**SECTION 26 36 23**

**AUTOMATIC TRANSFER SWITCHING EQUIPMENT**

**PART 1 – GENERAL**

* 1. **SUMMARY:**

1. This section includes “Automatic Transfer Switching Equipment” (ATSE).
2. All ATSE is to be designed as one integrated product (power switching, motorisation and ATS Control), shall be of the same recognized manufacturer and shall be tested to IEC 60947-6-1 as one complete automatic transfer switch.
   1. **SUBMITTALS:**
3. Product data including: Rated operational voltage and current capacity, number of poles (fully rated) and characteristics according to IEC 60947-6-1 and IEC 60947-3.
4. Metric dimensional drawings issued by the manufacturer for the complete ATSE including front, side and top views together with provision for power terminal connections.
5. Instructions for back plate and flush mounting installation of the ATSE within an enclosure.
6. Instruction manual specific to the ATSE, published in the English language by the manufacturer.
7. Quick Start Instruction sheet specific to the ATSE and published by the manufacturer.
8. Quality control test reports issued by the manufacturer for the ATSE.
9. A certificate issued by the manufacturer to certify that the ATSE supplied is in full compliance with the requirements included in this specification.
   1. **STANDARDS AND QUALITY ASSURANCE:**
10. The ATSE supplied must comply with Class PC of IEC 60947-6-1: *(Low-voltage switchgear and control gear - Multiple function equipment – Transfer switching equipment)*.
11. Besides IEC 60947-6-1 the ATSE supplied must also comply with IEC 60947-3: *(Low-voltage switchgear and control gear – Switches, disconnectors, switch-disconnectors and fuse-combination units).*
12. The ATSE supplied is to be designed and built as a fully integrated product *(power switching, motorisation and ATS Control),* shall be of the same recognized manufacturer and shall be tested to IEC 60947-6-1 as one complete unit.
13. The ATSE label shall include data markings and compliance to IEC 60947-6-1 and IEC 60947-3.
14. The manufacturer shall be certified ISO 9001: 2008 with third party certification verifying its Quality Assurance in design and production in accordance with ISO 9001.

**PART 2 – PRODUCTS**

* 1. **ACCEPTABLE ATSE and MANUFACTURERS:**

1. The ATSE shall be in full compliance with this specification and will be one of the following :
   1. SOCOMEC “ATyS p ”.
   2. …..
   3. **GENERAL CONSTRUCTION:**
2. The ATSE shall be composed of :
   1. An open transition break before make architecture (I – 0 – II), in full compliance with IEC 60947-6-1 Class PC.
   2. Two back to back, fully rated, IEC 60947-3 compliant, load break switch disconnects.
   3. A maintenance free switch design that includes self-cleaning contacts on all poles.
   4. An inherent fully integrated robust mechanical interlock between both switches.
   5. An independent switching mechanism free from external factors during transfer.
   6. Mounting lugs fit onto the switches (power section) independent of the motorisation.
   7. A wide band (control voltage of 50/60Hz, 166-332Vac) motorisation module fit directly to the switching mechanism.
   8. An integrated ATS controller with dual power supply (DPS) and 3 phase sensing on both source supplies. (Monitoring device and control module - MDCM).
   9. An easy to remove motorisation & control module. (With no disturbance to the load).
   10. Dual emergency manual operation.
   11. Padlocking in the zero position with the use of up to 3x 8mm padlocks.
   12. Clear switch position indication (I – 0 – II), on the motorisation module.
3. The ATSE shall be fully integrated in one device:

Besides customer I/O, no additional wiring between functional units other than the power connections and voltage sensing shall be necessary to allow the proper functioning of the ATSE.

