**PRODUCT GUIDE SPECIFICATION**

**ABB Zenith ZBTS T-series Bypass/Isolation Automatic Transfer Switches, 30-3000 A, 200-480 Vac**

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual—CSI Manual of Practice, Fifth Edition.*

This section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all “Specifier Notes” after editing this section.

Section numbers are from *MasterFormat 2010 Update.*

**SECTION 26 36 23**

**AUTOMATIC TRANSFER SWITCHES**

Specifier Notes: Delete any information below in Parts 1, 2 or 3 which is not required or relevant for the project. When information is displayed in sets of brackets, select which of the options are desired to remain and remove the brackets.

1. – GENERAL
	1. RELATED DOCUMENTS
		1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
	2. SUMMARY
		1. This Section includes transfer switches rated up to 480Vac, including the following:
			1. Automatic Transfer Switches
		2. Related Sections include the following:

Specifier Notes: List related products that appear in other Sections. The following are examples only; edit as appropriate.

* + - 1. 14 20 00 Elevators
			2. 23 09 00 Instrumentation and Control for HVAC
			3. 26 09 00 Instrumentation and Control for Electrical Systems
			4. 26 29 33 Controllers for Fire Pump Drivers
			5. 26 22 00 Low-Voltage Transformers
			6. 26 32 00 Packaged Generator Assemblies
			7. 40 78 33 Annunciators
			8. 40 60 00 Process Control and Enterprise Management Systems
	1. SUBMITTALS
		1. Product Data:
			1. Submit manufacturer’s descriptive literature and product specifications. These shall include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
		2. Shop Drawings:
			1. Single-line diagram or schematic of arrangement of ATS unit shall be submitted. Show connections between transfer switch, power sources, and load.
			2. Manufacturer’s product drawings.
			3. As applicable: dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified
		3. Operation and Maintenance Data:
			1. For each type of product include manuals for installation, operation, and maintenance.
			2. A quick start guide shall be provided with the product shipment to guide start-up.
			3. In addition, documentation shall define features and operating sequences for both automatic and manual operation.
			4. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.
		4. Manufacturer and Supplier Qualification Data:
			1. The transfer switch manufacturer shall be certified to International Quality Standard (ISO) 9001, with third party certification verifying quality assurance in design/development and production.
	2. QUALITY ASSURANCE
		1. Transfer switches shall be free of defects in material and workmanship.
		2. Transfer switches shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked as suitable for use in emergency, legally required or optional standby use as appropriate for the connected load.
		3. Transfer switch applications and installations shall comply with the requirements of the codes and standards listed below
			1. UL 1008 - Standard for Transfer Switch Equipment
			2. NFPA 70 - National Electrical Code; particularly, transfer switches shall be suitable for usage in accordance with Articles 517 - Health Care Facilities, 700 - Emergency Systems, 701 - Legally Required Standby Systems, 702 - Optional Standby Systems
			3. NFPA 99 - Healthcare Facilities Code
			4. NFPA 110 - Standards for Emergency and Standby Power Systems
			5. IEEE 241 - Recommended Practice for Electrical Power Systems in Commercial Buildings
			6. IEEE 446 - Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
			7. IEEE 602 - Recommended Practice for Electrical Power Systems in Health Care Facilities
			8. NEMA ICS 10-2005 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment
			9. IBC 2015/CBC 2016 - Seismic certified to Ip=1.5 for z/h = 1
1. – PRODUCTS
	1. MANUFACTURERS
		1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
			1. Automatic and Mechanically Held Transfer Switches:
				1. ABB Zenith ZBTS, ZBTSD, and ZBTSCT T-series 100-3000 A, 200-480 Vac
	2. GENERAL TRANSFER SWITCH PRODUCT REQUIREMENTS
		1. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch amperage rating, unless otherwise indicated.
		2. Fault-Current Closing and Withstand Ratings: UL 1008 WCR ratings must be specifically listed as meeting the requirements for use with protective devices at installation locations, under specified fault conditions. Withstand and closing ratings shall be based on use of the same set of contacts for the withstand test and the closing test.
		3. Microcontroller: Shall provide selectable nominal voltages from 200Vac to 480Vac for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to +/- 1% of nominal voltage. Frequency sensing shall be accurate to +/- 0.5%. The unit shall be capable of these accuracies at a temperature range of -20 to +70 °C.
		4. ATS should be configurable to any voltages between 200-480V in the field without changing any components.
		5. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements and voltage-impulse withstand requirements of UL 1008
		6. Electrical Operation: Accomplish by a momentarily energized solenoid, mechanically and electrically interlocked in both directions
		7. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
