthing switch, VILE.685112.035 – 1 pc.

– set of switches and relays for control circuit, IVEZ. 656467.001-02-1249-16 with 0,3 ratio – 1pc.

* Interruption disc OE9-ELEKTRO-001 Presponse=0,9 MPa (9kgs/cm2) Dy=100 mm «ELFAB» - 1 pc;

– breaker’s opening electromagnet (VILE.677112.007) – 1 pc.;

– breaker’s drive, PPrG-2 type (VILE.654133.030) – 1 pc.;

– drive for disconnector-earthing switch, PD-20 type (VILE.654133.009) – 1 pc.;

– drive for fast-acting earthing switch, PPrB-200 type (VILE.654133.010)

Automation control cubicles:

– cubicle’s key - set;

– key of rotating frame – 1 pc.;

–220V d.c. relay (РТ570220) – 3 pcs.;

– 220V d.c. contactor, coil, 4-pole (BF09 T4 D) – 2 pcs;

– indicator, NEF22-WPcz type (ENSK.433137.014 TU) – 1 pc.;

– Lamp, SKL14B-Gh-2-220 type (yellow) – 1 pc.;

– lamp, SKL14B-KZh-2-220 type (red-yellow) – 1 pc.

Annex 2

Kit of spare parts-2

GIS bays:

– module of VGO-110 circuit breaker (VILE.674122.003-01) – 1pc.;

-insulator (VILE.686174.023) – 2 pcs.;

– insulator (VILE.686174.022) – 2 pcs.;

– SF6 density monitor, liquid, outdoor, model 233.52.100 (WIKA) – 4 pcs.

-Interruption disc OE9-ELEKTRO-001 Presponse=0,9 MPa (9kgs/cm2) Dy=100 mm «ELFAB» - 1 pc;

– set of switches and relays for control circuits, IVEZ.656467.001-02-1249-16 with 0,3ratio – 1 pc.

- rotary switch F11-27/29-Z2 – 1 pcs.;

– breaker’s opening electromagnet (VILE.677112.007) – 1 pc.;

– breaker’s closing electromagnet (VILE.677112.008) – 1 pc.;

– breaker’s drive, PPrG-2 type (VILE.654133.030) – 1 pc.;

– drive for disconnector-earthing switch, PD-20 type (VILE.654133.009) – 1 pc.;

– drive for disconnector-earthing switch, PD-21 type (VILE.654133.009) – 1 pc.;

– drive for fast-acting earthing switch, PPrB-200 type (VILE.654133.010)

Automation control cubicles:

– cubicle’s key - set;

– key of rotating frame – 1 pc.;

–220V d.c. relay (РТ570220) – 3 pcs.;

– 220V d.c. contactor, coil, 4-pole (BF09 T4 D) – 2 pcs;

– indicator, NEF22-WPcz type (ENSK.433137.014 TU) – 1 pc.;

– Lamp, SKL14B-Gh-2-220 type (yellow) – 1 pc.;

– lamp, SKL14B-KZh-2-220 type (red-yellow) – 1 pc.

Annex 3 3

Kit of spare parts 3 (full)

GIS bays:

– module of VGO-110 circuit breaker (VILE.674122.003-01) – 1pc.;

– module of TTGO current transformer (VILE.685112.007-1249-16) – 3 pcs.;

– module of disconnector-earthing switch (VILЕ.674214.194-02-1249-16) – 1 pc;

– earthing switch for collected busbars (VILE.674232.011) – 1 pc.;

– module of fast-acting earthing switch (VILE.674214.195) – 1 pc.;

– Insulator (VILE.686174.023) – 2 pcs.;

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– SF6 density monitor, liquid, outdoor, model 233.52.100 (WIKA) – 4 pcs.

-Interruption disc OE9-ELEKTRO-001 Presponse=0,9 MPa (9kgs/cm2) Dy=100 mm «ELFAB» - 1 pc;

– voltage transformer, IVEZ.671214.011 – 1 pc.;

– set of switches and relays for control circuits, IVEZ.656467.001-02-1249-16 with 0,3ratio – 1 pc.

- rotary switch F11-27/29-Z2 – 1 pcs.;

– breaker’s opening electromagnet (VILE.677112.007) – 1 pc.;

– breaker’s closing electromagnet (VILE.677112.008) – 1 pc.;

– breaker’s drive, PPrG-2 type (VILE.654133.030) – 1 pc.;

– drive for disconnector-earthing switch, PD-20 type (VILE.654133.009) – 1 pc.;

– drive for disconnector-earthing switch, PD-21 type (VILE.654133.009) – 1 pc.;

–- drive for fast-acting earthing switch, PPrB-200 type (VILE.654133.010)– 1pc.;

-cubicle (IVEZ. 656467.001-02-1249-16) – 1 pc.;

-surge arrestor VILE. 674362.037 – 1 pc;

Automation control cubicles:

– cubicle’s key - set;

– key of rotating frame – 1 pc.;

–220V d.c. relay (РТ570220) – 3 pcs.;

– 220V d.c. contactor, coil, 4-pole (BF09 T4 D) – 2 pcs;

– indicator, NEF22-WPcz type (ENSK.433137.014 TU) – 1 pc.;

– Lamp, SKL14B-Gh-2-220 type (yellow) – 1 pc.;

– lamp, SKL14B-KZh-2-220 type (red-yellow) – 1 pc.