1. The ATSE should include dual “Product Available Outputs” (one on the motorisation and one on the ATS controls). The product should analyse / test its condition periodically and communicate through dry contacts to report the ability of the transfer switching equipment to operate.
   1. **RATINGS AND ATSE TEST:**
2. Characteristics, nominal phase voltage, current ratings, number of poles and withstand ratings shall be as shown on the drawings. The ampere ratings shall be for 100% continuous load current with the neutral pole fully rated.
3. Ratings and characteristics shall be according to IEC 60947-6-1 and IEC 60947-3 with non-welding of contacts during the performance of withstand and closing tests.
4. The complete ATSE shall be fully factory assembled by the manufacturer and tested to IEC 60947-6-1 so as to ensure proper operation of the ATSE as a complete system with a good overall operation sequence. The test must also ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
   1. **DESIGN REQUIREMENTS:**
5. The ATSE shall have 3 stables positions: I – 0 - II.
6. Besides the ATSE features as per IEC 60947-6-1, the equipment shall be a Load Break and Disconnect switch as per IEC 60947-3 with padlocking with a minimum of one padlock only.
7. The ATSE shall be of the clearly visible position indication type with markings I - 0 - II
8. The ATSE shall be electrically operated and fully automatic with the possibility to override the automation and operate remotely via dry contact inputs for position orders.
9. Dual emergency manual operation shall be provided using an insulated handle directly through the motorisation and on the switch mechanism with the motorisation removed.
10. The ATSE shall integrate a wide band (50/60Hz, 166-332Vac) double power supply (DPS) to supply the aux power to the motorisation and ATS immaterial of the available supply source.
11. The ATSE shall have a distinct manual / automatic mode selectable by turning a rotary switch or a removable key switch located on the motorisation module.
12. The neutral pole of the ATSE switches shall be fully rated and left or right configuration.
13. The ATSE shall have no power consumption while in a stable position other than that required for the ATS control unit.
14. The 4 poles shall switch simultaneously with a time gap of less than 1ms to avoid potential floating neutral issues during switching.
    1. **SAFETY REQUIREMENTS & FEATURES:**
15. Under no circumstance (including equipment failure) should it be possible to close switch I and switch II simultaneously.
16. During manual operation, opening and closing of the contacts must be independent from the emergency handle operational speed.
17. The ATSE shall have a built-in provision for padlocking in the O position. One x4mm padlock should be sufficient to padlock whilst it should be possible to use up to 3x 8mm padlocks.
18. All operating modes shall be inhibited when the product is padlocked.
19. Padlocking shall only be possible with the mode selector switch in manual position.
20. An insulated emergency handle shall be provided for dual manual operation.
21. The ATSE should allow manual switching I-0-II at full load without damage to the contacts.
    1. **BASIC OPERATION:**
22. The ATSE should have distinct Auto and Manual operational modes that should be fully operational under any load condition. (Within the product ratings intended scope).
23. The aux power of the ATSE shall be supplied by any one of the available supplies through a built-in dual power supply (DPS).
24. The ATSE power section shall have a high short time withstand current capability. (Icw 1s)
25. An automatic retransfer function should be included with the facility to inhibit retransfer locally or remotely through dry contacts.
26. The ATSE shall have the facility to inhibit the ATS controller and electrically change the switch state to any position (I – 0 – II) through dedicated inputs and dry contacts.
27. The ATSE shall include a priority input to force the switch to the 0 position and inhibit the automation of the ATS controller.
28. Cable length for remote dry contact order inputs is to be ≤ 100m
    1. **ATS CONTROLS:**
29. The ATSE shall have a fully integrated ATS Controller fixed directly on the motorisation.
30. The controller shall include an LCD display, LED’s and a keypad with front access.
31. Electrical motorised control (position I, O, II) should be available locally through the keypad, remotely through dry contacts and optionally through communication.
32. Main Parameters:
33. The ATS controller shall include 3 phase and neutral sensing for the monitoring of voltage and frequency on both source supplies.
34. Voltage settings shall be field adjustable in increments of 1%.
35. Frequency settings shall be field adjustable in 0.1% increments.
36. Setting configuration shall be adjustable through software as well as directly from the keypad on the front face.
37. The ATS Controller shall have phase sequence detection and allow the user to choose the desired sequence (ACB or ABC).
38. Changeover shall be forbidden if the supply phase sequences are different.
39. The ATS Controller is to include an Auto-Configuration function for configuration of the source supply voltage, frequency, phase rotation and neutral position.
40. The ATS Controller shall have the possibility to select the network type.
41. The ATS Controller shall allow the setting of the source priority.
42. The ATS controller shall be able to measure phase unbalance.
43. The ATS is to include 3 phase current transformer inputs for measurement of voltage, currents, frequency, PF, power (apparent, positive & negative active and reactive energy). These inputs are to allow for 5A or 1A CT’s configurable in the ATS Controller settings).
44. The ATS shall have provision to swap the power cables (SWI/SWII 🡪 SI or SII) so as to facilitate for source power cable inversion in the panel. (Software config)
    1. **ATSE INTERFACE:**
45. The ATS Controller is to be easily configurable via an HMI keypad directly on the controller, a remote control and display unit and via dedicated ATSE software.
46. Status of the ATSE shall be clearly visible through LED’s on the front of the unit.
    1. **ATSE INPUTS & OUTPUTS :**
47. The ATSE shall include five fixed output contacts, for positions I-0-II, for the availability of the product (motorisation watchdog) and a genset start relay.
48. The genset start relay is to be a failsafe 3 point changeover NO/NC dry contact.
49. The ATSE shall have five fixed inputs on the motorization module: one to enable the remote inputs and inhibit the automation, three to remotely control the switch positions, and one priority input to force the product to the 0 position.
50. The ATSE shall be able to provide six programmable inputs and one programmable out with the option to expand an additional eight programmable inputs and eight programmable outputs.
    1. **REAL TIME CLOCK / EVENTS:**
51. The ATSE shall have a built-in real time clock (RTC) with battery backup for event recording with the possibility to save up to 3000 events (date and time stamped) in non-volatile memory. Events are to be exportable and accessible through the software and Webserver.
    1. **COMMUNICATION:**
52. The ATSE is to include the possibility to plug in an optional communication modules with RS 485 Modbus as well as ETHERNET with Modbus/TCP or ETHERNET with Modbus RTU over TCP.
53. It shall be possible to configure all the ATSE parameters via the dedicated simple configuration software tools.
54. Configuration with the software should be possible isolated, connected directly to the ATSE as well as remotely connected through ETHERNET.
55. The settings file should allow to be saved on any external data storage media for a simple and quick download of multiple product configurations.
56. Configuration software is to be available free on the manufacturer’s website.
57. It shall be possible to control the position of the ATSE through configuration software when connected directly to the product or over ETHERNET.
58. Configuration and control through software is to be password protected.
59. The optional ETHERNET communication module is to include a built in WEBSERVER for monitoring of the ATSE status, power measurement, event recording, engine exerciser configuration, counters, timers, I/O state and settings, counter reset, configuration setting values, date and time.
60. The webserver is to allow configuration of the engine exerciser schedule, update of the date and time, counter reset as well as export and save to file of data logging events. (Up to 3000 date and time stamped events).
    1. **TIMER SETTINGS:**
61. Two adjustable timers of 0 to 60 seconds shall be provided to detect source 1 or source 2 failures, and to override any transient outages of the normal supply. (Source 1 Failure Timer, 1FT and Source 2 Failure Timer, 2FT).
62. A timer of 0 to 60 seconds shall be provided for source 2 available so as to ensure stability of the alternative network before transfer. (Source 2 Available Timer, 2AT).
63. A possibility to stay in switch position I or II shall be provided with an adjustment of 0 to 10 seconds prior to return to the 0 position. (0 Timer, 1OT, 2OT). Only to be accessible with parameter RETURN to 0 activated.
64. An adjustable timer of 0 to 60 minutes shall be provided to detect priority network return to normal so as to override any incorrect availability of the normal supply. (Main Return Timer, 1RT, 2RT).
65. An adjustable timer of 0 to 10 minutes shall be provided to allow the generator to cool down after the load retransfer from alternative back to the normal supply. (Cool Down Timer, 2CT accessible in Mains – Gen applications).
    1. **ENGINE EXERCISER:**
66. The ATSE shall provide a programmable engine exerciser with four independent customizable routines to exercise the Genset. Exercising should be carried out with or without loads, on a daily, weekly, bi-weekly monthly or yearly basis. It should also be possible to configure non-cyclic exercise runs through communication. Access to the exerciser settings should be via the configuration software as well as via the webserver.
    1. **ON LOAD / OFF LOAD TESTS:**
67. The ATSE should include for On-Load as well as Off Loads tests associated with Mains – Gen applications. (The test will as a minimum start the Genset for a determined period of time). These tests should be operable manually through the keypad, through remote inputs, through MODBUS / Ethernet communication or through the ATSE configuration software.
    1. **ONLINE MAINTENANCE:**
68. Once installed, the ATSE shall be “Maintenance Free” however it would be recommended to switch through at least one complete cycle once a year.
69. Replacement of the electrical parts (motorization or ATS controller) shall be possible on-load without removal of or disturbance to the power section and load.
70. Once the otorization module is removed the transfer switch shall remain functional as an on-load manually operated transfer switch. The switching mechanism should be independent of the operator switching speed.
    1. **EMC:**
71. The ATSE should be designed and built in accordance with IEC 60947-1 standards for EMC (Products intended to be installed in an “Industrial, Commercial and/or Residential Environment” therefore respecting both Class A and/or Class B EMC requirements as described below.