			1. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the Source 1 and Source 2 positions. Main contacts shall be mechanically locked in final position without the use of hooks, latches, magnets or springs. Contacts shall not be affected by momentary source power outages, swells, and surges such that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
			2. The contacts shall have the following construction characteristics:
				1. Power contactor type construction
				2. Specialized first-touch contact tips with specialized material and design to isolate and dissipate arc to limit wear of the normal fully closed contact point
				3. Self-cleaning contact design
				4. Spring over-center mechanism with quick-make, quick-break contact operation
				5. Contact wear inspection shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors, OR, provided via HMI, configure/connectivity software, and communications as a real-time status of contact wear as a percentage of manufacturer’s designed contact life (computed with an algorithm based on real-time contact wear and end of life prediction utilizing embedded switch current, voltage, and switch statistics).
			3. Electrical operation of contacts shall allow high speed transfer between sources in less than 50 ms (< 3 electrical cycles) from signal. Operating transfer speed shall be fixed and not vary depending on the voltage level conditions
			4. The power transfer mechanism and controller shall include provisions for manual operation under load through HMI keys.
		8. Control: Transfer switch control shall be capable of communicating with remote programming devices, annunciators or annunciator and control panels.
		9. Where neutral conductors must be switched as shown on the plans, the ATS shall be supplied with a full ampere/voltage rated 4th/neutral pole. The neutral pole shall have the same withstand and closing and operational ratings as the phase poles and switched simultaneously with phase poles. Neutral poles may be either switched (break before make construction equal to open transition phase poles) and configurable at 1st pole or 4th pole of the switch, or overlapping (neutral sources are momentarily paralleled during transfer of sources to maintain neutral reference).
		10. Where neutral conductors are to be solidly connected as shown on the plans, a 100% fully rated neutral bar should be provided.
		11. Enclosures: Shall be available as designated on the drawings as specified below, complying with NEMA ICS 6 and UL 50, unless otherwise indicated.
			1. Type 1 for indoor applications
			2. Type 12 for indoor applications (drip protection)
			3. Type 3R for outdoor applications (rain proof)
			4. Type 4 or 4X (stainless steel) for outdoors or uncontrolled environment applications
		12. Design utilizing components which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable. Insulated case and molded-case circuit breaker type switches are not acceptable.
		13. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.
		14. Control components and wiring shall be front accessible without disassembly of operating linkages and without disconnection of power conductors.
	3. BYPASS/ISOLATION AUTOMATIC TRANSFER SWITCHES
		1. Comply with [Level 1] [Level 2] equipment according to NFPA 110.
		2. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
		3. Automatic transfer switches (ATS) shall be available in [Open (without stable OFF position)] [and/or] [Delayed (with stable OFF position)] [and/or] [Closed (make before break <100ms paralleling)] transition versions in accordance with project drawings.
		4. In-phase monitor: ATS shall have embedded feature that when enabled by user, allows transfer from Source 1 (S1) to Source 2 (S2) and back only when phases are sufficiently synchronized (phase angle difference between sources within 5 degrees).
		5. The ATS shall be capable of top and/or bottom feed configurations by allowing easy cable entry from the desired direction of choice, and sufficient wire bending space for typically sized wire.
		6. Bypass/Isolation Features:
			1. Bypass/Isolation transfer switch shall be provided to permit convenient manual electrical bypass and isolation of the automatic transfer switch that could not otherwise be tested, inspected and maintained without interrupting the load. Bypass of the load to either the normal or emergency power source with complete isolation of the automatic transfer switch shall be possible regardless of the status of the automatic transfer switch. The bypass-isolation switch shall permit proper operation by one person through the movement of a separate handle. The entire system shall consist of two elements: the automatic transfer switch and the bypass/isolation switch furnished completely factory interconnected and tested.
			2. A bypass-isolation transfer switch shall be provided with the features necessary to allow for isolation of the Automatic Transfer Switch via external means without the need to access the current carrying components of the device. All transitional motion of the Automatic Transfer Switch (Auto / Test / Isolate) shall be accomplished via external means without the need to open the main enclosure door. Included in this requirement is the ability to store all operating handles in a separate compartment that is free and away from the line voltage / line current carrying elements. To ensure that only qualified personnel can access the internal live parts, the design shall be such that all operating handles may be stored and locked in this compartment if required/desired by building/local facilities management.
