

SECTION 28 08 00

SECURITY SYSTEM TESTING AND COMMISSIONING

PART 1 - GENERAL

1.01 WORK INCLUDES

- A. General Description: This specification section covers the provision of preliminary testing, acceptance testing, burn-in performance testing, and the commissioning of various access control systems in the Denver Public School District.
- B. Provide Testing to assure that electrical equipment and wiring is operational, within industry and manufacturers tolerances and is installed in accordance with other sections of these specifications.
- C. Conduct tests in the presence of the Owner and the Owner's agents for the purpose of demonstrating the equipment or systems' compliance with specifications. Demonstrate electrical and mechanical tests to the Owner and the Owner's agents that the entire installation is functioning properly and that circuits, including power, control, instrumentation, relaying, integration and communication, will function properly and as specified.
- D. Furnish, install and maintain tools, instruments, material, test equipment, test connections and power. Furnish personnel including supervision and "stand-by" labor required for the testing, setting, and adjusting of electrical facilities and component parts including putting the above into operation.
- E. Make tests with proper regard for the protection of equipment and personnel.
- F. Protect equipment from subsequent testing of other equipment and systems after equipment has been tested, checked for operation, and accepted by the Owner.
- G. Record test values of equipment, giving both "as-found" and "as-left" for existing conditions.
- H. The witnessing of any test by the Owner does not relieve the Contractor of warranties for material, equipment, and workmanship, as specified in the General Conditions.
- I. Check circuits for conformance with the wiring diagrams furnished by manufacturers.

1.02 RELATED SECTIONS AND REFERENCES

- A. Project General Requirements and General Provisions.
- B. Division 26 - Electrical.
- C. Division 27, Structured Cabling, Data Communications, and Telephone Systems.
- D. Division 27, Section 27 32 26 Emergency Phones.
- E. Division 27 Section 27 51 00 Security Communications Local Intercom System.
- F. Division 28 – Electrical Safety and Access control.
- G. Inspections and tests shall be performed in accordance with applicable codes and standards including the most current versions of NEC, ANSI, IEEE, NFPA, NEMA and OSHA.
- H. International Electrical Testing Association, Acceptance Testing Specifications (NETA ATS), latest edition.

1.03 SUBMITTALS

- A. In addition to the requirements of Section 28 05 00, four (4) bound copies of the certified test reports shall be submitted to the Owner within seven (7) days after the completion of the work. The final report shall be signed and include the following information:
 - 1. Summary of the project.
 - 2. Description of the equipment tested.

3. Visual inspection report.
4. Description of the tests.
5. Pre-Acceptance and Final Acceptance Test results.
6. Conclusions and recommendations.
7. Appendix including appropriate test forms.
8. Identification of the test equipment used.

1.04 WARRANTY

- A. Provide the work in accordance with Section 28 05 00, Security Systems General Requirements.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 GENERAL

- A. Furnish labor, instruments, products, temporary power, and sufficient materials required for testing at each test.
- B. Correct deficiencies found as a result of tests and make replacements or repairs to tested products that are damaged as the result of the tests. This included Burn In Performance report reviews.
- C. Schedule tests at a time convenient to witnesses thereto or persons affected by the tests.
- D. Provide fourteen (14) day written notification to the Owner for test procedures prior to the test.
- E. Make records of all tests in a neat and legible form. Identify the equipment or system tested and the test data.
- F. Check control, instrumentation, and power cables and conductors for proper connections, workmanship and identification.
- G. Test disconnect switches through an open and closed cycle for proper operation, alignment and contact.
- H. Additional tests required shall be as outlined under the various Sections of Division 26 and Division 28.
- I. Submit to the Owner certified reports on all tests indicating full compliance with test requirements.

3.02 COORDINATION

- A. Provide the work in accordance with Section 28 05 00, Security System General Requirements.

3.03 WORKMANSHIP

- A. Provide the work in accordance with Section 28 05 00, Security System General Requirements.

3.04 PRELIMINARY INSPECTION & TESTING

- A. Coordination: Coordinate testing of components of the system in cooperation with other trades.
- B. Verification: Prior to performing Preliminary Testing, inspection, and/or final testing procedures, Contractor shall insure the following:
 1. Safe and proper operation of all components, devices or equipment, and the absence of extraneous or interfering signals.
 2. Proper grounding of devices and equipment.
 3. Integrity of signal and electrical system ground connections.
 4. Proper powering of devices and equipment.
 5. Integrity of all insulation, shield terminations and connections.
 6. Integrity of soldered connections and absence of solder splatter, solder bridges, debris of any kind.

