

UTAH NATIONAL GUARD CONSTRUCTION GUIDELINES

All construction for the Utah National Guard (UTNG) Construction Facilities Management Office (CFMO) will comply with all applicable Federal, State, and local laws, regulations and building codes. Construction will adhere to and follow all applicable environmental laws, controls, and regulations. Construction will utilize the latest construction disciplines and principles to construct buildings that are energy efficient, maintainable, and durable. The following specifications are for the additional requirements of the Utah National Guard and do not supersede current codes and regulations implemented by the governing bodies.

Direct any questions regarding these guidelines to the UTNG CFMO Civil Engineer, Don Summit at (cell) 435-881-2404 or (e-mail) george.d.summit.nfg@army.mil.

Table of Contents

UTAH NATIONAL GUARD CONSTRUCTION GUIDELINES	1
1) Project Development	3
2) Safety	4
3) Energy Management	4
4) Electrical	5
5) HVAC	6
6) Plumbing	7
7) Environmental	7
8) Storm Water Pollution Prevention Plan for Construction Activity	8
9) Compliance with the National Environmental Protection Act (NEPA)	9
10) Data and Communication	10
11) Building Security Systems and Vaults	10
12) Paints and Coatings	10
13) Door Hardware	10
14) Fire Alarm and Mass Notification Systems	11
15) Fire Suppression System	13
16) Passive Fire Protection Systems (Life Safety Systems)	14
17) High Expansion Foam (HEF) Hanger Fire Protection	14
18) Hot Works Program	15
19) Plans and AutoCAD Files	16
20) Building Real Property	17
21) Commissioning	17
22) ATFP (Anti-Terrorism / Force Protection)	18
23) Cybersecurity	20
24) Facility-Related Controls	21

25) Equipment Tagging and Labeling.....	24
26) Signage.....	25
27) Landscaping	25
28) Gravel Parking Lots and Roads	26
APPENDIX A. Statement of Work and Standards for Structured Cabling Projects	27
Introduction.....	27
Approved Contractors	31
Cabling Specification Standards	32
Cabling Components Labels Definition	40
Readiness of IT & Specialized Rooms	41
Roles & Responsibilities of System Integrator	41
Quality Assurance	42
Testing and Certification	43
Warranty	44
Additional Considerations	45
APPENDIX B. Recycling Statements	46
APPENDIX C. Individual Security Requirements for Contractor Employees.....	49
APPENDIX D. Approved Paints and Coatings for the Draper Complex	52
Product Guide.....	52
Reference Pages	54
Data Pages	59
APPENDIX E. Building Automation Systems and Controls Project Checklist.....	71
APPENDIX F. Sample Points Schedule for VAV with Return Air	79
APPENDIX G. Building Automation Symbols Found in One-Line Drawings.....	80
APPENDIX H. One-Line Drawing of VAV with Return Fan	81
APPENDIX I. Building Automation Alarm Numbering and Formats.....	82

1) Project Development

- a) All parties involved with the construction plan must be present at the scoping meeting verifiable by signature and attending parties contact info. Attendees for subsequent meetings will be determined by the Architect/Engineer (A/E) and the Project Manager (PM).
 - i) Building Maintenance, Engineering and stakeholders will be invited to scoping meetings for projects in their purview. They will have the opportunity to review plans and submit comments in the development stages and before final approval.
 - ii) All decisions and changes will be approved only through the PM. Discipline POC's can always provide input but the final decision is by the PM.
 - iii) A/E will set up at a minimum 30%, 60% and 90% design review meetings and final design stage with all parties involved before submitting to the Division of Facilities and Construction Management (DFCM). A/E will provide electronic files in PDF format for review before each meeting.
 - iv) The A/E will provide an initial building real property worksheet (DD Form 1354) as listed below in the Building Real Property section of this document.
 - v) The final Scope of Work (SOW) will contain a project summary after the table of contents listing the general SOW for ease and quick reference.
 - vi) Project progress photos will be submitted to the PM after each site visit.
 - vii) A project timeline will be provided with major milestones clearly defined.
- b) During the construction phase of the contract if the plans and specifications do not agree, the PM for the National Guard will determine the applicable course of action.
- c) Building construction projects must not result in piles of leftover earth from building foundations and excavations. A/E will work with the PM and the CFMO Civil Engineer to set the floor level of a new building. Use excavated earth to create site drainage of landscape features, gravel parking lots and other places where the native earth is suitable.
- d) A/E will incorporate principles of Low Impact Development when designing storm water disposal systems for new facilities.
- e) O&M manuals will be produced with a listing of maintenance programs and warranty information listed in the front of the books for the maintenance teams to have easier reference. The maintenance manual will list the frequency and sequence of preventative maintenance to be performed.
- f) O&M manuals will be provided within 30 days of substantial completion. Final bills are not approved for payment until operation and maintenance manuals and as-built drawings are provided to the PM.
- g) Military-specific specifications can be found in the Unified Facilities Criteria (UFC) and the Unified Facilities Guide Specifications (UFGS). They may be found at www.wbdg.org.
- h) The A/E will submit a copy of all geotechnical investigations and soils reports to the PM and the CFMO Civil Engineer.

2) Safety

- a) The contractor on each job will contact Blue Stakes to identify underground utilities before digging. This may include calling 811 if the digging is outside armory property or outside Camp Williams' property.
- b) For digging on armory or Field Maintenance Shop (FMS) property, the contractor must submit a work request with CFMO Maintenance at 801-432-4173 at least two weeks before the digging. They will schedule CFMO Facility Maintenance or a GIS specialist for blue staking at armories and FMSs.
- c) For digging on Camp Williams, the contractor must submit a work request with the Directorate of Public Works (DPW) at 801-878-5518 for blue stakes services at least a week before the digging. DPW will schedule their blue stakes specialist for work being done on Camp Williams.
- d) Blue stakes for digging at the UTNG part of Dugway Proving Grounds must be scheduled through Camp Williams DPW and the Dugway Facilities Department at least a week before the digging. Contact DPW Engineering at 801-878-5594 or 801-878-5428 for the current contact information for the Dugway Facilities Department.
- e) Contractors will emplace trace wires and/or marking tape over buried natural gas, electrical and communications lines according to best practices.

3) Energy Management

- a) During a building's design and development, apply a comprehensive, integrated approach to the process, to:
 - i) Reduce heating, cooling, and lighting demand through passive strategies such as climate-responsive design, daylighting, and conservation practices.
 - ii) Specify efficient HVAC and lighting systems that consider part-load conditions and utility interface requirements.
 - iii) Employ renewable energy sources such as solar heating for hot water, photovoltaics, geothermal space heating, and groundwater cooling, sized for the reduced building loads.
 - iv) Optimize building performance by employing energy modeling programs during design.
 - v) Optimize system control strategies by using occupancy sensors, CO₂ sensors, and other air quality alarms during operation.
 - vi) Monitor project performance through a policy of commissioning, metering, annual reporting, and periodic re-commissioning.
 - vii) Consider retro commissioning of buildings which were never originally commissioned.
 - viii) Integrate water saving technologies to reduce the energy burden of providing potable water.
- b) Apply this integrated process to the reuse, renovation, or repair of existing buildings as well.
- c) All construction will comply with the specific guidelines and requirements listed below. The CFMO Energy Manager will be the approving authority for energy requirements.

- d) Follow the Utah Division of Facilities and Construction Management (DFCM) requirements for energy efficient products and high-performance building systems. They are found in the DFCM High Performance Building Standard on their website at: <https://dfcm.utah.gov/high-performance-building-standard/>. These requirements ensure that buildings funded with State money comply with the International Energy Conservation Code.
- e) A Project's FINAL accepted submittals must comply with the currently approved version of the International Energy Conservation Code or be life cycle-cost effective. Submit a copy of these final accepted submittals to the CFMO Energy Manager: COMcheck Envelope, Mechanical, Exterior & Interior Lighting.
- f) Buildings using federal funds must exceed the standards in the current version of ASHRAE 90.1. Building equipment must comply with Energy Star or Federal Energy Monitoring Program standards.

4) **Electrical**

- a) Electrical systems will be designed according to the current National Electric Code and the CFMO Energy Manager's and Maintenance Director's requirements. See the DFCM Design requirements at www.dfc.utah.gov for specific electrical requirements.
- b) All outlets and fixtures must be labeled with the panel and breaker number at the termination and all subsequent points along the line. A single line drawing schematic of all lines and termination points will be provided in the final as built.
- c) All electrical equipment will be tagged and labeled per DFCM standards with sequencing from the National Guard maintenance manager.
- d) Occupancy sensors will be utilized for lighting. It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to cover the respective room.
- e) Contractor will arrange a pre-installation meeting with an authorized representative, at owner's facility, to verify placement of occupancy sensors and installation criteria.
- f) Proper judgment must be exercised in executing the installation of occupancy sensors to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem-solving diagnosis of the occupancy sensing devices and systems.
- g) Plan during the initial design phase for an Automatic Transfer Switch for connecting a generator to a building.
- h) Plan for drop ceilings instead of hard lid applications during design and construction to allow future access for electrical or telecommunications work except restrooms, locker rooms, and kitchens.

- i) All new panels installed in UTNG installations will have load calculation readings completed as part of the close out documents.
- j) Restrooms will have motion lights tied to the exhaust fans.
- k) Remove all abandoned conduits and fixtures at the point of origin.
- l) Provide a minimum of ten working days' notice to PM for required power outages. This will give the PM time to warn the building owners, maintenance managers or users affected.
- m) Any CAT6 cabling will be done per Appendix A.
- n) Spare Electrical Capacity: Provide 25% future space for additional overcurrent protection devices in panel boards and switchboards. Provide 25% additional load capacity in addition to the capacity required for continuous loads in panel boards and switchboards.

5) HVAC

- a) Heating, Ventilation and Air Conditioning (HVAC) equipment will utilize DDC (direct digital controls). The CFMO Energy Manager will review and approve all mechanical and electrical equipment going into the designs.
- b) See the DFCM Design requirements at www.dfcm.utah.gov for specific HVAC requirements.
- c) All work must have a corresponding plan and single line drawing of each system and areas it covers. This is to include all VFD's, valves, pumps, and other HVAC equipment.
- d) All equipment requiring power will be labeled with the breaker number and panel number that it is associated with. Place both the breaker number and the panel number on the equipment power disconnect.
- e) All HVAC equipment will be tagged and labeled per DFCM and Utah National Guard maintenance manager's specifications.
- f) All server rooms or IT closets will have a dedicated split air system to provide cooling only for equipment and an additional thermostat for monitoring only.
- g) Remove all abandoned equipment, hangars and fasteners from origin or nearest junction.
- h) Any CAT6 cabling will be done per Appendix A.
- i) Add thermostats to fire riser rooms for monitoring only.
- j) Ensure that there is adequate space above the drop ceiling in hallways for a technician to access and service or replace HVAC equipment.
- k) Design exhaust fans to exceed minimum standards to improve air movement especially in shower and locker rooms.
- l) Spare Mechanical Space: Provide 25% spare space in pipe chases and for mechanical equipment (except air handlers).
- m) Add a label on the metal ceiling grid below all variable air volume (VAV) assemblies to identify the VAV locations for maintenance workers.
- n) See building automation and cybersecurity requirements for HVAC and other systems in Sections 23 and 24 of these Guidelines.

6) **Plumbing**

- a) Plumbing will adhere to the most recent plumbing and building codes and utilize water efficient fixtures and appliances. See the DFCM Design requirements at www.dfcm.utah.gov for specific plumbing requirements.
- b) Single line drawings will be provided showing valves, terminations, and connections. They will also show which area of building is serviced by which service connection. This will include which valves control water to which part of the building. These valves will be labeled to identify them with the corresponding drawings.
- c) Along with tagging, the information must be provided to CFMO maintenance and must have the tag number, type of unit, serial number, size, manufacturer, and appropriate location. Any information such as belt sizes or maintenance schedules will also be provided.
- d) Safety eye washes and safety showers must use tempered water, not straight cold water.
- e) Restrooms will meet or exceed these standards:
 - i) Urinals will be 1 GPF and use auto flush valves.
 - ii) Floor mounted toilets will be 1.6 GPF or less and use auto flush valves.
 - iii) All sink faucets will use auto eye type fixtures.
 - iv) Showers will use Hyko valve heads or equal.
 - v) Add shelves to mirrors above sinks.
 - vi) Restroom dispensers will be provided by Waxie. Coordinate installation with the maintenance manager.
 - vii) Tile on all plumbing walls will be a minimum of 4' high. Other walls will have tile base to match.
- f) Hydronic piping will be thoroughly cleaned inside before being put into service using Power Engineering PECO 5204 or equivalent. Follow the manufacturer's recommendations to ensure that all foreign matter is washed and flushed from the system, including its piping, heat exchangers, pumps, boilers, traps, valves, etc.