			3. A bypass-isolation transfer switch shall be equipped with an automatic shutter system that will automatically open and close upon installation and removal of the Automatic Transfer Switch portion of the system. The shutter system shall operate in such a manner that will prevent incidental contact with all live bus systems via a moving shutter. During Automatic operation, the shutter system shall remain open allowing for electrical connection between the Automatic Transfer Switch and the Bypass assembly. In Test Mode, the shutter system will automatically adjust, isolating the live bus from the automatic transfer switch. This will ensure a safe operation of the Automatic Transfer Switch with zero current passing through the main contact assemblies. In the Isolate Mode, once again the shutter system will remain closed, isolating the live bus from the automatic transfer switch. Upon removal of the Automatic Transfer Switch from the assembly, there shall be no access or exposure to live bus systems and no risk of accidental or incidental contact between the live bus and the maintenance personnel. The design of this system shall be such that it will provide maximum protection against fault conditions that may occur on the front or rear panels of the bypass assembly.
			4. To minimize installation and maintenance activities, the interaction between the front (ATS) and rear (BPI) panels should be smooth and consistent with no unreasonable effort required to re-align the bus systems or other features within the front or rear panels. This applies to new installations as well as replacement of the automatic transferring device relative to the rear panel. Should a spare Automatic Transfer Switch of like ratings be available and need to be installed to replace a damaged unit or device, the installation shall be consistent with the standard operating instructions without the need to readjust components or features within the front or rear panels.
			5. The isolation handle shall provide three positions: Automatic, Test and Isolate. The Test position shall permit electrical testing of the automatic transfer switch without disturbing the load. The Isolate position shall completely isolate the transfer switch from both sources and load without actual removal of the line or load conductors and allow its removal for inspection and maintenance. The transfer switch shall be arranged for draw out operation to facilitate its removal. Also, while in the Test or Isolate positions, the bypass-isolation switch shall function as a manual transfer switch to allow load transfer to either source of power regardless of the position or condition of the transfer switch, including the condition when the transfer switch is removed, and without reconnecting the load terminal of the transfer switch.
			6. The load shall not be interrupted during bypass-isolation functions. The addition of load-break contacts that cause load interruption is not acceptable. The bypass-isolation switch contacts shall not be in the system current path except during actual bypass operation
			7. The bypass-isolation transfer switch shall be furnished with a detailed step-by-step operating instruction plate, located outside of cabinet door, as well as the following function diagnostic lights:
				1. S1 available
				2. S2 available
				3. Bypass S1 engaged
				4. Bypass S2 engaged
				5. ATS S1 engaged
				6. ATS S2 engaged
				7. ATS connected position
				8. ATS test position
				9. ATS isolated position
				10. ATS inhibit
			8. The bypass-isolation switch shall be equipped with an independent engine start circuit so that, should a utility outage occur while in the bypass-normal/ATS isolated condition, the engine will automatically start and allow immediate selection of emergency bypass.
			9. The bypass-isolation transfer switch shall be the product of one manufacturer and completely factory interconnected and tested so that only the services and load connections to the bypass-isolation switch are required for field installation. All interconnections between the transfer switch and the bypass-isolation switch shall be silver-plated copper bus bar. A visual position indicator shall be provided to indicate bypass-isolation switch positions. Enclosure construction shall be in accordance with UL and NEMA standards for industrial controls.
		7. Automatic Transfer Switch Features:
			1. Functions managed by ATS control shall include adjustable time-delays, that can be bypassed via HMI key control, communications protocol (optional), or programmable digital I/O (optional):
				1. Override momentary Source 1 Outage adjustable from 0-60 s
				2. Transfer from Source 1 to Source 2 adjustable from 0-60 min
				3. Override momentary Source 2 Outage adjustable from 0-60 s
				4. Transfer from Source 2 to Source 1, adjustable from 0-120 min
				5. Generator stop delay, adjustable from 0-60 min
				6. Center-OFF delay, adjustable from 0-300s (Delay Transition ONLY; cancelled on outage)
				7. Pre-transfer delay S1 to S2 adjustable from 0-300 s
				8. Post-transfer delay S1 to S2 adjustable from 0-300 s
				9. Pre-transfer delay S2 to S1 adjustable from 0-300 s
				10. Post-transfer delay S2 to S1 adjustable from 0-300 s
				11. Load shed delay adjustable from 0-60 s
				12. Elevator pre-signal S1 to S2 adjustable from 0-60 s (cancelled on outage)
				13. Elevator post-signal S1 to S2 adjustable from 0-60 s (cancelled on outage)