7. Proper dressing of wire and cable with labels matching as-build documents.
 8. "Wire-checking" of all circuitry, including phase and continuity.
 9. Preliminary targeting and setup of video camera assemblies.
 10. Mechanical integrity of all support and positioning provisions, i.e.: as provided for video cameras, monitors and any other equipment.
 11. Sequencing: If applicable, determine and record the sequence of energizing systems to minimize the risk of damage from improper startup.
 12. Proper operation of devices and systems in accordance with specified performance requirements.
 13. System is programmed for alarm reporting of each device and associated with the graphical maps.
 14. Verify system programming is defined.
 15. Verify provided Owner designations for all devices.
- C. Perform a Preliminary Inspection and Test to determine the operating status of components and systems prior to Final Acceptance Testing. Verify graphical maps have been installed for the system. Each device shall be displayed as an alarm icon on the graphical map, and in a textual description on the alarm reporting screen.
1. Testing Electronic Access Control Security Terminal Cabinets:
 - a. Test each equipment enclosure for tamper alarm.
 - b. Test each power supply battery for power loss alarm reporting.
 - c. Test each STC for 120VAC power loss alarm.
 - d. Test each STC for communication loss with server reporting.
 2. Testing Electronic Access Control Doors:
 - a. Doors with Door Position Switch (DPS) and Request to Exit device (REX) shall be tested for:
 - 1) Door Forced Open alarm is generated when door is opened from unsecured side.
 - 2) Door Held Open alarm is generated when door is held open past its preprogrammed duration after valid REX event.
 - 3) REX shunts alarm on egress.
 - 4) REX does not shunt forced door alarm.
 - b. Doors with Electrified Exit Device, DPS and REX:
 - 1) Door is locked in secure mode.
 - 2) Door is unlocked by manual command from system workstation.
 - 3) Door is unlocked by time zone.
 - 4) Door Forced Open alarm is generated during secure mode only.
 - 5) Door Held Open alarm is generated during secure mode only.
 - 6) REX shunts alarm on egress during secure mode, for the preprogrammed duration.
 - 7) Door relocks immediately when door closes after valid passage (does not wait for preprogrammed duration).
 - 8) REX does not unlock door.
 - 9) REX does not bypass forced door alarm.
 - 10) Door relocks on time zone.
 - 11) Door relocks during day mode on manual command from system workstation.

- c. Doors with Automatic door operators:
 - 1) Door is locked in secure mode.
 - 2) Door is unlocked by manual command from system workstation during secure mode.
 - 3) Door is unlocked by time zone.
 - 4) Door Forced Open alarm is generated during secure mode only.
 - 5) Door Held Open to long alarm is generated during secure mode only.
 - 6) REX shunts alarm on egress during secure mode.
 - 7) REX does not unlock door.
 - 8) Door relocks on time zone.
 - 9) Door relocks during day mode on manual command from system workstation.
 - d. Doors or Gates with card reader:
 - 1) Door unlocks by use of the card reader for programmed unlock time and does not alarm when door is opened.
 - 2) Door is locked in secure mode.
 - 3) Door is unlocked by manual command from system workstation.
 - 4) Door is unlocked by time zone.
 - 5) Door Forced Open alarm is generated during secure mode.
 - 6) Door Held Open alarm is generated during secure mode.
 - 7) REX shunts alarm on egress during secure mode.
 - 8) Door relocks immediately when door closes after valid passage (does not wait for preprogrammed duration).
 - 9) REX for door does not unlock door.
 - 10) REX for gates does not unlock gate.
 - 11) Door relocks on time zone.
 - 12) Door relocks during day mode on manual command from system workstation.
3. Testing Video Surveillance System:
- a. Live viewing:
 - 1) Verify each camera live viewing at the monitoring workstation is in focus.
 - 2) Verify each camera live viewing at Central Command Post is in focus.
 - 3) During an alarm event verify camera and pre-programmed views associated with alarm event are displayed at the viewing location(s).
 - 4) Verify camera identification match Owner defined description.
 - b. Recorded Images:
 - 1) Verify each camera viewing of recorded images at the monitoring workstation.
 - 2) Verify each camera viewing of recorded images at Central Command Post.
 - 3) Verify alarm event is recorded as specified in 28 23 00.
4. Testing Emergency Phone System:
- a. Local Device.