7) **Environmental**

- a) All contracts and contractors will conform to applicable State and Federal Environmental Regulations. Any questions regarding applicable requirements can be directed to the PM.
- b) Implement at least a 50% recyclable construction material program to be documented and tracked during construction. This meets the requirements of the Army's solid waste annual report. All contracts will specify to report weight actual or estimate, volume actual or estimate, revenue, cost, tenant name, invoice number for construction and debris recycled glass, metals, paper, cardboard, plastic, and textiles, wood, and cardboard. This information will be given to the PM to be entered into a reporting database for the Utah Army National Guard Solid Waste Annual Report. Forms are available from the UTNG environmental office. See Appendix B.
- c) If hazardous waste is generated, transportation and disposal options shall be reviewed by the UTNG Hazardous Waste Manager prior to shipment off-site.
- d) Where practical, install facility air conditioning and refrigeration systems as well as firefighting systems which use equipment and/or chemicals which are EPA-approved alternatives to traditional Ozone Depleting Chemical (ODC) based systems. At a

minimum, use systems which use Class II ODCs which have production phase-out dates at least ten years from the projected facility completion date.

8) Storm Water Pollution Prevention Plan for Construction Activity

- a) Eligibility: As defined in the Utah Administrative Code R317-8-3.9, Code of Federal Regulations 40 Section 122, Army Regulation 200-1 section 4-2, Storm Water Pollution Prevention Plans (SWPPP) are required where storm water discharges may be present at large or small construction projects. Large or small construction projects are defined by construction activities that result in a *total* land disturbance of equal to or greater than one acre. In addition, Section 438 of the Energy Independence and Security Act of 2007 (EISA), Congress requires that all federal developments that exceed 5,000 square feet to maintain or restore pre-development hydrology. The UTNG Environmental Resources Management (ERM) Department will provide guidance and oversight in maintaining compliance to these regulatory requirements.
- b) The SWPPP must be generated before construction can begin and should include the following:
 - i) Site Plan
 - ii) Site Details including Best Management Practices (BMPs)
 - iii) Pollution Prevention Site Map (PPSM)
 - iv) Endangered Species
 - v) Cultural Resources
 - vi) Monitoring, Inspection, Maintenance Plan
 - vii) Change Management
- c) Implementation: Where a construction project requires a SWPPP, according to the eligibility guidelines above, a PPSM (aka Erosion and Sediment Controls Sheet(s) as specified by the Construction Specification Institute (CSI) 31.25.00) will be created by the architect and be included in the design package.
- d) The following verbiage will be included in the design package: “The Utah Army National Guard will obtain coverage under the Utah Pollutant Discharge Elimination System (UPDES) General Permit associated with construction activities. The contractor will be responsible for applying for the Notice of Intent (NOI). This coverage complies with Utah Administrative Code (UAC) R317-8-3.9. The Goal of this permit is to prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground, and surface waters. The contractor (as co-permittee) will develop, certify, and comply with the requirements of the SWPPP and the Permits for any work performed on site. Any person or group who violates any condition of the Permit(s) may be subject to substantial penalties in accordance with state and federal law. The contractor is encouraged to advise each employee working on this project of the requirements of the SWPPP and the Permit(s). A copy of the SWPPP and Permit(s) will be made available for review at the ERM Office and at the project site.”
- e) Once the design package has been finalized, the contractor will be responsible for the development of the plan and the remaining necessary elements for successful implementation of the SWPPP, including the plan completion, notice of intent, monitoring, inspecting, and notice of termination.

9) **Compliance with the National Environmental Protection Act (NEPA)**

- a) Utah National Guard construction activities will comply with the requirements of NEPA. There are three levels of NEPA documentation. The appropriate level is selected based on the type of action proposed and the environmental issues involved. The three levels are Categorical Exclusion (CX), Environmental Assessment (EA) and Environmental Impact Statement (EIS).
- b) Categorical Exclusion (CX): This level, the "lowest" level of NEPA compliance, is for minor proposed Federal actions that do not have the potential to produce significant environmental effects individually or cumulatively. The Army, in 32 CFR Part 651, Appendix B, has established 52 classes of actions that are categorically excluded from further NEPA analysis, provided certain conditions are met. Examples include:
 - i) Construction of an addition to an existing structure or new construction on a previously undisturbed site if the area to be disturbed has no more than 5.0 cumulative acres of new surface disturbance. (Record of Environmental Consideration (REC) and checklist (CHECK) required).
 - ii) Demolition of non-historic buildings, structures, or other improvements and disposal of debris therefrom, or removal of a part thereof for disposal, in accordance with applicable regulations, including those regulations applying to removal of asbestos, polychlorinated biphenyls (PCBs), lead-based paint, and other special hazard items (REC/CHECK required).
 - iii) Road or trail construction and repair on existing rights-of-ways or on previously disturbed areas.
- c) A REC/CHECK can be completed typically in 1 to 6 weeks (or less), depending upon the issues involved.
- d) To use a CX, the proponent must satisfy the following three screening conditions:
 - i) The action has not been segmented. Determine that the action has not been segmented to meet the definition of a CX. Segmentation can occur when an action is broken down into small parts to avoid the appearance of significance of the total action
 - ii) No exceptional circumstances exist.
 - iii) One (or more) CX encompasses the proposed action. If no CX is appropriate, and the project is not exempted by statute or emergency provisions, an EA or an EIS must be prepared before a proposed action may proceed.
- e) Environmental Assessment (EA): This level is for proposed Federal actions that may have the potential to produce significant environmental effects. These include actions for which none of the 52 Army CXs applies. If the Proposed Action would not result in significant effects, then a Finding of No Significant Impact (FNSI) is the appropriate decision document. If the Proposed Action would produce such significant effects, then (1) the Proposed Action could be modified to avoid the effect or (2) the next higher level of NEPA compliance would be required: an Environmental Impact Statement (EIS). An EA/FNSI can be completed typically in 8 to 12 months, depending upon the issues involved.
- f) Environmental Impact Statement (EIS): This level is for major proposed Federal actions that have the potential to produce significant environmental effects. An EIS requires more rigorous and prescribed public and agency involvement, publication, review, as well as coordination with the Army; therefore, the process is longer. The decision

document resulting from an EIS is a Record of Decision (ROD), signed by the Deputy Director, ARNG. With an EIS, a Proposed Action may result in significant environmental effects; however, the ARNG is required to comply with all other applicable Federal laws (e.g., the Federal Endangered Species Act [ESA]). EIS/RODs typically take from 2 to 5 years to complete.

- g) The PM will request a REC by going to the ERM page of the CFMO SharePoint at https://ngut/staff_sites/erm/SitePages/NEPA.aspx and completing the request to create a REC. ERM personnel will process the REC and investigate the impacts of the project on natural resources, historical resources and tribal issues. ERM personnel will record their approval, denial, or conditional approval results in the matrix on the NEPA site page.

10) Data and Communication

All projects must be coordinated and approved through the UTNG Telecommunications Manager (G6) to ensure that National Guard standards are adhered to, including switches, networking, phones, T1 data service, etc. There are requirements for conduit and boxes to be installed for security that needs to be completed at the rough stages. Plans with locations need to be approved by the Telecom manager and inspected at the rough stage of installation. Please refer to Appendix A for the G6 standards for projects involving cabling.

11) Building Security Systems and Vaults

- a) There are special requirements for access to UTNG Guard facilities. Due to the continual evolution of this program, the contractor will contact the building security systems manager for approval and recommendations.
- b) A signature or stamp is required for verification of compliance from the security systems representative from the UTNG.
- c) Security and screening requirements for contractors and their employees will be managed for each construction project by the project's PM. See the Individual Security and Screening Declaration in Appendix C.
- d) Fences shall meet the requirements of Unified Facilities Criteria 4-022-03 Fencing and Gates

12) Paints and Coatings

Paints in the Draper Complex will be high quality according to the standards in Appendix D.

13) Door Hardware

- a) Door hardware will be of the type to allow the installation of 'Best' brand cores. The cores will be provided by the contractor and installed by the UTNG. Keying and code information will be gathered from the security manager.
- b) The pinning of the cores will be done at the manufacturer. All cores are 7 pin except for cores going into supply rooms or secure areas which will be 8 pin cores.

- c) Temporary construction locks are the responsibility of the contractor and must also provide the required number of keys as specified by the CFMO Office.
- d) Locks for the protection of arms will conform to the specifications of the Department of Defense lock program.

14) Fire Alarm and Mass Notification Systems

- a) All fire protection designs shall follow current revision of UFC 3-600-1 Fire Protection Engineering for Facilities.
- b) All design and construction projects which involve or impact fire detection and suppression systems for UTNG facilities, especially those involving the design of aircraft hangar fire suppression systems, require the designer (A/E or in-house), and contractor to have on staff, or under contract, a qualified and experienced Fire Protection Engineer (FPE). For meeting qualification requirements, a qualified FPE is defined as an individual meeting the requirements of UFC 3-600-01, Fire Protection Engineering for Facilities.
- c) Addressable fire alarm design
 - i) All fire alarm shop drawings shall be submitted to the local Authority Having Jurisdiction (AHJ) prior to installation.
 - ii) All branch circuit breakers providing power to the fire alarm systems shall be identified in power panels with red labels stating 'Fire Alarm Circuit' as required by NEC 760.41(B)
 - iii) Battery Calculations:
 - (1) Battery calculation shall be provided for each control panel, sub-panel, power booster, etc. Calculations shall be submitted on a standard calculation format sheet and shall indicate adequate power for 24-hours of stand-by power and 5 minutes of alarm power (15 minutes of alarm for Emergency Communications Systems)
 - (2) Calculations for each circuit shall indicate each device, quantity of device(s), current draw of each device, total standby current (amps), total alarm current (amps) and total system current. Current draw of each device shall be matched to the specific current draw as indicated on the manufacturer(s) data sheets for the specific installation. (i.e.: 15 candela strobes will be indicated separately from 75 candela horn/strobes in the calculations due to different current draws)
 - (3) Calculations shall include a 20 percent safety margin to the calculated amp-hour ratings.
 - (4) Calculations must be coordinated with floor plans and riser diagrams. Discrepancies between drawings and calculations shall result in a rejected submittal.
 - iv) Voltage Drop Calculations:
 - (1) Voltage drop calculations shall be provided for each notification circuit. Calculations shall be submitted on a standard calculation format sheet and shall indicate each appliance voltage draw, circuit length, total voltage draw and drop.
 - (2) Voltage drop shall not exceed the allowable percent listed on the manufacturer(s) data sheets for the specific device(s) installed.