				14. Elevator pre-signal S2 to S1 adjustable from 0-60 s (cancelled on outage)
				15. Elevator post-signal S2 to S1 adjustable from 0-60 s (cancelled on outage)
			2. Undervoltage sensing for each phase of Source 1 and Source 2, with the following selectable threshold ranges:
				1. Pick-up: 71-99% of nominal
				2. Drop out Voltage: 70-98% or nominal
				3. Accuracy: 1%
			3. Overvoltage sensing for each phase of Source 1 and Source 2, with the following selectable threshold ranges:
				1. Pick-up: 101-119% of nominal
				2. Drop out Voltage: 102-120% of nominal
				3. Accuracy: 1%
			4. Underfrequency sensing for each phase of Source 1 and Source 2, with the following selectable threshold ranges:
				1. Pick-up: 80.5-99.5% of nominal
				2. Drop out Voltage: 80-99% of nominal
				3. Accuracy: 0.5%
			5. Overfrequency sensing for each phase of Source 1 and Source 2, with the following selectable threshold ranges:
				1. Pick-up: 100.5-119.5% of nominal
				2. Drop out Voltage: 101-120% of nominal
				3. Accuracy: 0.5%
			6. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:
				1. CISPR 11:2009 – Radiated Emissions
				2. IEC 61000-4-2: 2008 - Electrostatic discharge immunity test
				3. IEC 61000-4-3:2006+A1:2007+A2:2010 - Radiated, radio-frequency, electromagnetic field immunity test
				4. IEC 61000-4-4:2012 - Electrical fast transient/burst immunity test.
				5. IEC 61000-4-5:2005 - Surge immunity test
				6. IEC 61000-4-6:2008 - Immunity to conducted disturbances, induced by radio-frequency fields
				7. IEC 61000-4-11:2006 – Voltage dips immunity test
				8. IEC 61000-4-13:2009 – Harmonic voltage immunity test – Class 3
		8. HMI Characteristics
			1. ATS shall be equipped with 3” by 2” graphical color touch screen LCD HMI display.
			2. ATS shall have a display module/HMI mounted to the ATS panel door mounting with one single standard Cat 5/Ethernet/RJ45 cable connection.
			3. The controller shall have the ability to log data and to maintain the last 250 events stored in nonvolatile memory. Event log should record the date, time, reason and action taken.
			4. Auxiliary power supply shall be available to power controller and HMI throughout outage via an alternate 12-24 Vdc source
			5. ATS shall be equipped with a large multi-line display and supporting the following languages:
				1. English
				2. French
				3. German
				4. Italian
				5. Spanish
				6. Russian
				7. Chinese
				8. It shall be possible to download more languages if required
			6. ATS shall be fully operational even when the HMI is disconnected
			7. Source Connected Status LED’s – Controller display shall have industrial grade LED’s, to indicate when the ATS is connected to each source (Green – Source 1, Green – Source 2)..
			8. Availability Status LED’s – Controller display shall have industrial grade LED’s, to indicate the availability of each source (Green – Source 1, Green – Source 2).
			9. ATS HMI shall indicate via LED when switch in or not in AUTO mode, and whether there are any alarm or warning conditions.
			10. ATS HMI shall display system status as a main screen that is the default screen and readily accessible from any menu screen by pressing ESC key. The screen shall clearly show the following:
				1. S1 and S2 status
				2. Which source is connected to load
				3. Current alarms, warnings, or information
				4. Generator start/stop contact status
				5. Time of day
				6. Active time delay and remaining time
				7. Aux power connected
			11. ATS HMI shall have an optional main screen that displays line to line and line to neutral (if applicable) voltage.
			12. ATS alarms, warnings, and information shall be clearly communicated from the main screen and shall provide meaningful information for detecting and diagnosing system errors that may be preventing load transfer commands from being executed.
			13. ATS HMI shall display statistical information (switch diagnostics) to assess the conditions and operational history of the switch:
				1. Total operations
				2. Number of load transfers
				3. Transfer time (last transfer: total time from source failure to close-on alternate source)
				4. Source fail transfers (number of times ATS has transferred due to source failure)
				5. Days energized
				6. Total time on S1
				7. Total time on S2
				8. Time S1 available
				9. Time S2 available
				10. Last generator start
				11. Generator starting time
				12. In-phase time (last transfer: how long it took for sources to sync for transfer)
		9. Auxiliary Contacts: ATS shall be offered with (NC) and (NO) contacts for position indication rated 6A at 240Vac, with the ability to place four contacts per position of each source.
		10. Generator Start/Stop Contacts: One single pole double throw form C; rated 5A at 250Vac/30Vdc.
		11. Standard Digital I/O: Standard (open, ZBTS) transition ATS shall include two programmable digital input and one programmable output contact. Delayed transition (ZBTSD) ATS shall include three programmable digital inputs and one programmable output contact. The number of I/O is expandable per 2.04.A.2. All input and output functions may also be utilized via communications protocol. The programmable functions shall be possible as stated below:
			1. Input functions:
				1. Emergency Stop – Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
				2. Remote Test on Load – Start/stop test-on-load sequence (simulates S1 failure).