- 1) Verify indicator is 'on' solid.
 - 2) Verify indicator 'flashes' when operated.
 - 3) Verify audio communication with monitoring station.
- b. Remote monitoring:
- 1) Verify audio communication with remote station.
 - 2) Verify alarm generated on EACS system.
 - 3) Verify Video Surveillance System is activated 'calling' camera(s) to view location.
- c. Duress Switch – Intrusion Detection System:
- 1) Verify switch activation reports to IDS control panel.
 - 2) Verify switch activation reports to monitoring station.
- d. Security Communications Local Intercom System:
- 1) Verify each switch remote station reports to the monitoring station and resets when restored.
 - 2) Verify each remote station reports as Owner defined room number.
 - 3) Verify audio is free from static and is has sufficient volume for communication.
- e. Wireless Alarm System:
- 1) Verify wireless transmitters are activated by their associated alarm devices.
 - 2) Verify transmitted alarms report their individual ID's to their associated alarm receivers from various locations around the area of coverage.
 - 3) Verify each wireless transmitter supervision reports its individual identification to the system.
- D. Adjustments and Documentation: After successfully energizing and testing the systems, make adjustments and document the setting of controls, configurations, as applicable. Tabulate all data along with an inventory of test equipment, a description of testing conditions and a list of test personnel. Copies of preliminary test data shall accompany copies of performance testing data as part of the Operating and Maintenance submittal.

3.05 PREPARATION FOR ACCEPTANCE (PRIOR TO FINAL INSPECTION)

- A. Temporary facilities and utilities shall be properly disconnected, removed, and disposed of off-site.
- B. Systems, equipment, and devices shall be in full and proper adjustment and operation, and properly labeled and identified.
- C. Materials shall be neat, clean and unmarred, and parts securely attached.
- D. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc., shall be replaced or properly repaired, and debris cleaned up and appropriately discarded.
- E. Extra materials as specified shall be delivered and stored at the premises as directed by the Owner at the completion of the [first building/phase].
- F. Preliminary Test reports of each system and each system component, and Record project documents shall be complete and available for inspection and delivery upon completion of each [building/phase] as directed by Owner.

3.06 ACCEPTANCE TESTING AND ADJUSTING PROCEDURES

- A. Purpose: Conduct testing and adjusting procedures to realize and verify the performance criteria specified herein and identified in Preliminary Testing procedures listed above. Successfully demonstrate the acceptable performance of each specified system in the presence of the Owner and Engineer.
- B. Scope: Conduct all performance testing, adjustment and documentation procedures to verify and realize compliance with the performance specifications herein. Make available at least one (1) engineer familiar with

this work, and all required test equipment for the duration of performance testing verification, at the convenience of the Owner.

- C. Acceptance Testing Readiness: Acceptance testing will be performed after the system is installed and pre-tested completely.
 - 1. The contractor shall have successfully tested the system prior to scheduling formal acceptance testing and provided forms with each test for each portal. Contractor shall correct any and all deficiencies found at that time.
 - 2. Acceptance testing will be conducted in accordance with the approved Acceptance Testing Plan with a minimum of testing listed in Preliminary Testing section.
 - 3. Deliver equipment, devices and materials required for the access control work to the site at least fourteen (14) working days prior to the scheduled Completion Date.
 - 4. Install, test and ready all of the access control work for final Acceptance Testing of the Installation ten (10) working days prior to the Completion Date.
- D. Acceptance Testing Schedule: Contractor shall confirm in writing to the Owner when the system is ready for acceptance testing. Contractor shall then schedule a complete Acceptance Test at the convenience of the Owner.
- E. Acceptance Testing:
 - 1. Contractor shall test and verify the performance of all equipment, systems, interfaces and peripheral equipment in the presence of the Owner, Owner Representatives, and Engineer.
 - 2. Tests shall be performed in accordance with the requirements of individual systems as specified herein and in related specification sections. Test shall incorporate testing described in preliminary inspection and testing.
 - 3. Contractor shall furnish communication equipment between the field testing team and the monitoring team.
 - 4. Contractor shall furnish testing forms for each location.
- F. An Observation Report will be generated by the reviewing team, Owner representative, Design Engineer and Contractor for contractor to review
- G. Correction of Jobsite Observation Report Items: Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner within ten (10) working days of the completion date. Corrective work shall be performed at no additional cost to the Owner. Contractor shall provide a written report each week of repairs made and plan to complete repairs in progress.
- H. Test Documentation: Document all acceptance testing, calibration and correction procedures described herein with the following information:
 - 1. Performance date of the procedure.
 - 2. The names of personnel conducting the procedure.
 - 3. The equipment used to conduct the procedure.
 - 4. Type of procedure and description.
 - 5. Condition during performance of procedure.
 - 6. Parameters measured and their values, including values measured prior to calibration or correction as applicable.