- (3) Calculations must be coordinated with floor plans and riser diagrams.
Discrepancies between drawings and calculations shall result in a rejected submittal.
- v) Copies of the approved addressable fire alarm drawings shall be provided to the facility
- d) All fire protection systems shall use equipment that is Underwriter's Laboratory (UL) listed or Factory Mutual (FM) approved for its intended fire protection service.
- e) The addressable fire alarm systems shall be kept to the minimum required by the referenced standards from this document.
- f) The addressable fire alarm system shall provide radio based, fiber optic or landline based, remote system reporting to the facility's central system, and a secondary central receiver. Provide radio-based transmission systems for all new facility-wide systems where an existing networked campus addressable fire alarm system is not present. Retrofit installations shall use system equipment that is listed by a nationally recognized testing laboratory and is directly compatible with the existing equipment to include the central facility transmitting, any campus fire alarm system network, and receiving system. All facility fire alarm systems must also transmit appropriate signals to the responding (host or other) fire department, which in most cases is the local community fire station. The contractor shall communicate with the Project Manager to ensure all quoted systems are compatible with the existing fire alarm infrastructure prior to bid date.
- g) All addressable fire alarm system conductors shall be run in minimum 3/4 in. electrical metallic tubing (EMT) conduit. Exception would be those locations deemed unsuitable for EMT conduit. In such cases, use rigid or PVC type conduit. Use of flexible metal conduit (FMC) or liquid-tite conduit is not permitted except in areas subject to extreme vibration, and where used, shall be limited to 6 ft. lengths.
- h) Systems shall utilize addressable detection devices and notification appliances.
- i) Provide and install an addressable fire alarm system to meet the requirements of the current NFPA 72, NEC, IBC/IFC, Utah National Guard Construction Guidelines and other pertinent local and state codes.
- j) At all locations that a duct detector is installed, provide remote test switch (install at a maximum of 7 feet above finish floor (AFF) elevation) and LED indicator for maintenance and alarm identification.
- k) The fire alarm control panel for each facility's detection system shall be located in a room with outside access, either the fire protection, mechanical, or electrical rooms. Coordinate the locations of the fire panel and annunciator panel (if required) with the PM.
- l) Any service to fire alarm systems shall be performed by manufacturer-certified technicians with the required software keys to ensure that any system warranty stays intact.
- m) Emergency eyewash and shower station connections to the fire alarm system will be determined by the facility or local Fire Chief. If provided with connections to the fire alarm system, these stations shall report as a supervisory alarm and not as a trouble alarm.
- n) The contractor shall provide the following:
- i) Identification and operations identifications that are coordinated with and keyed to the posted operations instructions and the operation & maintenance (O&M) manuals.

- ii) O&M manuals shall be completed, submitted, and approved by no later than 30 days prior to beneficial occupancy.
- iii) Posted instructions for, at a minimum, the following:
 - (1) Comprehensive schematics for Sprinkler and High Expansion Foam (HEF) distribution systems.
 - (2) Facility floor plans showing location of all fire equipment and devices with coordinated identification. Show items such as fire walls, fire dampers etc.
 - (3) System diagrams, including isometrics of special equipment and systems (fire alarm riser, fire pumps, HEF system, etc.).
 - (4) Valve charts.
 - (5) Equipment schedules
 - (6) Wiring diagrams and schematics.
 - (7) Fire/smoke dampers.
- iv) Posted Operations Instructions, framed in heavy gauge extruded metal frames, mounted under glass. These posted instructions shall be water/weatherproof. Instructions shall be permanently mounted in the reserved clear wall area (show reserved area in the design drawing details) in each fire protection room or mechanical room. Instructions shall be prepared for all fire protection systems and shall include all components.
- v) Training for facility personnel on all fire detection and suppression systems. Training shall be specified to be complete with all materials, fees and tuition paid for by the contractor. Government employee travel costs shall be paid for by the government.
- vi) A professionally edited DVD for training on all HEF and other "special" systems. Editing shall include voice-over editing describing features and action of the depicted system.

15) **Fire Suppression System**

- a) For all projects that involve a building addition to an existing building without sprinklers, both the addition and the existing building shall be sprinklered. This requirement exceeds that of UFC 3-600-01, Fire Protection Engineering for Facilities.
- b) Fire suppression systems shall be wet pipe or dry pipe, and the design shall be based on the hazard involved. Pre-action systems are strongly discouraged, and wet pipe systems are recommended in lieu of pre-action systems.
- c) In no case shall the A/E use any source data for water supply information other than an actual test witnessed and accepted by the A/E representative.
- d) The following component details shall be designed into all suppression systems:
 - i) All steel piping for the fire suppression system shall be minimum schedule 40 thickness.
 - ii) Instructions shall be provided to installers to provide piping with flow markings.
 - iii) Installation of cleated (e.g., Uni-Flange) flanges on any piping is prohibited.
 - iv) Provide dedicated fire service entrance with back-flow prevention device and indicating shut off valve. All fire service utility entrance shall be separate from

facility domestic water supply utility entrance. UTNG preference for incoming service is a single stainless-steel service.

- v) Fire suppression system auxiliary drain valves shall be fully accessible and located no higher than 7'-0" above the finished floor height.
 - vi) For all projects, design of supports for fire protection systems shall comply, as a minimum, with seismic criteria as outlined in the UFC requirements.
 - vii) All wall and floor penetrations for fire protection piping shall be fully sleeved and sealed.
 - viii) Sprinklers shall be located symmetrically within ceiling tiles. Provide architecturally coordinated, single piece sprinkler trim rings in occupied spaces.
 - ix) For fire hydrants, on facilities where the UTNG is a tenant, follow host facility style and color policy.
 - x) The use of CPVC is allowed for light and ordinary hazard group 1 in accordance with its listing.
 - xi) Sprinklers for server rooms shall be standard response intermediate temperature classification.
- e) All fire sprinkler risers shall be in rooms with direct access to the exterior of the building, such as mechanical rooms.
 - f) Fire protection design for all facilities shall include the following listed features and items.
 - g) Provide Knox (or equivalent type) boxes, located on the exterior of the building at a location to be determined by the PM and the local Fire Chief. The box shall be cast brass, recessed style and suitable for housing appropriate keys. Box shall be wired to a tamper switch and routed through the fire alarm panel. Provision of tamper switches for these boxes shall be coordinated with the PM.
 - h) Provide fire extinguisher cabinets in accordance with UFC 3-600-01, Fire Protection Engineering for Facilities. All extinguisher cabinets shall be recessed or semi-recessed style with eased corner and glass face. Cabinets shall be specified to be of heavy duty brushed stainless steel construction. Cabinets shall be specified to accommodate the size extinguishers that will be provided by PM. Extinguishers are government furnished items.

16) Passive Fire Protection Systems (Life Safety Systems)

- a) Provide emergency ballast packs in a standard lighting system.
- b) SCIF spaces shall comply with NFPA 101 requirements for life safety.

17) High Expansion Foam (HEF) Hanger Fire Protection

- a) The HEF system releasing panel shall have output capability which emulates all inputs on a zone-by-zone basis. All system components shall be listed for their operating and environmental conditions.
- b) The HEF system shall incorporate the use of cross-zoned, minimum Class A; supervised heat detection configurations used in conjunction with either a pre-action or wet-pipe sprinkler system. The cross-zoned heat detection shall be spaced at 25 ft. x 25 ft. spacing (625 sq. ft.) with no one side measurement to exceed 25 ft. Detector spacing shall be

based on the requirements of NFPA 72 with no de-rating factor applied. Detectors shall be wired with adjacent detectors on opposite zones. Detectors shall be of the rate compensated type with a temperature range of 160 – 170 degrees Fahrenheit. (UL or FM listed). The use of linear type wire or beam detection is prohibited.

- c) No addressable modules for the releasing system shall be located outside of the climate-controlled area.
- d) Manual foam activation stations shall be provided with NEMA 4x enclosures, with conduit routed into the bottom of the back box.
- e) The A/E shall layout the HEF Generators based on the approved “normal” facility parking plan.
- f) HEF systems shall include automatic trench drain closure and automatic shutoff of gas supply to aircraft servicing bay. The automatic closure valve controller shall be of the type that must be manually reset. A key-type switch or similar device, mounted in proximity and exterior to the control panel shall control the bypass valve reset. HEF systems do not require independent containment systems.
- g) The following component details shall be designed into the Hangar suppression systems.
 - i) All HEF system piping shall be minimum schedule 40 steel. All HEF piping system couplings, fittings, etc. in a facility shall be of one manufacturer.
 - ii) The use of all-thread rod to mount an HEF Generator is prohibited. The design shall provide for a suitable mounting platform constructed of steel angles and plate suspended from the overhead with steel components or it shall be bracketed to the walls. Design of support shall as a minimum, comply with seismic criteria as outlined in the UFC 3-310-04 Seismic Design for Buildings.
 - iii) Piping design shall show consideration (unions or flanged connections) for the removal of pumps, valves, and other items for maintenance.
 - iv) Foam concentrate pipe shall be stainless steel. Pipe gaskets must be compatible with foam concentrate. Flanged connections shall be “Garlock” type or an approved equivalent type that is compatible with the HEF concentrate used. Threaded stainless steel pipe shall only be used at concentrate tank and proportioner locations as called for by the HEF system manufacturer.
 - v) A/E shall require contractor to provide a refill pump for the HEF concentrate system. Horizontal bladder storage tanks shall be utilized when feasible. Vertical bladder storage tanks may be permitted, only in existing facilities where there is insufficient space for a horizontal tank.
 - vi) On new construction, the HEF foam room shall be designed to fully contain a leak of the HEF storage tank, including pressurized discharge. In renovations, provide a minimum containment curb of sufficient height to contain the volume of the HEF tank contents.
 - vii) The installation of the HEF system shall also include a commissioning and start up plan that the contractor will follow, including personnel, equipment, procedures, checklists, required final report data and details of all results that are expected.

18) Hot Works Program

- a) UTNG construction projects often require Hot Work in existing buildings, on training ranges and in other areas where combustibles are present. Hot Work is considered all temporary operations involving open flames or producing heat and/or sparks, which

includes, but is not limited to, grinding/cutting, brazing, soldering; thawing frozen pipes by torch; and torch applied roofing and welding. This activity presents a significant opportunity for fire and injury.

- b) Following the guidelines set forth in the OSHA CFR 29 Part 1910.252, and in compliance with NFPA 51B, 2009 Edition, UTNG requires that all precautions of the Utah Division of Construction and Facilities Management (DFCM) Hot Works program must be applied prior to commencing any welding or hot work by general contractors and/or any subcontractors.
- c) The DFCM Hot Works Program is incorporated into these standards by reference. A copy of this program and the relevant training and forms are available on the DFCM website.
- d) Contractors will provide fire watches, fire extinguishers, safety equipment and communications for fire watches. Contractors will train their employees before they can be assigned as permit-authorizing individuals, hot works operators or fire watches. Contractors will ensure that their subcontractors are trained and using this hot works program when applicable.
- e) Permit-authorizing individuals will be designated by the contractor as approved by the PM.
- f) The UTNG may provide water hoses or fire truck resources if available. Any UTNG water resources will be coordinated with Facilities Maintenance or Range Control by the PM.
- g) The PM is responsible to ensure that contractors and subcontractors follow the Hot Works Program on every construction project.

19) Plans and AutoCAD Files

- a) The A/E will submit plans and AutoCAD drawing files to the DFCM or CFMO. The PM will coordinate delivery and acceptance of plans that go to the CFMO. The PM will also assist the A/E to submit plans to the DFCM electronic document management system as needed. All drawings to the CFMO will be delivered in DWG and PDF format. Two sets of Hardcopy drawings will also be provided.
- b) Geo-reference all CAD data to surveyed control points. Within plan documents, provide details on the Coordinate System used and the XY coordinates of all control points.
- c) Ensure AutoCAD files are in a common unaltered Geographic Coordinate System, i.e. State Plane (UT83-CF) NAD83 Central Zone US Foot or UTM (UTM83-12) NAD83 Zone 12 North Meters, in order for National Guard GIS staff to properly import into federally mandated ESRI ArcGIS Software. See <https://www.esri.com/> and <https://www.sdsfieonline.org/>
- d) All AutoCAD drawings will be bound to include all digital XREFs.
- e) Submit all “red line” post-construction alterations and edits. Data must be complete and accurate.
- f) The contractor will record found utilities as they are discovered during a project and include them in the as-built record of the project. Thus, the as-built drawings will reference the surveyed location of project features and include these notes, sketches and pictures of the found utilities, including water line bends, elbows, valves, pipe sizes and materials, sewer manholes, storm drain catch basins, inlet boxes, communications lines, electrical lines, etc. Found utilities not measured and recorded shall be uncovered, measured, recorded, re-backfilled and re-paved by the contractor at no cost to the UTNG.

20) **Building Real Property**

- a) As we are required by law to report how each dollar in construction is used, tracking the expenditures is of utmost importance. A preliminary Department of Defense DD form 1354 is required for all projects. The 1354 is commonly referred to as a schedule of values. The example below lists the typical items required to be entered in the form.
- b) Building real property is an important part of the construction process to track and monitor future costing and maintenance requirements. All data will be coordinated with real property manager.
- c) The A/E and the contractor will work together in providing the 1354 and will be delivered with the as-built drawings as part of the close out documentation.
- d) All laterals are to be measured 5' out from the building. All other lengths are considered interior. List all items in units by length, width, and height as well as units of measure listed below.