				3. Remote Test off Load – Start/stop test-off-load sequence (engine start/stop).
				4. Inhibit Auto Mode – Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
				5. Manual Retransfer – Disables automatic transfer back to priority source.
				6. Priority S1 – Sets priority for source 1 in transformer-transformer application
				7. Priority S2 – Sets priority for source 2 in transformer-transformer application
				8. Inhibit Transfer - Disables automatic transfer from priority source to non-priority source.
				9. Bypass Running Time Delays – Bypass any currently running time delay.
				10. Remote Control to S1 – Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
				11. Remote Control to Off – Transfer to O position when active (Delayed Transition, ZBTSD only.
				12. Remote Control to S2 – Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
				13. Alarm Reset – Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
				14. Manual-Auto Mode – Toggle automatic/HMI control mode (The controller shall allow the operator to select the option of Auto/Manual transfer via front display, input contacts, or communications to allow the transfer switch to function in a non-automatic mode)
			2. Output functions:
				1. Alarm/Product Availability – Signals any active alarms or ATS being disabled for automatic transfer operations (generated when ATS is not capable of auto operation).
				2. ATS in Position I – Indicates switch in position I.
				3. ATS in Position O – Indicates switch in position O (Delayed Transition, ZBTSD only).
				4. ATS in Position II – Indicates switch in position II.
				5. Pre-transfer Signal – Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
				6. Source 1 Available – No anomalies in S1 voltage supply per configured set points.
				7. Source 2 Available – No anomalies in S2 voltage supply per configured set points.
				8. Load Shed – Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
				9. Elevator pre-signal – Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		12. Engine-Generator Exerciser: Programmable function starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable between daily or 7, 14, or 28 days. Running periods can be adjustable in minutes. On-load or off-load exercising is selectable.
		13. Commit Transfer (Off/On): If set to “On”, Load is transferred to non-priority source after priority source failure even if the priority source returns before the non-priority source is ready to accept the load.
		14. Test: Ability to simulate normal source failure and test on-load or off-load either direct from HMI, Ekip connect software (optional), communications protocol (optional), or digital programmable I/O (optional).
		15. Position Indication: reliable indication of contact position shall be visible on the ATS unit via a mechanical indicator directly driven by the switching mechanism
		16. Operational Requirements:
			1. The complete ATS solution shall be compatible with the following temperature conditions:
				1. Operating temperature without derating: -20°C to +40°C
				2. Operating temperature maximum with derating: +70°C
				3. Transportation and storage temperature: -40°C to +70°C
			2. ATS shall be capable of operating in 200 to 480Vac voltage range without additional devices like external voltage transformers.
			3. The display module/HMI shall be communicating with the ATS controller via local communication bus and shall be completely isolated from the dangerous line voltages
			4. Generator start time delay shall be adjustable up to maximum 60 secs without using additional batteries, external power supplies or similar accessories
	4. OPTIONAL FEATURES
		1. Connectivity and Communication
			1. ATS shall be capable of communicating, without external gateways and data converters, with the following listed communication protocols. Use of two modules/protocols shall be possible.
				1. Modbus RS485
				2. Modbus/TCP
				3. Profibus DP
				4. Profinet
				5. DeviceNet
				6. Ethernet/IP
			2. ATS shall have expandable programmable digital I/O, capable of adding up to 6 additional inputs and 6 additional outputs. These shall be capable of any of the I/O functions described in section 2.03 K. of this document.
			3. Accessorizing with communication or I/O modules shall not take additional space inside the panel
		2. Laptop Programming
			1. It shall be possible to program the ATS without any power (no mains, generator or auxiliary power supply) via laptop with Ekip Connect software and Ekip programming module (USB).
			2. With this software and programming module it shall be possible to import and export saved settings files.
		3. Aux Power Supply
			1. Control system shall be suitable to accept 12-24VDC external power supply to keep the controller, display, I/O, and communications modules live during power outages.
		4. Metering
			1. ATS shall have power metering capabilities embedded
			2. ATS shall have capability to show on panel face: the metering values in numeric format with bright, long-life, LED display.
			3. The following metering functions shall be available but not limited to:
				1. Current (A); phase and neutral
				2. Voltage (V); L-N and L-L for each pole of S1 and S2
				3. Frequency (Hz)
				4. Power (kW); active, apparent, and reactive
		5. Proactive Outage Prevention
			1. ATS shall use embedded switch sensing system to provide:
				1. Contact wear status as a percentage of life (100% = end of life)
