

SFB Fire Alarm Performance Specialty Specification  
Emergency Radio Communication Enhancement System (ERCES)  
(28 55 00)

1. All applicable parts of the [General Fire Alarm Performance Specification](#) (section 28 46 00) shall be included in this section.
2. Assessment of the Fire Alarm installations that require an Emergency Radio Communication Enhancement System (ERCES) [is this a requirement? Should it say “shall require”]. Some Manufacturers call this ERCES a Bi Directional Amplifier System (BDA). The industry also refers to an Assessment as a Survey. **There are also other systems that can be considered such as a fiber based network system.**
  - 2.1. The Assessment Phase may not be required if the AHJ (Authority Having Jurisdiction) requires the design and installation of the ERCES for a building permit due to a recent school site fire alarm inspection. **Typical examples of communication signal blockages are elevators, basements, stairwells, cell towers onsite, low “E” glass and surrounding buildings.**
  - 2.2. The guidelines mentioned in this Assessment Section, even if this Assessment is not needed, needs to be pursued by the District’s Designer for their scope of work determinations.
  - 2.3. A third party organization called [Safer Buildings Coalition](#) can provide assistance in providing system integrators (S.I.) to provide network signal assessments (surveys), designs and installations. These SI’s can also provide design services for the District. **Note: Some of these S.I. members may represent the Cellular Industry and not ERCES Industry.**
  - 2.4. **A local Phoenix based firm called RWC ([Regional Wireless Cooperative](#)) may have more local AZ assistance in providing S.I.’s and regional code assistance.**
  - 2.5. A qualified SI shall be certified as a FCC GROL (General Radiotelephone Operator License) Technician. The GROL (**Element Level 3**) is a license granted by the U.S. Federal Communications Commission (FCC), which is required to operate certain radio equipment.

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3. Design shall be by the District's Electrical Engineer or the District can use a 3<sup>rd</sup> party Fire Alarm Specialist as found in the General Fire Alarm Performance Specification (section 28 46 00).
  - 3.1. Demolition requirements, if required, shall be recommended by the Assessor's report and shall be determined by the Designer's Team mentioned above to confirm their design scope of work.
  - 3.2. Protection of interior surfaces is required.
  - 3.3. Verification of existing structure, fasteners and other related connections at exposed areas shall be included in the Assessor's report. This work shall be coordinated by the Designer's Team in a safe manner to prepare their design scope of work.
  - 3.4. Section includes fire alarm/communications accessories.
  - 3.5. As mentioned above, a survey shall be performed after the building is dried in and prior to the start of installation of electrical wiring for new construction projects.
  - 3.6. For BRG (Building Renewal Grants) projects, this survey is needed in order to define the Designer's scope of work for existing buildings.
  - 3.7. This survey may include a RF Spectrum Analyzer, system compatible radio or another suitable device with traceable certificate of calibration to analyze the RF signal strength of the Emergency Responder Radio Signal into the building and to determine if amplification of the signal is required. This process is necessary to establish the AHJ's direction to provide such a system.
  - 3.8. The required Public Safety radio signal level inside the District's educational spaces must be determined per code, ordinance or AHJ as applicable. Spaces requiring an ERCES that are excluded spaces will be paid by the District.
  - 3.9. A drawing shall be prepared to clearly depict the areas that have passed and/or failed based on the survey provided. This survey shall include the AHJ's site testing results if available. This drawing shall be part of the AHJ submittal for a building permit.

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3.10. An RF measurement drawing shall be prepared for each floor of the building which indicates relative RF field strength for each frequency band of interest. This drawing shall be part of the AHJ submittal for a building permit.

~~3.11.~~ Testing procedures shall be developed. These procedures require District & AHJ approvals. [what is process if the testing results in a failure?]

~~3.11.~~~~3.12.~~ It is recommended that spare conduits are installed in new construction for pathway to the roof in areas where faults are common (ie basements, stairwells, elevator cores or any other areas with potential signal blockages).

~~3.12.~~~~3.13.~~ It is preferred that a remote annunciator panel's monitoring module be used to terminate the new ERCES system with LED lights that monitors power, battery and antenna damage. This panel is typically the first place the Fire/Police Departments review when responding to an emergency call.

~~3.13.~~~~3.14.~~ A dedicated 120v power supply with battery backup is required for the new ERCES. The battery back-up shall have a UL 2524 certification.

~~3.14.~~~~3.15.~~ The System Integrator shall obtain written approval from the FCC "License Holder". This License Holder shall be part of the design process since he represents the end user who will provide life safety services to the School District.