3.07 BURN-IN PERFORMANCE PERIOD

- A. Prior to Final Acceptance by the Owner, the Contractor shall be responsible for performing testing and inspections, as specified herein, to verify that the installation equipment and materials are performing in compliance with the specifications.

- B. Upon satisfactory completion of Acceptance Testing and inspection, the Owner shall notify the Contractor, and the Burn-In Performance Period shall commence.
- C. Contractor shall obtain weekly reports of alarm events related to this project and make system repairs or corrections to minimize false alarms. A report shall be provided by the Contractor to the Owner indicating corrections required and locations corrected. Engineer may provide additional comments to the report for contractor to review and provide corrective action.
- D. A Performance Period of thirty (30) consecutive calendar days of operating without fault in accordance with the specifications, subsequent to testing and inspection, shall constitute a successful Performance Period.
- E. Upon successful completion of the Performance Period, the Owner and design team shall meet to confirm Acceptance, and the Final Acceptance Form shall be executed.
- F. If a successful Performance Period cannot be accomplished within ninety (90) consecutive calendar days after commencement of the first Performance Period, the Owner reserves the right to find the Contractor in default, and terminate the Contract. In that event, the Contractor shall remove the equipment, and the Owner shall not be responsible for any payment whatsoever to the Contractor, except for any materials (i.e., wiring) left in place and elected to be reused by the Owner.
- G. Obtain system alarm and event reports at a minimum of four (4) times during the burn in period. Review reports with Owner and repair system equipment and/or adjust system parameters as requested by the Owner or required for system performance.

3.08 COMMISSIONING AND VALIDATION

- A. Commissioning is a “fine tuning” process used for complex systems that occurs after acceptance testing, during the Burn-In Performance period and before final acceptance. It helps assure that the system performs to its fullest potential, and validates the effectiveness of the total system implementation in relation to the goals of the access control countermeasures program.
- B. After the installation and final testing of the system, an Access Control Commissioning team will be assembled to validate the best performance of the system under different scenarios. Alarm reports shall be used to verify operation of the system.
- C. This process includes participation by the Owner, Contractor, the Consulting Engineer, A third party testing agent may also be hired by the Owner to plan, conduct, and verify the Commissioning process.
- D. The Contractor shall include a minimum of sixteen (16) hours of participation in the commissioning and validation process by a minimum of two (2) employees familiar with the specific project and installation. Contractor shall adjust device installation where alarms are determined to be false.
- E. Scheduling of Commissioning and Validation testing will be by the Owner, and may occur after the Notice of Completion, but before the end of the Warranty period.
- F. Revisions to the configuration and programming of the system which are recommended by the Commissioning Team as a result of validation testing, shall be performed by the Contractor under the direction of the Owner, at no additional charge. The Warranty provisions of this specification shall apply to any configuration and programming revisions resulting from the validation testing process.
- G. Revisions and improvements recommended by the Commissioning Team which require physical modifications or additions to the approved and accepted system, including the provision or relocation of new equipment, wiring, and installation, shall be treated as additional changes to the contract, and shall be processed as defined in the Project General Provisions. Where such requested work was part of the Contractors’ original scope of work, as defined in the design drawings and specifications, or in contract revisions and agreements, the Contractor shall provide the work at no additional charge.

3.09 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 28 05 00, Security System General.

END OF SECTION 28 08 00