<u>Description of work</u>	<u>Measurements</u>	<u>Unit</u>	<u>Cost</u>
Building		SF	
Sidewalks		SY	
Concrete Pads		SY	
Storage Buildings		SF	
Flagpole		EA	
Parking Paved		SY	
Parking Unpaved		SY	
Motor Pool Parking Paved		SY	
Motor pool Parking Unpaved		SY	
Fencing		LF	
Gates		LF	
Roads		SY	
Transformer		KVA	
Underground Electrical Lines		LF	
Communication Lines		LF	
Potable Water Lines		LF	
Gas Pipelines		LF	
Sanitary Sewer		LF	
Loading Ramp		EA	
Wash Platform		EA	
Grease Rack		EA	

For example: Concrete pad #1 3' x 5' = 1.7 SY. \$250.00

21) **Commissioning**

- a) Commissioning will be utilized on construction that involves new or updated mechanical and electrical systems and building envelopes. The PM and A/E will determine when commissioning is applicable. The commissioning team will also work in junction with the A/E. Coordinate commissioning requirements with CFMO Energy Manager.

Typically, the systems and equipment to be commissioned (or recommissioned) will parallel the project SOW.

- i) Commissioning – certifying that the new construction is in accordance with the construction specifications from the engineers and architects, ensuring that the construction is done as per our or the designer’s specifications.
 - ii) Re-commissioning – certifying a building of previous construction with commissioning and going back to the building again to measure and verify the building is performing as was commissioned. Run times, air flows, control set points, HVAC controls and equipment still within operating specifications, etc. Coordinate commissioning requirements with the CFMO Energy Manager. Typically, the systems and equipment to be commissioned (or recommissioned) will parallel the project SOW.
 - iii) Retro-commissioning – certifying a building that has not been previously commissioned. This process is accomplished by performing a complete inventory of what needs to be replaced to make the building function properly for HVAC, utilities, and building envelope properties.
- b) The commissioning plan for each building is relatively unique. In general, UTNG commissioning plans will emphasize Enhanced Commissioning for LEED Certified projects, extensive staff training, DDC building performance reports, O & M Manuals with summary maintenance schedules for all equipment and an electronic file. Format as specified by the project team, containing a complete inventory of equipment to include warranties.

22) ATFP (Anti-Terrorism / Force Protection)

- a) Plan review. An Operational Security/Antiterrorism (OPSEC/AT) coversheet from the protection branch is required for every project to ensure approval.
 - i) The Utah National Guard has specific requirements regarding physical building security. All projects need to be reviewed to ensure compliance with current physical security regulations as they pertain to the most recent risk assessment.
 - ii) The Utah National Guard has specific requirements regarding antiterrorism. All projects need to be reviewed to ensure compliance with the latest version of UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.
- b) Access and General Protection/Security Policy and Procedures.
 - i) The contractor and all associated subcontractors' employees shall comply with applicable installation, facility, and area commander installation and facility access and local security policies and procedures (provided by the PM). The contractor shall also provide all information required for background checks to meet installation access requirements to be accomplished by the installation Provost Marshal Office or Security Office. The contractor workforce must comply with all personal identity verification requirements as directed by DOD, HQDA, and/or local policy. The contractor will provide a digital passport photo of each employee, a signed Security Screening Declaration form, and a copy of the employee’s ID/driver license. See attached Appendix C.
 - ii) In addition to the changes otherwise authorized by the changes clause of their contract, should the Force Protection Condition (FPCON) at any individual facility or

- installation change, the Government may require changes in contractor security matters or processes. During FPCONs Charlie and Delta, all services not previously identified as essential are discontinued. Non-essential services will resume when the FPCON level is reduced to level BRAVO or lower.
- iii) The company will ensure that its employees entering state-controlled installations or facilities have obtained access badges and passes in accordance with facility regulations and that these badges and passes are obtained in advance so as not to delay the accomplishment of contracted services.
 - iv) The company will return all issued U.S. Government Common Access Cards, installation badges, and/or access passes to the state agency representative from whom they were received when the contract is completed or when a contractor employee no longer requires access to the installation or facility.
 - v) All photographs, sketches, drawings, and plans of UTNG installations, buildings, and facilities are the property of the UTNG and will be returned to the PM when no longer needed for the performance of the contract.
- c) Training.
- i) AT Level I Training. All contractor employees, including subcontractor employees, requiring access to National Guard installations, facilities, or controlled access areas shall complete AT Level I awareness training within 30 calendar days after contract start date or effective date of incorporation of this requirement into the contract, whichever applies. The contractor shall submit certificates of completion for each affected contractor employee to the PM within 90 calendar days after completion of training by all employees and subcontractor personnel. AT Level I awareness training is available at <https://atlevel1.dtic.mil/at>.
 - ii) iWATCH Training. The contractor and all associated subcontractors shall brief all employees on the local iWATCH program (training standards provided by the UTNG Antiterrorism Program Coordinator). This locally developed training will be used to inform employees of the types of behavior to watch for and instruct employees to report suspicious activity to the PM. This training shall be completed within 30 calendar days of contract award and within 30 calendar days of new employees commencing performance, with the results reported to the PM no later than 90 calendar days after contract award.
 - iii) OPSEC Training. New contractor employees must complete OPSEC awareness training within 30 calendar days of beginning work at Utah National Guard facilities. Training will specify the UTNG critical information, why it needs to be protected, where it is located, who is responsible for it, and how to protect it. For contracts lasting more than one year, all contractor employees will complete annual OPSEC awareness training.
 - iv) Information Assurance (IA)/Information Technology (IT) Training. All contractor employees and associated subcontractor employees must complete the DoD IA awareness training before issuance of network access and annually thereafter. All contractor employees working in IA/IT functions must comply with DoD and Army training requirements in DODD 8570.01, DoD 8570.01-M, and AR 25-2 within six months of employment.

23) Cybersecurity

- a) Cybersecurity will be considered in facility-related controls and information systems in accordance with Unified Facilities Criteria (UFC) 4-010-06 (Change 1-2017) Cybersecurity of Facility-Related Control Systems. This UFC describes requirements for incorporating cybersecurity in the design of all facility-related government-owned control systems.
- b) Firewalls, intrusion detection systems, intrusion prevention systems, malware and virus prevention software should be included in facility-related control networks.
- c) Use the “secure by default” approach where the first option for users and programmers is the most secure option.
- d) Facility-related control devices will not be exposed to the internet. If they require remote access at any point in construction, they will be set up behind a secure gateway or virtual private network router. Once the automation server comes to a UTNG facility and is ready to be connected to our network, it must have no back door access. Accounts established by the contractor will be disabled once the device is connected. The CGS will create new accounts for the contractor to access the new server(s) from that point.
- e) Ensure that logon credentials will be changed for new devices so they will not use factory-default credentials at substantial completion.
- f) Keep systems up to date during installation performance testing by installing and keeping track of security patches.
- g) Use encrypted communications with devices and systems where possible.
- h) The UTNG does not maintain a list of approved facility-related system IP controllers (hereafter referred to as “controllers”). The speed of change in the features of these controllers makes it impossible to keep an approved product list up to date. Instead, the UTNG uses the following cybersecurity standards as a baseline for determining if IP-connected devices will be considered for use on the UTNG federal network. Contractors should consider these standards to ensure that their product submittals will receive approval for the project.
 - i) Communications
 - (1) All controllers must communicate via secured protocols. For example:
 - (a) HTTPS to any overhead building management system or building automation system
 - (b) BACnet/SC, Modbus TLS to IP-based field controllers. Modbus TLS is a more secure version of Modbus TCP. However, it is often confused with basic Modbus TCP. Therefore, the UTNG prefers BACnet/SC communications.
 - (2) Controllers must be able to specify protocol in use and disable unused protocols and port.
 - (3) Controllers must have clear-text protocols disabled.
 - (4) Controllers must have secured remote connectivity settings (RHP, SSH, HTTPS) or remote connectivity must be disabled.
 - ii) Users and Passwords
 - (1) Controllers must have the ability to disable default usernames and change default passwords.

- (2) Controllers must have the ability to add additional users and require password complexity.
- (3) Controllers must require all users to have unique logins and passwords.
- (4) Controllers must allow for different profile settings: Users must only have enough permissions to perform required tasks (Least Privilege)
- (5) Controllers must allow account expiration date to be set.
- iii) Physical Connectivity
 - (1) If two Ethernet ports are available on a device, administrators must be able to disable the second port if it is not in use.
 - (2) Controllers must be able to assign IP addresses to any ethernet port that is available.
 - (3) USB connectivity must require a username and password to authenticate.
- iv) Other Standards
 - (1) Support for certificate issue (not self-signed) is highly preferred.
 - (2) Controllers must maintain device logs and the ability to isolate logs from standard users.
 - (3) Serial-connected devices (MS/TP and RS-485) that require user interfaces should meet as many of these applicable standards as possible.

24) Facility-Related Controls

- a) Facility-related control systems consist of the devices, conduit, wire, programming, and protocols required for operation of a building's environmental control systems, lighting control systems, and their associated software. These software applications control a myriad of systems to include, but not limited to, chilled and hot water distribution, air handling units, chillers, boilers, heat exchangers, lighting control systems, advanced meters, other building-level devices (BLDs), etc.
- b) The Building Automation contractor or Mechanical contractor shall do the following:
 - i) Furnish and install new Building Automation System (BAS) components and advanced electrical, gas, and water metering as specified. Fully connect and integrate advanced meters and BLDs to the existing UTNG BAS network.
 - ii) Provide all material, equipment, labor, installation, integration, cybersecurity hardening of BLDs, coordination with the UTNG G6, and supervision required to connect meters to the site's network where infrastructure does not exist.
- c) Facility-related control systems will be designed to monitor and operate building automation systems, utility control systems, electronic security systems, lighting systems, fire, and life safety systems devices, etc. in accordance with the following:
 - i) UFC 3-530-01 Interior and Exterior Lighting Systems and Controls (Change 4-2019).
 - ii) UFGS 23 09 00 Instrumentation and Control for HVAC.
 - iii) UFGS 23 09 13 Instrumentation and Control Devices for HVAC. This specification describes the materials and equipment that should be used in the control system. It specifies valves, dampers, sensors, instrumentation, indicating devices, output devices, etc.
 - iv) UFGS 23 09 23.02 BACNET Direct Digital Control for HVAC and other Building Control Systems. This specification guides the technician to build the control system

as an implementation of BACnet technology using ASHRAE 135 as the communications protocol.

- v) UFGS 23 09 93 Sequences of Operation for HVAC Control. This specification gives examples of sequences of operation for many different HVAC devices. These sequences of operation must be tailored for the individual device, its place in the HVAC system and the situation.

The PM can give the Contractor and A/E copies of the UTNG-approved versions of these UFC and UFGS standards.

- d) The UTNG will purchase the BAS servers for projects. The Contractor will program the BAS servers using secure protocols. They shall not be programmed using Hypertext Transfer Protocol (HTTP), older versions of Secure Socket Layer (SSL, as in SSL 2.0 and SSL 3.0), or Transport Layer Security (TLS, as in TLS 1.0) protocols.
- e) Control system designers must balance requirements for value, cost, compatibility, flexibility, and security. The UTNG uses the Schneider Electric EcoStruxure Building Operations (EBO) framework for new building automation systems and various other frameworks for other systems. This includes new and remodeled building automation systems. Therefore, A/E and designers must coordinate with the PM to ensure that the systems will function as designed in the EBO framework.
- f) All the abilities of facility-related equipment and their controls will be fully released to the UTNG. Fully released is defined as, "Equipment installed free of controls requiring a proprietary service provider after its installation for diagnostics, maintenance, common changes, sequence adjustment, or adjustments of any kind." Equipment and controls that are not fully released will be rejected and removed. The contractor will replace it with a system meeting these requirements at the contractor's expense. The integration will be full and complete to the needs of the UTNG as approved by the Controls Group Supervisor (CGS) and the CFMO Information Management Director (IMD). No proprietary systems, programming or software will be installed which might prevent the complete integration of the equipment's controls into the UTNG BAS.
- g) The UTNG will pay the A/E to have a consultant perform a field survey of existing control systems and equipment before beginning a renovation or refit project. As a minimum, the HVAC control system, lighting control system, fire suppression system and fire alarm system will be included in this survey. This survey will also include testing and inspection of the equipment to be controlled. The A/E will submit an existing conditions report to the PM documenting the status of the controls and equipment and their impact on the scope of work for the project. For those items considered nonfunctional, document the deficiency in the report, including explanation of the deficiencies and estimated costs to correct them. Define the needed schedule date to connect to existing equipment and the BAS. Make written requests to the CGS through the PM to obtain Government approval prior to disconnecting any controls and causing equipment downtime.
- h) The Contractor will inspect, calibrate, and adjust as necessary to place in working order all existing devices which are to be reused. This will normally be paid for by the UTNG on a time and materials basis.
- i) Projects that involve installing new controls or updating existing controls will be done in their entirety by the contractor fulfilling the project's contract. The contractor will program, install, and troubleshoot the new control systems as part of the project.