|  |  |  |
| --- | --- | --- |
| **Description** | **Std (IEC)** | **Requirement (criteria)** |
| Conducted | CISPR 11 | Class B |
| Radiated | CISPR 11 | Class B |
| ESD contact | 61000-4-2 | 4KV (B) |
| ESD air | 61000-4-2 | 8KV (B) |
| Electromagnetic field | 61000-4-3 | 10V/m (A) |
| RF Conducted | 61000-4-6 | 10V (A) |
| Burst | 61000-4-4 | 2KV (A) power 1KV (A) control |
| Surge differential | 61000-4-5 | 1KV (A) |

**PART 3 – EXECUTION**

**3.01 INSTALLATION:**

1. Preparation shall be in accordance with the reviewed product data, final shop drawings and the manufacturer’s recommendations.
2. Installation shall be in accordance with manufacturer’s instructions and recommendations.
3. Identify components according to Division 26 section “Identification for Electrical Systems”.

**3.02 CONNECTION:**

1. Wiring for the ATSE equipment shall be in accordance with manufacturer’s instructions.
2. Connections and wiring shall be according to Division 26 section “low-Voltage Electrical Power Conductors and cables”.

**3.03 MAINTENANCE & TRAINING:**

1. Operational and Maintenance Instructions: Personnel on site should be formally trained by the manufacturer’s authorized representative. This is with regards to the proper operation and maintenance of the automatic transfer switching equipment.

**3.04 TESTING:**

1. The ATSE shall be declared compliant to the IEC standards listed above by a testing laboratory having delegation or working under contract for certification to UL and IEC standards under the IEC Electrotechnical Equipment (IECEE) certification body scheme.
2. After installation of the equipment, a test report is to be submitted to state that the equipment has been installed and commissioned in accordance with the manufacturer’s instructions.

**END OF SECTION 26 36 23**