~~3.15.~~~~3.16.~~ The S.I. will need to apply for the end user's ERCES. This application process serves as both an application & written consent by the applicant and licensee. [See this link for a sample of this form.](#)

~~3.16.~~~~3.17.~~ There are currently two types of ERCES. A Class "A" System which is a narrow band device and Class "B" System which is a Broad Band System. The AHJ shall determine which Type of System will be specified.

~~3.17.~~~~3.18.~~ Some school site installed cell towers may interfere with the new ERCES. Band #14 filters or other filters at the cell towers may be required to prevent degradation of the new ERCES signal.

~~3.18.~~~~3.19.~~ Annual Inspections are required for ERCES. Provide a cost to the District via their IFB for this project for Annual Inspections.

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4. Performance Criteria

4.1 It is extremely important to have long term performance of materials used in Arizona.

4.2 Design, specification and installation shall provide a 20-year minimum life. Proper installation is particularly important to the life of this repair/installation and will require third party quality assurance and quality control inspections as well as enhanced contractor and Architectural/Engineering inspections during the construction.

4.1.1. A two year minimum material and labor warranty shall be provided by the Contractor.

4.1.2. All materials shall meet low VOC standards.

4.1.3. All products used shall not contain asbestos, lead, or other hazardous materials.

4.1.4. All penetrations, curb flashings and corner flashings to be factory-fabricated. No field fabricated components permitted. Refer to the [SFB's Roofing Performance Specification](#).

4.1.5. All materials to be compatible.

4.1.5.1. The Designer shall perform a site survey to determine the existing fire alarm equipment and its data receiving module. This review shall be depicted in their design documents to insure compatibility of network communications.

4.1.5.2. If the potential contractor/designer/installer cannot communicate their new ERCES equipment to the existing fire alarm for monitoring purposes, this contractor/designer/installer shall be considered nonresponsive to the Districts IFB.

4.1.6. The ERCES address shall be listed in the design documents so the actual radio signal can be properly coordinated.

4.1.7. The final approval for the type of communication signal for the ERCES shall be provided in writing by the AHJ prior to commencement of work.

4.1.8. The AHJ shall provide their field representative's contact information to the Designer so that the designer's scope of work can be determined/finalized. Typically, a field representative is assigned by the AHJ as their field project

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inspector who has pass/fail authority. This AHJ point of contact will be determined before commencement of work since they represent the spirit and intent of the codes being enforced.

- 4.1.9. A field pre-construction meeting between the District's Designer who prepares their performance specification, Contractor/Designer/Installer, AHJ Field Representative, District and the SFB shall be scheduled prior to commencement of work.
- 4.1.10. The District shall use the data contained here-in for their Procurement process. The IFB package shall be submitted to the SFB prior to the advertisement for the District's IFB for the SFB's review/comments.

4.3 References shall be used for basis of Design:

- 4.3.1 UL 2524 2<sup>nd</sup> Edition – Outline of Investigation for in-building 2 way emergency radio signals
- 4.3.2 IBC current edition Section 916
- 4.3.3 NFPA 1 Section 10
- 4.3.4 **NFPA 21**
- 4.3.5 IFC **2018** Section 510 for Emergency Responder Radio Coverage
- 4.3.6 NFPA 72 - National Fire Alarm & Signaling Code
- 4.3.7 UL 268
- 4.3.8 NFPA 70 - The National Electrical Code
- 4.3.9 NFPA 101 as applicable
- 4.3.10 FCC 47 - CFR Private Land Mobile Radio
- 4.3.11 90 219 Services – Use of Signal Boosters
- 4.3.12 ICC International Fire Code, Code and Commentary
- 4.3.13 ADA
- 4.3.14 FCC's OET 65 Standards – Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

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- 4.3.15 FCC Rules Part 22, Part 90 and Part 101
  - 4.3.16 NFPA 1221 2016 edition
  - 4.3.17 [City of Phoenix Emergency Responder Radio Coverage](#)
  - 4.3.18 [City of Scottsdale Amendments to the National Electric Code 2011 Edition Ordinance 4064](#)
  - 4.3.19 [City of Tempe Public Safety Radio Coverage](#)
  - 4.3.20 [Pima County Building Radio Coverage Standard](#)
- 4.4 System operates on a specific radio frequency/radio channel within a specific band. The following are examples:
- 4.4.1 VHF Band is 150-174 MHz
  - 4.4.2 UHF Band is 450-520 MHz
  - 4.4.3 700 MHz
  - 4.4.4 800 MHz
    - 4.4.4.1 **The following link provides a sample of the [City of Phoenix ERCES radio frequencies.](#)**
- 4.5 The system frequencies/radio channels mentioned above, shall be verified onsite. This project address shall be depicted on the drawings to verify the appropriate signal strength/type. A FCC GROL certified Technician shall be used for this survey/assessment. If this survey indicates the signal strength path loss is less than compliancy, an ERCES is required.
- 4.6 Typically, the AHJ performs a Fire Alarm final inspection at a District site and during this inspection the AHJ Team performs a 2 way radio communication series of tests using a grid. This is when compliance is determined by the AHJ and an ERCES becomes a contingency for the Fire Alarm permit's final approval.
- 4.7 A minimum of 3 manufacturers shall be considered by the designer so the lowest cost system can be provided and these manufacturers shall be considered a basis for this project's design. Provide the District with these manufacturers which will be part of the District's IFB.