- j) The UTNG Facilities Maintenance Group (FMG) will generally hire a controls contractor or other specialist to do controls work for in-house projects that involve installing new controls or updating existing controls. The Maintenance Supervisor will coordinate with the CGS to determine whether the Controls Group has the time to help with controls work on the project.
- k) A Controls Contractor hired by the UTNG FMG for in-house projects will get military Common Access Cards (CAC) for their programmers and technicians that need unaccompanied access to the UTNG BAS network to install and change those systems. This unaccompanied CAC access requires that the contractor's employee have a fully adjudicated background check done by the UTNG G-2. The process can begin after the contract for work is awarded. These steps begin the background check:
 - i) The contract employee will make an appointment with the G-2 Security Manager at the UTNG Headquarters in Draper, Utah at 801-432-4623.
 - ii) Forms will be completed, and fingerprints collected for the background check. The background check process typically takes 2-6 months.
 - iii) The effort and expense required for the background check on the part of the Government will only be justified if the contractor and contract employee will be on the project (or other projects) for the UTNG for an extended period of at least 3 years.
- l) When controls or a BAS are part of a building remodel project or new construction, the Contractor will not generally have unaccompanied access to the UTNG BAS. The Contractor will generally be physically supervised by the IMD, who will give the Contractor the needed access. Once a building management server is physically connected to the UTNG federal network, contractors will not have unaccompanied access to devices.
- m) Each device must be physically safe from tampering and unauthorized access. Each BAS Server must be secured within a locked box. All keys must be given to the CGS no later than when the automation server or controller is installed in the box. No common keys shall be used. Only approved locks will be used, as paid for by the Contractor and provided to the UTNG. Devices and systems must also be securely configured using individual passwords and two-factor authentication where possible.
- n) Schedule periodic system backups as a part of device and system programming. The Contractor will give the UTNG a backup copy of facility-related controls programming at substantial completion. The CGS will verify that the backup copy is complete.
- o) Appendix E lists the minimum control points to be included in new building automation projects. This appendix also displays a one-line drawing example, a sample points list, a list of BAS alarms, a page of typical BAS symbols that can be used for making new one-line drawings, and a list of alarms that should be included in BAS programming
- p) Appendix F provides a Control Systems Installation Process SOP for typical BAS project milestones. Appendices G, H, and I show examples of documents that can help the contractor design, document, and label their automation programming in a standard way.
- q) The Contractor will provide the following submittals to the PM for review by the A/E and the CGS:
 - i) DDC Contractor Design Drawings
 - ii) A/E Draft As-Built Drawings
 - iii) Contractor Final As-Built Drawings
 - iv) Contractor Programming Software

- v) Contractor Controller Application Programs
- vi) Contractor Configuration Software
- vii) Contractor Controller Configuration Settings
- viii) Manufacturer's Product Data
- ix) A/E Pre-Construction Quality Control (QC) Checklist
- x) Contractor Post-Construction Quality Control (QC) Checklist
- xi) Contractor Start-Up Testing Report
- xii) Contractor Performance, Verification and Testing (PVT) Procedures
- xiii) Contractor PVT Report
- xiv) Contractor SD-10 Operation and Maintenance (O&M) Data Operation and Maintenance O&M Instructions
- xv) Contractor Training Documentation
- xvi) Contractor Enclosure Keys
- xvii) Contractor Password Summary Report
- xviii) Contractor Closeout Quality Control (QC) Checklist

25) Equipment Tagging and Labeling.

- a) All installed equipment will be tagged and labeled. Contact the PM for the current system being used for numbering.
- b) This will include a bar code label attached with assigned numbers from the CFMO maintenance department.
- c) The contractor will ensure that all equipment has the tag attached and displayed in a location easily identified by the maintenance department.
- d) The information on the equipment required and numbers assigned to accomplish the tagging and labeling will be provided by the CFMO maintenance department through the PM. All O&M manuals will be provided to CFMO for any installed equipment.
- e) The contractor will conduct a walk-through review of above-grid-ceiling mechanical, electrical and plumbing equipment with subcontractors and the PM. This will be done after code official inspection and before ceiling tile goes in. The purpose will be to identify misplaced or missing pipe hangers, pipe insulation issues, electrical junction boxes undone or unmarked, as well as locating all dampers, VAV's, valves, drains, shut offs, etc.
- f) The contractor will apply labels to the ceiling grid below tagged and labeled equipment. These labels will identify the ceiling tiles that maintenance technicians must remove to access the equipment. The equipment type and equipment number will be written on a white label on the ceiling grid. A color-coded label be placed next to the white label. It will not contain information other than the color to show the type of equipment.:
 - i) Orange – HVAC equipment (VAV, controls, fire dampers, etc.) and filters.
 - ii) Red - Fire protection equipment (fire/smoke dampers, fire suppression valves or drains, fire alarm or other devices).
 - iii) Blue – Plumbing equipment (valves, strainers, drains, hammer arrestors, cleanouts, etc.).
 - iv) Green – Electrical equipment such as disconnects.
 - v) Yellow – Network, data, or digital controls equipment.

26) **Signage**

- a) Besides the standard code-required signage, door signs will also be provided for all offices and conference rooms.
- b) The door signs standards are provided by CFMO. Signs can be locally purchased from UCI industries. The standards also include the height and placement location.
- c) Exterior signage will be included in the bid when resurfacing or painting the exterior of buildings. This includes address or building numbers and signs indicating the purpose of the building to include designation of the Utah National Guard and the building users. The signs will be made to complement the building using signs or raised lettering. Approval will be done through the PM.
- d) A/E will incorporate designated parking spaces for handicapped access, chain of command and GSA/State vehicles into parking lot plans for armories and field maintenance shops. The PM will provide signage for these parking spaces.
- e) PM will provide signage for projects involving fencing at reservation boundaries, bullpens, etc.

27) **Landscaping**

- a) Landscaping will include a 3-foot buffer using weed barrier and decorative rocks around buildings to prevent the need to irrigate next to building walls. Set turf and plants that need irrigation away from the buildings by at least three feet.
- b) Utilize xeriscape and drought resistant plantings to reduce the need for watering.
- c) Design of sprinkler systems should utilize heads that do not allow water to spray on the buildings during high winds or adverse weather conditions.
- d) Untreated base course (UBC) shall be placed, watered, and compacted under all sidewalks, curbs, gutters, exterior concrete flatwork, etc. UBC is better than gravel because it contains a significant fraction of fine material to “glue” the gravel together. Gravel without fines does not compact as well as UBC. Consider gravel in applications where it may be important to drain free water from under the concrete or pavement.
- e) Consider using a geotextile fabric when underlying soils are marshy or very weak. The fabric can reinforce and provide separation of the base course from the native subbase materials. In construction over soft soil, a geotextile can be placed over the soft subgrade, and then gravel or crushed stone placed on the geotextile. The geotextile prevents mixing of the two materials.
- f) Contractor will reseed disturbed areas by adding an appropriate wildland seed mix at the proper seed density. This must be done in the late fall if the area is not irrigated. Contact Douglas Johnson of the UTNG Environmental Resource Management Directorate at 801-878-5658. He can advise on the proper seed mix and density for different areas of the state.
- g) Trees removed as a part of a construction project on Camp Williams will be replaced at the direction of DPW at a ratio of 3 new trees for every tree removed. Contact DPW Facility Maintenance at 801-878-5518 for acceptable species and caliper sizes for the new trees.

28) **Gravel Parking Lots and Roads**

- a) Gravel parking lots will consist of the gravel and base courses recommended by the geotechnical engineer on the soil study for the project.
- b) The surface course of parking lots will generally consist of crushed gravel to keep the vehicle cabs and the parking lot relatively mud-free. The maximum size of this surface course gravel is generally ¾" to 1".
- c) Gravel roads should have crown or side slope of 3-4% to allow the roads to drain properly
- d) UBC is suitable surface material for gravel roads. The fines in a properly shaped and compacted road surfaced with UBC can form a crust to allow runoff to drain from the road. The size of the largest aggregate can vary depending on the traffic loading of the road.
- e) Ditch side slopes next to the shoulder of a gravel road should have a slope of 3 horizontal to 1 vertical or less steep to allow vehicles to climb back on the road if they slide into the ditch.
- f) Ditch side slopes steeper than 1-1/2 horizontal to 1 vertical or steeper are unacceptable because seeds run off the slope before they can germinate.
- g) Ditch bottom slopes greater than 5% should be lined or diverted to prevent erosion. Avoid long stretches of steep ditch bottoms. Water flowing in a steep ditch will widen the ditch, erode banks, and cross nearby slopes and roads. Steep ditches should be diverted into nearby flat fields or into culverts to cross the road and move runoff away from the road.

APPENDIX A. Statement of Work and Standards for Structured Cabling Projects

Version January 20, 2022

Introduction

1.1 About the Utah National Guard

The Utah National Guard comprises both Army and Air National Guard components. The Constitution of the United States specifically charges the National Guard with dual federal and state missions. The National Guard is the only United States military force empowered to function in a state status.

More information is available at <https://state.nationalguard.com/utah>.

1.2 Purpose of This Document

The Utah Army National Guard (UTARNG) requires that Telecommunication components be installed in accordance with Industry Standard TIA/568B. All projects must be coordinated and approved through the UTARNG State Communications Manager (Shawn Beck) to ensure that industry standards are adhered to.

This Statement of Work document gives details of UTARNG requirements and specifications for the premise structured cabling system, manufactured by CommScope/SYSTIMAX, which will meet the Voice, Video and Data Communication needs of UTARNG.

The structured cabling system proposed and quoted, shall incorporate all features, facilities and parts listed in this document, however, the quantity of parts will vary based on the size of the project.

The Structured Cabling System (SCS) shall be in accordance with ANSI/TIA/EIA568-C.2 and by the Building Industry Consulting Service International (BICSI) guidelines and shall consist of cable and connecting hardware manufactured by CommScope SYSTIMAX Solutions.

Section 4 of this Document provides a list of UTARNG standards and recommendations on the various cabling components to be used. These standards and recommendations are developed based on the SYSTIMAX Structured Cabling Solution and should be adhered to whenever possible.

If a certain cabling product or component is not available, or the product or component has been replaced with a newer version, the bidding Cabling Services Providers should clearly make this known in the proposal response and provided details of the alternative.

1.3 Key Dates

Proposal Review: The Contractor should allow the Owner two weeks for review of proposals and award. A start date will be provided in the Notice of Award.

Key Personnel

Shawn Beck by telephone at 801-432-4114, or by e-mail at shawn.l.beck2.mil@mail.mil

Dave Bullock by telephone at 801-432-4133, or by e-mail at david.d.bullock.nfg@mail.mil

1.4 Questions

Questions regarding this Statement of Work should be presented in writing to:

Utah Army National Guard
UT-G6, ATTN: Shawn Beck
P.O. Box 1776
Draper, UT 84020
FAX (801) 432-4844
E-mail questions to shawn.l.beck2.mil@mail.mil

A written answer to any such questions will be provided to all respondents to this request for proposals.

1.5 Supplemental Information

The Contractor shall be fully conversant and capable in the cabling of low voltage applications such as, but not limited to data, voice, and imaging network systems. The Contractor shall at a minimum possess the following qualifications:

Personnel trained and certified in the design of the Systimax Cabling Solution.
Personnel trained and certified to install the Systimax Cabling Solution.

The Designer and Installer shall show proof of current certification of the Systimax Cabling Solution via an updated card given after attending the 5-day course or a re-certification class given every two years.

Personnel trained and certified in fiber optic cabling, splicing, termination, and testing techniques.
Personnel must have experience using a light meter and OTDR.
Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.