				2. Predicted contact end of life date computed based on recent switch diagnostic history and current conditions
				3. Temperature sensing embedded in HMI, mechanism/controller, and load side of ATS power poles
				4. Standard HMI-based alerts
				5. Display of above values on HMI, communications, connectivity software, or optional cloud monitoring system
				6. Custom alerts via optional cloud monitoring system
		6. Enclosure Heater
			1. An enclosure heater with thermostat shall be provided as an optional ATS feature for Type 1, 3R, 12, 4, and 4X enclosures.
		7. ATS shall have the ability to embed a cloud-based monitoring system for online real-time supervision.
			1. Supervision system shall have a data logging interval of 30 seconds to ensure a fast reaction in case of warning or alerts and continuous measures for reliable efficiency analysis. Supervision system shall be designed to monitor following data, without storage limitation capability.
			2. It shall be possible to monitor status of devices and alarms. It shall be possible for web user to set up alerts, identifying alerts for specific devices or on all devices, in order to schedule maintenance and to check health of installation. Alerts shall include:
				1. Phase and neutral currents
				2. Phase to phase and phase to neutral voltages
				3. Number of operations
				4. ATS position
			3. It shall be possible to set alarms and define type of notification through SMS or e-mail for each user.
			4. Analytics and reports:
				1. Supervision system shall be provided with web app with pre-configured widget to allow immediate overlook of plant consumption and analytics based on collection of data on selectable period of one day, one week, one month, one semester, one year or on custom period.
				2. Widget should be designed to display single or multi-site information and shall include both power utility consumption and power generated on site.
				3. Web app shall allow the creation and customization of “digital” representation of asset, allowing creation of synoptic representation of switchboard, importation of single line diagram or switchboards’ front view. It shall be possible to activate the graphics by connection with markers or tags, to easily access to device data.
				4. Export of data and trends in excel shall be possible both on-demand and via automatic report scheduling function. It shall be possible to generate reports for all information managed or generate customize reports selecting specific measures and devices. Benchmark on multi-site level shall also be possible in order to compare plants and systems and identify best practices.
			5. Commissioning and maintenance:
				1. System shall allow final user or installing contractor to execute the commissioning with the simple use of free software provided by manufacturer OR simply utilizing HMI. Automatic recognition of devices shall be ensured so that there is no need of programming and free software shall include wizard for commissioning directly from web. Free software provided by manufacturer shall allow execution of system implementation in conjunction with ABB USB Ekip Programming Module without requiring system integrator.
			6. Interface:
				1. System shall be supplied with pre-set graphic pages with dashboard for immediate evaluation and management of power consumption and switch status. It shall be possible to display dashboard on tablet or smartphone.
			7. Security:
				1. Authentication system shall be provided to access to data. Encrypted communication channel and certification for communication to cloud and from cloud to web app shall be guaranteed. Encrypted communication channel and certification shall follow TSL protocol to ensure maximum safety level available. TSL protocol shall be provided embedded in the module for supervision and cloud connection.
			8. Level of users:
				1. It shall be possible to define at least 4 different profiles for users. Only one of the users can be identified as owner. The owner shall sign up the EULA to start the data transmission and has the rights to renew license of use. Only owner and administrator can send invitation to other users and have rights to change roles.
			9. It shall be possible to define staff profile with the rights to access to asset and device view, alerts view, analytics view and control view. It shall be possible to assign visitor profile for enabling users to access only to alerts view.
		8. Advanced ATS Controller Features
			1. ATS shall have auto configuration feature for automatically detecting the source 1 and source 2 rated voltage, rated frequency, phase distribution system, location of neutral and phase rotation (ABC, ACB)
			2. ATS shall have capability to be equipped with real time clock (RTC) with a capacitor back-up to maintain time and date for minimum 48 hours if both source 1 and source 2 become unavailable. RTCs with battery back-up shall not be not allowed.
			3. It shall be possible to program the generator to utilize either source 1 or source 2 terminations via the HMI
	5. ADDITIONAL REQUIREMENTS
		1. Withstand and Closing Ratings
			1. The ATS shall be rated according to UL 1008 to withstand and close-on the available RMS symmetrical short circuit current at the provided ATS terminals according to these maximum ratings with specified overcurrent protection on drawings. Minimum UL listed withstand and close into fault ratings shall be as follows:

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| **ZBTS T-series coordinated WCR** |
| **ATS frame** | **ATS rating** | **Transition types** | **Coordinated fuse ratings** | **Coordinated breaker ratings** |
| **480V Max withstand** | **Class** | **Max fuse size** | **240V Max withstand** | **Max breaker size** | **480V Max withstand** | **Max breaker size** |
| R3B | 100-600A | OT, DT | 200kA | Class J or T | 400A | 200kA | 600A | 100kA | 600A |
| 100kA | Class J or T | 600A |
| 200kA1 | Class J or T | 800A | 200kA1 | 600A |
| 200kA1 | Class L | 800A | 65kA1 | 800A |
| R4B | 100-600A | OT, DT | 200kA | Class J or T | 400A | 200kA | 600A | 100kA | 600A |
| 100kA | Class J or T | 600A |
| 200kA1 | Class J or T | 800A | 200kA1 | 600A |
| 200kA1 | Class L | 800A | 65kA1 | 800A |
| 800-1200A | OT, DT | 100kA1 | Class L | 2000A | 200kA | 1600A | 100kA1 | 1200A |
| 200kA1 | Class J or T | 800A | 65kA1 | 1600A |
| 200kA1 | Class L | 1200A |
| R5B | 1600-4000A | OT, DT, CT | 200kA | Class L | 4000A | 100kA | no max | 100kA | no max |
| 1: 3 phase applications only |   |   |   |   |   |   |   |