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- 4.8 The new ERCES shall be compatible with the existing fire alarm system. If the existing fire alarm system is not compatible, the SFB shall be notified before proceeding with any work. This compatibility issue should have been noticed by a site assessment by the designer.
- 4.9 Two hour rated walls are required for the enhancement coaxial cable routings up to the roof. **As an alternate to rated walls, a fire resistant rated cable may be considered if approved by the AHJ. This fire resistant cable is called "Dragon Skin." This reference is not to encourage a specific manufacturer but to use as a type of cable as an alternate method of design.**
- 4.10 The designer should be aware that IFC 2012 was when this code started to require this ERCES but enforcement of this requirement was not universal. Therefore, this contractor/designer/installer shall be experienced with this new enforcement of code.
- 4.11 The criteria mentioned herein are generalized for the Designer's project specific scope of work. It is the District's Designer and their Teams responsibility to provide more detailed specifications and drawings to the Contractor/Designer/Installer who is performing this work. The SFB's General Fire Alarm Performance Specification and ERCES Specialty Performance Specification is intended to be a guideline for the Designer & Team to supplement their specifications and drawings for the District's specific scope of work.
- 5 Construction Administration (CA) by the Designer (if authorized by the SFB Liaison). **Need input on this from the District and State Fire Marshal.**
- 5.1 The Designer must perform CA to ensure construction is in compliance with their design intent of their drawings and specifications, which will require regular site visits (with reports).
  - 5.2 If the ERCES System is interfaced with any other system(s), the Engineered Systems Distributor shall arrange for and the District shall pay for their representatives to be present to witness and accept their interface is operating correctly.
  - 5.3 The Designer shall define Shop Drawing requirements in the Construction documents & review Shop Drawings in a timely manner. A Shop Drawing review stamp shall be used as evidence of this review.

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- 5.4 The intent of the design, specification and installation is to provide a long life in their design. Proper installation and maintenance is particularly important to the life of the system.
- 5.5 The design and construction teams shall work together to provide District (Owner) training based upon the design intent, operation and maintenance requirements.
- 5.6 Has the installer's field observations been submitted to the District? Has the manufacturer been copied on these reports?

6 Contractor/Installer/Designer

6.1 Contractor/Installer/Designer for the AHJ required submittal shall meet the required qualifications:

6.2 Registered, Licensed, or Certified for Arizona

6.2.1 Nationally recognized certification organization

6.2.2 Brand/System Specific Factory Trained and Certified Fire Alarm and Emergency Communication System Installers

6.2.3 Certifications by FCC GROL License

6.2.4 Project References Product Certifications

6.3 If any of the above mentioned qualifications where not required as the basis of the District's IFB, the missing items not submitted to the District shall be submitted to the SFB prior to commencement of any work. If the missing qualifications are found not to meet with the SFB's approval, the District shall cancel their contract and rebid the project.

7 Commissioning of the ERCES

7.1 Commissioning of the new ERCES System shall be performed by the Contractor's Team, Designer or his designee and the District's Representative.

7.2 At the completion of the project the ERCES system shall be commissioned (Cx) in accordance with a pre-approved plan presented by the Contractor/Designer/Installer. A representative sample of all systems shall be commissioned. The Designer will define the Cx plan.

7.3 The District's Representative shall attend this Cx review since he will become the end user.

8 Closeout Documents



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8.1 All items as found in the General Fire Alarm Performance Specification (28 46 00).

9 Preventative Maintenance Criteria

9.1 All items as found in the General Fire Alarm Performance Specification (28 46 00).

10 Budgeting cost ranges

10.1 This part shall apply only to SFB budgeting and economic projections and analysis.  
Not to be used for anything else.

10.2 Provide the expected End of Life (EOL) for the repair if properly maintained and inspected regularly.