1.6 Environmental Policy

The UTARNG is committed to the protection and preservation of the environment and the safeguarding and protection of UTARNG employees, on-site personnel, and the community. It is UTARNG policy to always protect employee health and safety. The UTARNG does its' utmost to be environmentally responsible to its customers, employees, the community, and the nation. As part of this commitment the UTARNG has set the following environmental and health and safety objectives.

- Compliance with all applicable International, Federal, State and Local environmental and health and safety regulations.
- Ensuring that environmental, health and safety policies are always adhered to by employees.

- Prevention of pollution through reduction, reuse, and recycling of materials through the development of an environmental, recycling and reuse program.
- Safeguarding of the environment through the establishment of best management practices and community interaction.

1.7 Proposal Instructions

The proposal must include the following components: a technical proposal, a cost proposal, a delivery schedule, and a presentation of the Contractor's personnel qualifications and experience. Proposals that do not include the specified elements may be rejected. The Contractor is encouraged to submit copies of relevant projects performed (TIA/568B) within the last two years with the proposal.

Proposal Organization:

The Contractor **shall** break down their proposal deliverables and costs into parts and labor.

Cost Basis:

The Contractor **shall** show a unit price breakdown for the personnel, materials and tasks to be provided, as well as lump sum prices per project.

The cost **shall** include projected labor categories, hours and billing rates.

The cost proposal **shall** identify any proposed subcontractors and their labor categories, hours and billing rates.

Selection Criteria:

The UTARNG will use the following criteria, equally weighted, to select the successful Contractor for this work.

Technical Abilities and Approach: The qualifications and experience of key personnel, as well as the proposed methodologies and resources will be considered.

Past Performance: The experiences of the Contractor most closely related to this project will be considered, particularly successful completion of projects using Industry Standard TIA/568B.

Responsiveness: The ability of the Contractor to dedicate sufficient resources to the project and to be readily available will be considered.

Cost: The overall costs proposed by the Contractor and the completeness of detail of these costs will be considered.

Award of Contract:

Award of any Contract is contingent upon availability of state/federal funds to perform this work. The UTARNG anticipates award of all work to a single contractor but reserves the right to split the award or make a partial award.

The completed proposal should be mailed to:

Utah Army National Guard
UT-AAG-SMD, ATTN: Jayson Ilada
P.O. Box 1776
Draper, UT 84020

Electronic copies should be sent to jilada@utah.gov accompanied by a hard copy cover letter on letterhead.

All questions may be directed to either Shawn Beck or Dave Bullock.

Shawn Beck		Dave Bullock
801-432-4114 Office	or	801-432-4133 Office
801-716-9114		801-716-9099 Cell

1.8 Pre-Requisites

The selected System Integrator shall be fully capable and experienced in the Structured Premise Network Cabling System.

During the evaluation process, the UTARNG may, with full cooperation of the System Integrators, visit the System Integrators' places of business, observe operations, and inspect records.

Requirements

- The System Integrator must have a minimum of 5 years of experience.
- The Contractor must be a current CommScope/SYSTIMAX Authorized System Integrator/Partner (VAR).
- The Contractor shall have previously installed a minimum of 4 Sites each of 1,000+ Copper Connections & 100+ Fiber Connections. Present recent Customer References of completed projects of similar type and size with contact names and telephone numbers for each.
- A list of test equipment proposed for use in verifying the installed integrity of copper and fiber optic cable systems on this project.
- Contractor shall be able to meet stringent Project Deadlines.
- Contractor shall have an in-house team of Engineers to execute this project. No sub-contractors will be allowed.
- Substitution of parts is not allowed unless approved by the UTARNG designer.
- Contractor must utilize BICSI Certified Personnel for installations at a ratio of (1) BICSI Certified Technician (TECH) for every three (3) total people onsite.
- Contractor must utilize CommScope Certified Personnel for all aspects of the installation. A CommScope Design Engineer and Installation & Maintenance certified technician must be always onsite for the duration of the project.
- Contractor must utilize personnel that have completed the OSHA 10 Hour Construction Industry Outreach Training Program.

1.9 Definitions, Acronyms and Abbreviations

Definitions of terms, acronyms, and abbreviations are provided here.

Term	Definition
MPOE / EF	Main Point of Entry / Entrance Facility – This is the location of the main point in the building for the entry of all data and voice services.
MDF / ER	<p>Main Distribution Frame / Equipment Room – This is the room that will contain the network/patch racks, main IT equipment and backbone cabling. This room may also contain Telecom vendor equipment, physical security equipment and servers.</p> <p>There is normally only one MDF / ER.</p> <p>This room may also serve as the MPOE / EF and also as an IDF / TR</p>
IDF / TR	<p>Intermediate Distribution Frame / Telecommunications Room – This room provides a floor-serving distribution facility for horizontal cabling.</p> <p>These are needed when the horizontal cabling will exceed 90 meters. There can be multiple IDF / TR rooms per site.</p> <p>These rooms can also contain IT network equipment.</p>
IO	Information Outlet – This is the fixed outlet terminating the horizontal subsystem wiring at the work area

Approved Contractors

This is a list of all approved SYSTIMAX contractors and installers in the State of Utah

Americom Technology Contact: Chris Caldwell

5305 W 2400 South England Ct.
West Valley City, UT 84120
Tel: 801-892-0533
FAX: 801-892-0533

Cache Valley Electric Contact: Brian Parkin

2345 South John Henry Dr
Salt Lake City, UT 84119
Brian.parkin@cve.com
Tel: 801-908-2680
FAX: 801-908-7041

IES Commercial, Inc. Contact: Jason King

1960 South Milestone Drive
Suite D
Salt Lake City, UT 84104-4853
Jason.king@ies-com.com
Tel: 801-301-1508
FAX: 801-972-9095

TeamLINX LLLP Contact: Mike Herd

9980 S. 300 W.
Suite 254
Sandy, UT 84070
mherd@teamlinx.com
Tel: 801-702-7083

Wasatch Electric Contact: Marc Varner

2455 West 1500 South
Suite A
Salt Lake City, UT 84104
mvarner@wasatchelectric.com
Tel: 801-487-4511
FAX: 801-487-5032

Cabling Specification Standards




The following is the default specification for all cabling products. Project specific specifications are detailed in following sections.




2.1 Copper Cabling

Cable

Use the following Plenum cable when local codes mandate or equivalent.

- For LAN, Wireless, AV, Data Center and Security Cables - Plenum



	COMMSCOPE 7504	CAT 6 BLUE PLENUM (NIPR VOICE)
	COMMSCOPE 7504	CAT 6 YELLOW PLENUM (NIPR DATA)
	COMMSCOPE 7504	CAT 6 GREEN PLENUM (RTI)

	COMMSCOPE 7504	CAT 6 WHITE PLENUM (SPEAKERS)
	COMMSCOPE 7504	CAT 6 GRAY PLENUM
	COMMSCOPE 7504	CAT 6 RED PLENUM (SIPR)

2.2 Copper Cabling Hardware





Copper Cable Patch Panels



The recommended standard for Copper Cable Patch Panel is:

	760105429 M4800-1U-GS	CS-SYSTIMAX M4800-1U-GS, 1U HIGH DENSITY 48 PORT MODULAR PANEL 760105429
	760104737 360-RCM-RM	CS-SYSTIMAX 360-RCM-RM, REAR CABLE MANAGEMENT SYTEM (RACK MOUNTABLE, ONE PER 48 PORT PANEL) 760104737

Information Outlets






The recommended standard for Information Outlet is:

	760092445 MGS600-123	CS-SYSTIMAX MGS400BH-123 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED 700206691 YELLOW
	760092429 MGS600-318	CS-SYSTIMAX MGS400BH-318 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED 700206758 BLUE
	700206709 MGS400-226	CS-SYSTIMAX MGS400BH-XXX 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED GREEN
	700206725 MGS400-262	CS-SYSTIMAX MGS400BH-XXX 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED WHITE

	700206733 MGS400-270	CS-SYSTIMAX MGS400BH-XXX 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED GRAY
	700206741 MGS400-317	CS-SYSTIMAX MGS400BH-XXX 1-PORT MOD JACK 110 8W8P UTP T568A/B CAT6 GIGASPEED RED

Faceplates and MUTOA


The recommended faceplate to be used in a hard wall application is:

	108168469 M12L-262	L Type Flush Mounted Faceplate, two port white
	108168543 M14L-262	L Type Flush Mounted Faceplate, four port white
	108168584 M16L-262	L Type Flush Mounted Faceplate, six port white
	108168543 M28-262	L Type Flush Mounted Faceplate, eight port white
	106658156 M112SMB-262	M112 Type Surface Mount Box, twelve port white

Notes: The recommended workstation furniture faceplate to be used should be coordinated with the furniture vendor. Coordinate specific termination location in the workstation panels with the UTARNG designer. Cabling VAR will provide faceplates/escutcheon.

Above Ceiling Boxes for Cameras and Wireless Access Points

Above ceiling Plenum Rated IO box


	107984056 M102SMB-B-262	M102 Type Surface Mount Box, dual port white
---	----------------------------	--

2.3 Fiber Cabling

Verify all strand counts with UTARNG personnel and the system designer prior to installation. Strand counts listed below are for reference only and do not necessarily represent each project's needs.


OM1 Multimode Fiber 62.5 micron

- For use in SCIF or secured areas


	006K88-31130-29	MIC® Cable, Plenum, 6 F, 62.5 μm multimode (OM1)
---	-----------------	--

OS2 Singlemode Fiber 8.3 micron

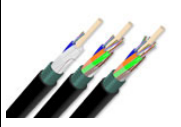
- For use in duct banks, conduits and risers
- ISP RISER FIBER (ARMORED)

	012E88-33131-A3	MIC® Interlocking Armored Cable, Plenum, 12 F, Single mode (OS2)
---	-----------------	--

- ISP RISER FIBER (NON-ARMORED)

	012E88-33131-29	MIC® Cable, Plenum, 12 F, Single mode (OS2)
---	-----------------	---


- OSP FEED FIBER

	012ZUC-T4F22D20	ALTOS® Lite™ Loose Tube, Single-Jacket, Single-Armored Cable with FastAccess® Technology, 12 F, Single-mode (OS2)
---	-----------------	---

2.4 Fiber Cabling Hardware


Fiber Optic Connector

The recommended standard for Single Mode Fiber Optic Connector is:

	95-201-41-SP	CORNING ANAEROBIC-CURE CONNECTORS BLUE SC SINGLEMODE 8.3 um CERAMIC FERRULE 95-201-41-SP
---	--------------	--





Fiber Optic Adaptors

The recommended standard for Singlemode Fiber Optic Adaptors is:

	CCH-CP12-59	Closet Connector Housing (CCH) With SC Adapters, Singlemode, (6) Duplex Adapters for 12-Strand Fiber
---	-------------	--

Fiber Optic Panel Shelf

The recommended standard for Fiber Optic Panel Shelf is:

	CCH-01U	CORNING CCH-01U CLOSET CONNECTOR HOUSING THAT ACCEPTS TWO CCH PANELS
	CCH-02U	CORNING CCH-02U CLOSET CONNECTOR HOUSING THAT ACCEPTS FOUR CCH PANELS
	CCH-03U	CORNING CCH-03U CLOSET CONNECTOR HOUSING THAT ACCEPTS SIX CCH PANELS
	CCH-04U	CORNING CCH-04U CLOSET CONNECTOR HOUSING THAT ACCEPTS TWELVE CCH PANELS

2.5 Patch Cords

Copper Patch Cords


- CS-SYSTIMAX CPC3312-03F001 CBL ASSY 110-MOD GS8E CAT 6 PATCH CORD T568B 1FT - GREY
- CS-SYSTIMAX CPC3312- 03F014 CBL ASSY 110-MOD GS8E CAT 6 PATCH CORD T568B 14FT-GREY (WORKSTATION SIDE)
- CS-SYSTIMAX CPC3312- 03F025 CBL ASSY 110-MOD GS8E CAT 6 PATCH CORD T568B 25FT-GREY (WORKSTATION SIDE)
- Provide (1) of each length listed above per data cable installed.