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| **ZBTS T-series Time-based WCR and STR** |
| **ATS frame** | **ATS rating** | **Transition types** | **Time-based ratings** | **Short-time ratings** |
| **480V Max withstand** | **Time-period** | **480V Max withstand** | **Time-period** |
| R2 | 30-200A | OT, DT | 18kA | 0.1 sec | 18kA | 0.3 sec |
| R2 | 260A | OT, DT | 25kA | 0.1 sec | 25kA | 0.3 sec |
| R3 | 400A | OT, DT | 35kA | 0.1 sec | 30kA | 0.3 sec |
| R3 | 600A | OT, DT | 42kA | 0.1 sec | 30kA | 0.3 sec |
| 63L | 100-1200A | CT | 50kA | 0.05 sec | - | - |
| R4 | 800-1200A | OT, DT | 50kA | 0.1 sec | 50kA | 0.5 sec |
| 65kA | 0.05 sec |
| R5 | 1600-3000A | OT, DT, CT | 100kA | 0.05 sec | 65kA | 0.5 sec |
| 1: 3 phase applications only |   |   |   |   |

For further details on ratings, refer to document number 1SCC303020C0201 Zenith T-series Withstand and Closing Ratings.

1. – EXECUTION

Specifier Notes: Sections 3.01 – 3.04 are suggested sections, and shall be generated by the Engineer.

* 1. 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”.
	2. CONNECTION
		1. Wiring for the ATS 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. FACTORY TESTS
		1. The ATS shall be factory tested prior to shipment to ensure proper mechanical, electrical, and software operation. This shall include at a minimum, 10 load transfer sequences and a dielectric voltage withstand test.
	4. SERVICE AND SUPPORT
		1. Service Representation
			1. The ATS manufacturer shall have and maintain a nationwide service organization throughout the United States, on call 24 hours a day, 365 days a year and capable of responding for service with spare parts within 24 hours.
		2. Serviceability
			1. ATS shall have modular construction, enabling:
				1. Field service, including but not limited to: controller, HMI, power module, and/or mechanism unit replacement without requirement for disconnecting the power cabling and removing the ATS from the enclosure. Replacement of any of these individual components shall be possible in a few minutes or less
				2. Complete mechanism and electronics including solenoid operator, power module, and controller board can be replaced in less than 10 minutes, using only a flathead screwdriver and without removing power cables.