2.6 Fiber Patch Cords

NOT REQUIRED

2.7 Horizontal Cable Management

The recommended standard for Horizontal Cable Management is:

	HTK-19-DS-2U	COMMSCOPE HORIZONTAL CABLE MANAGER 2U
---	--------------	---------------------------------------

2.8 Network Racks and Cabinets

Server Cabinets:

Equipment racks for telecom/network equipment must be either the 4 post 7' lockable style from APC Netshelter part# AR3140 or a wall mount lockable APC Netshelter rack part# AR100HD, contact Shawn or Dave to see which rack or racks will be used at which location.

2.9 Cable Runway System – Ladder Racking/Fiber Guide

Cable Tray and Ladder Racking installation must follow the NEMA VE 2-2013 standard.

Cable runway system provides improved cable organization for easy cable changes. Cable runways prevent tangles and cable damage to maintain quality data transmission. The recommended standard cable runway system consists of CPI 12" Ladder with Rack Butt / Corner Clamp and Wall Mounting Brackets. The ladder racking should be mounted above the Racks.

2.10 Grounding/Bonding

The recommended standard for Equipment Frame Grounding Solution is:

CPI Two Hole Ground Terminal Block (40167-001)

All Network Rack and Ladder Racking must be grounded in compliance with ANSI J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2002 using SYSTIMAX Grounding products where available which bond cable runway components and connect equipment frames to the telecommunications ground.

2.11 Conduits

Unless specified, the Communication Riser Conduits shall be a minimum size of (1 inch) and installed so that no section of conduit shall be longer than 30 meters (100 feet) or contain more than 2, 90° bends between pull points or pull boxes.

All conduits shall be clearly labeled at both ends designating the floor closet and sequential number of the conduit originating at the closet.

Conduit must home run to the telecommunications room.

A fill ratio for all conduit runs is not to exceed 60%. Standards generally call for conduit 40% fill limits - Note that this can be increased where conduit is used for short sleeves and when careful feed and pulling is exercised.

2.12 MDF for Army Garrison Camp Williams (AGCW)

Standard Equipment:

1. AVAYA 107894966 100 PAIR LIGHTING PROTECTION 110 TERMINATION STYLE
2. CORNING PCH-04U RACK MOUNT LIU.

The MDF at AGCW is in building 6170. To gain access to this area you will have to contact Shawn Beck at (801-432-4114). All work to be bid on or done at AGCW will contact Shawn prior to starting.

Manholes and Misc. Info

- Copper Splice Cases ARMADILLO Stainless Splice Closure. You will need to talk to Shawn Beck or Dave Bullock to determine what ends need to be placed on the ends of the splice case.
- Fiber Splice Case Coyote 80805514 (Splice tray will depend on amount of fiber)

There are several Manholes at AGCW. When pulling Backbone Cable, you will leave a 20 ft maintenance loop in every manhole between the IDF and the MDF.

All splices will be sealed watertight. If a case is opened, it will be resealed to maintain a watertight seal. All splices in optical fiber cable will be fusion spliced. Splices in the copper cable will be done in a splice case with a 710-splice tool and with mods. Splice case must be made watertight.

To find a path from the IDF to the MDF you will need to speak with Shawn Beck or Dave Bullock.

2.13 Firestopping

Provide fire stopping systems to meet the hourly time delay rating of the fire rated floor, wall, or other partition through which penetrations have been made.

2.14 Supplemental Instructions

All telecommunication work to be done on any Utah Army National Guard Facility will be coordinated and approved through Shawn Beck (801-432-4114).

2.15 Coordination

Layout of the Systimax Solution will be coordinated through Shawn Beck.

2.16 Standard Outlet Configuration

There will be one blue and one yellow CAT 6 wire pulled to each location, with a minimum of 3 feet on station end and 10 feet on closet end coiled above the ceiling. They will correlate with the same number on the patch panel System (ex. Jack 101 will have one blue and one yellow wire that will be in the same location on the patch panel System).

2.17 Fiber Terminations

Fiber will be terminated in an LIU can. Termination of fiber will be done on the SC style connector unless specified otherwise. This will depend on location. Coordinate connector type with UTARNG personnel prior to installation.

2.18 Cable Removal

When upgrading or replacing the communication cabling at any UTARNG facility the old cabling must be extracted and delivered to UTARNG personnel for recycling purposes prior to the completion of the project.

2.19 Plywood

In a MDF or IDF there must be no less than two 4x8 foot fire retardant sheets of plywood mounted vertically side by side of one another and the minimum size for these rooms shall be 6'x 8'. Coordinate plywood supply/installation with General Contractor and Electrical Contractor to resolve duplication of scope.

2.20 Hook and Loop

Use only hook and loop cable wraps, cable-tie wraps are not acceptable.

2.21 Fire Suppression

All telecommunication rooms must have a fire suppression system that adheres to these three standards: NFPA72 (or ISO 7240) for guidance on the design of the detection system, NFPA 2001 (or ISO 14520) for guidance on the design of the clean agent system itself, and the standard applicable to the facility. In addition, any local codes or standards, and any requirements mandated by the local authority having jurisdiction (AHJ) must also be adhered to in the design of a clean agent fire suppression system.

2.22 Cooling

All telecommunication rooms must have a Mitsubishi Mr. Slim wall mounted MSZ series A/C unit that is sized appropriately for the anticipated heat output from electrical components.

Cabling Components Labels Definition

The System Integrator must utilize the ANSI/TIA/EIA-606-B Standard for labeling all cables, patch panels and information outlet. Unless specified, all labeling will be in English.

- Each Station **Faceplate** shall be labeled with a unique identifier – identifying which MDF or IDF the cables are connected to.

Example of Station cable labeling:

1 st floor MDF room	Label Faceplate	1.0 – 1001 & up
1 st floor IDF Room	Label Faceplate	1.1 – 1001 & up
2 nd floor IDF room	Label Faceplate	2.0 – 2001 & up
2 nd floor IDF room	Label Faceplate	2.1 – 2001 & up
3 rd floor IDF room	Label Faceplate	3.0 – 3001 & up
3 rd floor IDF room	Label Faceplate	3.1 – 3001 & up
4 th floor IDF room	Label Faceplate	4.0 – 4001 & up

Example of Access Point cable labeling:

1 st floor MDF room	Label Faceplate	AP – 1.0 - 01 & up
1 st floor IDF Room	Label Faceplate	AP – 1.1 - 01 & up
2 nd floor IDF room	Label Faceplate	AP – 2.0 - 01 & up
2 nd floor IDF room	Label Faceplate	AP – 2.1 - 01 & up
3 rd floor IDF room	Label Faceplate	AP – 3.0 - 01 & up

Example of Rack Labeling:

1 st floor MDF room	Label Rack	RACK 1.0-1 & up
1 st floor IDF Room	Label Rack	RACK 1.1-1 & up
2 nd floor IDF room	Label Rack	RACK 2.0-1 & up

2 nd floor IDF room	Label Rack	RACK 2.1-1 & up
3 rd floor IDF room	Label Rack	RACK 3.0-1 & up

- Every MDF and IDF room shall have a computerized CAD Floor plan mounted on the wall with clear representation of every cable number and location.
- Provide Rack Elevation Drawings for each IT room. Drawings are to be compiled in Visio and CAD and sent to Utah National Guard prior to starting installation.
- Components shall be marked where they are administrated (label at all punch down points, panels, blocks, outlets, etc.).
- All pathways labeled (conduit, trays etc.).
- The Cabling Services Provider will also provide the Labels for Faceplates / Racks / Fiber Patch Panels, etc.

Readiness of IT & Specialized Rooms

Mounting, installation, configuration and testing of telecommunication and IT equipment in the IT & Specialist rooms can only be carried out when the room is a READY mode. By definition a room is deemed READY when:

- Racks and cabinets installed.
- Cable trays and ladder racks installed.
- Seismic bracing (where applicable) of all equipment completed.
- Installation, termination, testing and certification of communication cabling as follows:
 - Riser Cabling (Copper & Fiber Optic).
 - Inter / Intra rack cabling
 - Grounding

Roles & Responsibilities of System Integrator

2.23 System Integrator Responsibilities

With respect to installation of the Premise Structured Cabling System, the System Integrator is responsible for:

- Installation and termination of all cables between the Patch Panels and Information Outlets.
- Installation of Open Racks and Cabinets with proper grounding.
- Installation of Patch Panels, Vertical & Horizontal Cable Management Panels.
- Submit a SYSTIMAX 20-year warranty application within 30-days after project completion on behalf of Utah Army National Guard. Warranty must be executed and delivered to Utah National Guard within 60 days of project completion.

2.24 Installation Guidelines

For unshielded twisted-pair cabling infrastructure to deliver high-speed performance, it is manufactured to very tight specifications. Consequently, to maintain the unshielded twisted-pair cabling system performance proper installation practices must be followed.

- Never crush the cable with fasteners – cable must be able to move freely under discrete fastener without jacket deformation. Use of Velcro cable ties in the closets is required.
- Do not kink, knot, or snag the cable while pulling; this will cause damage under the jacket and alter cable performance – replacement of damaged cable is required by SYSTIMAX to be covered under warranty.
- Do not to exceed the manufacturer’s specified cable pulling tension.
- Do not exceed the minimum “at-rest” bend radius of 4 x Outside Diameter (OD) for 4-pair UTP; 10 x OD for multi pair (more than 4 pair) UTP; 1.18 inches for two fiber cable; 10 x OD for multi-fiber cable.
- Follow manufacturers specifications for cable fill limits. Cabling pathway depth must not exceed 23 cm (9 in), or 15 cm (6 in) for standards compliance.
- Standards generally call for conduit 40% fill limits - Note that this can be increased where conduit is used for short sleeves and when careful feed and pulling is exercised. A fill ratio for all conduit runs is not to exceed 60%.
- Per TIA/EIA 568-C.2 never un-twist the pairs of cable beyond what is required for termination per manufacturer’s instructions.
- The cable jacket on UTP shall only be stripped back the minimum required to terminate to connecting hardware per manufacturer’s instructions.
- Cable management panels shall be used when terminating cable.
- Use the same performance criteria for both cable, cord and connecting hardware through the entire horizontal run.
- Maximum UTP permanent-link cable lengths of 90 meters (295 feet) shall not be exceeded.
- All non-armored fiber optic cables shall be set in inner duct with the appropriate flame and smoke rating.
- Connecting hardware for optical fiber to be installed at the following locations: main cross-connect, intermediate cross-connect, horizontal cross-connect, horizontal transition point, telecommunications outlet, shall not surpass minimum bend radius and shall be capable of storing 1 meters (3.28 feet) of additional fiber.
- Shared sheath / multiple applications to the IO are not acceptable.
- Follow the proper 4-pair wiring configuration – only T568B pinning is allowed throughout the entire installation.

Quality Assurance

SYSTIMAX, the manufacturers of cables and hardware specified herein, shall be ISO 9001 registered. Initial Qualification and Certification of the manufacturer is required. A certified SYSTIMAX representative is required to inspect and certify the cabling job after completion.

Testing and Certification

2.25 Testing

Testing of all installed “Permanent-Links” shall be performed using a Level II handheld tester and performed to the latest revision of TIA-568-C.0 ANNEX E. All reports shall be recorded and presented to the UTARNG PM via CD format before acceptance. This also includes all installed fiber Permanent-Links. Fiber will be tested for both wavelengths of multi-mode fiber by power meter and light source.

Testing of Permanent-Link cabling shall be performed prior to system cut-over, 100% of the UTP horizontal and riser pairs shall be tested for opens, shorts, polarity reversals, transposition, and presence of AC voltage. UTP voice, data and building control device horizontal wiring pairs shall be tested to TIA/EIA 568-C.2 from the information outlet to the MDF and IDF and from the MDF and IDF to the information outlet.

- Testing all installed Cables by using a Level II handheld tester and performed to the latest revision of TIA/EIA TSB-67 and TSB95.
- Fiber to be tested on wavelength of Multi-mode Fiber by power meter and light source
- 100% of UTP cable to be tested for open, shorts, polarity reversals, transposition, and presence of AC voltage.
- UTP voice, data and building control device horizontal wiring pairs shall be tested to TIA/EIA 568-C.2 from the information outlet to the TC and from the TC to the information outlet.
- Providing UTP Cable and Optical Fiber OTDR Test Reports
- Providing Optical Fiber Power Loss Test Reports
- Providing Complete Cabling Network Diagrams
- Providing SYSTIMAX TWENTY (2propo) Years Extended Product Warranty and Applications Assurance Program Certificate(s)

2.26 Workmanship

Components of the premise distribution system shall be installed in a neat, orderly manner consistent with the best telephone and data installation practices. Wiring color codes shall be strictly observed, and termination shall be uniform throughout. Identification marking and systems shall be uniform, permanent, and readable and in accordance with TIA/EIA-606 standards.

2.27 Inspection

On-going inspections shall be performed during construction by UTARNG Designer. All work shall be performed in a high-quality craftsman manner and the overall appearance shall be clean, neat, and orderly. The following points will be examined:

- Is the design documentation complete?
- Are all cables properly labeled from end-to-end?
- Have all terminated cables been properly tested in accordance with the specifications for the required performance level as well as tested for opens, shorts, polarity reversals, transposition, and presence of AC and/or DC voltage?

- Is the cable type suitable for its pathway?
- Are the cables bundled in parallel?
- Have the pathway manufacturer's guidelines been followed?
- Are all cable penetrations installed properly and fire stopped according to the code?
- Have the Cabling Services Providers avoided excessive cable bending?
- Have potential EMI and RFI sources been considered?
- Is the Cable Fill ratio correct?
- Are hanging supports within 1.5 meters (5 feet)?
- Does hanging cable exhibit some sag?
- Are MDF & IDF terminations compatible with applications equipment?
- Have machine generated wrap around labels been installed on each end of the cable within 6" of termination?
- Have Modular Panel instructions been followed?
 - Cable dressing first
 - Jackets remain up to the Connecting Block
 - All pair terminations tight and undistorted
 - Twists maintained up to the Connecting Block
- Are the correct outlet connectors used and turned right side up?
- Are identification markings uniform, permanent and readable?

Warranty

A unique 20-Year Extended Product Warranty and Applications Assurance Program is provided for all certified SYSTIMAX projects. The SYSTIMAX SCS Applications Assurance Program covers all applications currently contained in the SYSTIMAX SCS Performance Specifications. In addition, the Assurance Program will cover any application introduced in the future by recognized standards or user forums that use TIA/EIA 568-C and ISO/IEC IS 11801 for UTP channel specifications for cabling.

Upon successful completion of the installation, commissioning and subsequent testing by the Cabling Services Provider, Utah National Guard shall be provided with the SYSTIMAX 20-year Extended Product Warranty and Applications Assurance Program as provided for all certified SYSTIMAX projects.

- The SYSTIMAX 20-Year Extended Product Warranty and Applications Assurance Program shall insure against product defects, that all approved cabling components exceed the specifications of TIA/EIA-568-C and ISO/IEC IS11801, exceed the attenuation and NEXT requirements of the TIA/EIA-568-C and ISO/IEC IS 11801 for cabling links/channels, that the installation will exceed the loss and bandwidth requirements of TIA/EIA-568-C and ISO/IEC IS 11801 for fiber links/Channels, for a TWENTY (20) years period. The warranty shall apply to all passive SCS components.
- In the event of system failure, the System Integrator shall cover all cost to repair or replace the defective products and the cost of labor to perform the repairing and replacement until the cabling system is set up to support the required applications. The 20-Year Extended Product Warranty and Applications Assurance Program shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a TWENTY (20) year period.

Additional Considerations

2.28 Project Manager

The System Integrator will provide a full-time PM who will act as a single point of contact for all activities regarding this project. The PM will be required to make on-site decisions regarding the scope of the work and any changes required by the work.

It will also be the responsibility of the PM to maintain the Utah National Guard facility in a neat and orderly manner during the installation of the structured premise network cabling system. The Utah National Guard facility will be maintained in broom clean condition at the completion of work each day.

APPENDIX B. Recycling Statements

To: Contractors
From: Utah National Guard HQ
Subject: Construction & Demolition Projects for the UTNG

IAW EO 13514, DoDI 4715.4, and AR 420-1, all construction and demolition (C&D) projects for and on behalf of the Utah National Guard must implement a 50% recyclable construction material program to be documented and tracked during construction.

The UTNG provides this list of materials recycled at the Camp Williams recycling warehouse to assist contractors with conformance to these regulations. Documentation of recycled materials must then be reported to the related Project Manager or the Utah National Guard Sustainability/Recycling Manager, Kelly Miller, at (801) 878-5854 or email at kelly.s.miller20.nfg@mail.mil

The Camp Williams Recycling Warehouse is located at:

**Building 1770
17800 South Redwood Road
Riverton, UT 84065-4999**

List of items that can/cannot be taken to the Camp Williams Recycling Warehouse:

Materials Recycled:	Excluded Materials:
<ul style="list-style-type: none">✓ Electronics✓ Appliances✓ Cardboard✓ Paper (Mixed, Shredded, etc.)✓ Scrap Metal✓ Other Metals: Steel, Tin, Copper, Aluminum✓ Lead Acid Batteries✓ Wooden Pallets	<ul style="list-style-type: none">- Precious Metals- Hazardous Waste- Electrical Components- Fuels- Radioactive Items- Printed Circuit Boards- Thermal Batteries- Incendiary Products

Recyclable items that **CANNOT** be taken to the Camp Williams Recycling Warehouse may be taken to these locations:

RECYCLED EARTH

3027 S. Midland Drive
Ogden, UT 84401
(801) 452-6143

CONSTRUCTION MATERIAL RECYCLING, INC.

1267 W. Chapel Ridge Drive
South Jordan, UT 84095-7819
(801) 518-7645

DUNN RECYCLING

679 North 1500 West
Orem, UT 84057
(801) 221-9001

DUNN RECYCLING

635 West Airport Rd
Heber, UT 84032
(801) 373-4224

WESTERN METALS RECYCLING

1776 South Colorado Ave
Provo, UT 84606 (also in SLC)
(435) 657-0696

C&D Recycling Documentation Form

The UTNG will need the following information (found on landfill disposal invoices and waste recycling invoices) to document the amount of construction and demolition waste generated and recycled after the completion of a construction project:

Contractor: _____ **Contract #:** _____

Project Description: _____

Total Waste Disposed at Landfill (Weight in LBS or TONS):

If you do not know weight in lbs/tons, then enter Bulk Load (m³ or yd³) _____

Total Waste Recycled (Weight in LBS or TONS):

If you do not know weight in lbs/tons, then enter Bulk Load (m³ or yd³) _____

Final Disposal Location: _____

DESCRIPTION OF MATERIAL	ESTIMATED %
Electronics	
Appliances	
Asphalt	
Brick	
Concrete	
Concrete Block Unit	
ABC Other C&D Masonry/Asphalt	
ABC Stone	
ABC Crushed Stone/Base	
Metal – Aluminum	
Metal - Copper	
Metal – Mixed Metal	
Metal – Other C&D Metal	
Metal – Steel	
OD/I/M Ceiling Tile	
OD/I/M Composition Roof	
OD/I/M Doors/Windows/Stairs/Cabinets	
OD/I/M Glass	
Plastic	
Cardboard	
Paper	

EXAMPLE:

ABC Company completes project and takes 2 dumpsters filled with appliances and electronics to TISA warehouse. Invoice says 3000 lbs or 1.5 tons. ABC takes 1 dumpster filled with concrete and asphalt to Recycled Earth. Invoice says 4000 lbs or 2 tons. ABC then takes last remaining dumpster with no recyclables to landfill. Invoice from landfill says 2000 lbs or 1 ton.

Total Wasted Disposed at Landfill: 2000 lbs or 1 ton

Total Waste Recycled: 7000 lbs or 3.5 tons (TISA and Recycled Earth)

Lastly, ABC estimates how much of each material it recycled: approximately 25% electronics, 30% appliances, 30% concrete, and 15% asphalt.

Cost: _____

Revenue: _____

Contractor - Sign and Date.

I certify that this information is an accurate assessment of the C&D waste recycled and generated during this project.

Signature: _____ **Date:** _____

APPENDIX C. Individual Security Requirements for Contractor Employees

- A. Contractor's employees that need access to UTNG facilities must submit the following documents to the PM. The PM will submit them to the UTNG G-2 Office for security screening:
 - i. Completed and signed Security/Screening Declaration form. The form must be signed in ink or digitally signed. Typed signatures are not acceptable.
 - ii. Copy of the front and back of the employee's valid State-issued picture ID or driver license.
 - iii. Passport-type photo of the head and shoulders of the employee against a solid background. The employee must remove his/her hat and glasses for the picture.
- B. For each statement that is checked "YES" on the Security/Screening Declaration form, additional information will be required. Please cite the line number and provide additional details, to include circumstances of the activity or association, and current status. Write these in the Comments space at the bottom of the form, in line 21.
- C. Label the security form and photo with the person's name and give them to the PM. It is okay to send them electronically, but the signature must be valid on the Security Screening Declaration form. In that case, print the form, have the employee sign it and then scan it so it can be sent to the PM in an email.
- D. The background check can take up to a three weeks.
- E. Contractors should direct questions regarding individual security requirements to the PM.

SECURITY SCREENING/DECLARATION			
PRIVACY ACT STATEMENT			
<p>AUTHORITY: Executive Order (E.O.) 10450, Security Requirements for Government Employees; 5 CFR 731.202, Suitability Determinations, E.O. 12958, Classified National Security Information; and E.O. 12968, Access to Classified Information, are the authorities for soliciting information during this interview. 10 U.S.C. 8013, and E.O. 9397 (SSN).</p>			
<p>PURPOSE: SSN is used for positive identification and will assist in determining the acceptability of an individual for nomination, retention, or further processing for suitability or security determinations.</p>			
<p>ROUTINE USES: This form serves an addendum to the OF-306 for pre-employment screening. This form is used to screen individuals for access to UTNG facilities when a full background investigation is not required. It can also be used to update background investigations or for pre-deployment screening. It is also used as part of the UTARNG Continuous Evaluation Program. Any information developed during this interview may be disclosed to Federal, state, or local authorities.</p>			
<p>DISCLOSURE: Disclosure is voluntary; however, failure to provide the requested information may result in reassignment to non-sensitive duties, unfavorable suitability determinations, withdrawal of employment offers, or suspension of classified access.</p>			
Name:		UNIT:	
SSN:		DOB:	
		CHECK ONLY ONE	
		YES	NO
1. In the past seven years have you been arrested or charged with any offense, been issued a summons, citation, or ticket to appear in any court? (This includes traffic violations)			
2. In the past seven years have you been on probation or parole?			
3. Are you currently on probation or parole?			
4. Have you <u>ever</u> been charged with a felony?			
5. Have you <u>ever</u> been charged with a firearms or explosives offense?			
6. Have you <u>ever</u> been charged with any offense(s) related to alcohol or drugs?			
7. Since the age of 16 or in the last 7 years, whichever is shorter , have you <u>illegally</u> used any controlled substance or prescription drugs? Example, marijuana, cocaine, crack cocaine, hashish, narcotics (opium, morphine, codeine, heroin, etc.), amphetamines, depressants (barbiturates, meth, tranquilizers, etc.), hallucinogenic (LSD, PCP, etc.),			

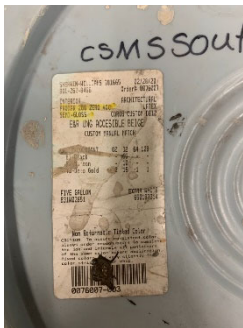
8. In the last 7 years, has your use of alcoholic beverages resulted in any alcohol-related treatment or counseling?		
9. In the last 7 years, have you filed a petition under any chapter of the bankruptcy code (to include Chapter 13)?		
10. In the last 7 years, have you been over 180 days delinquent on any debt(s)?		
11. Do you have any accounts that are charged off or currently in collections?		
12. Are you currently delinquent on child support or alimony payments?		
13. In the past 7 years have you had, or do you now have, any liens for failing to pay property taxes, income taxes, etc.?		
14. In the last 7 years have you had any property foreclosed on or repossessed?		
15. Are you currently delinquent on any federal, state, or local debt, including student loans, taxes, etc.?		
16. Do you have any pending lawsuits or litigation or other legal issues?		
17. Do you have any immediate family members who are not US Citizens? (Mother, Father, siblings)		
18. Are any individuals you live with not US Citizens?		
19. Have you divorced or married in the last 24 months?		
20. Do you have any close and continuing contacts with individuals who are not US Citizens?		
21. Comments		

APPENDIX D. Approved Paints and Coatings for the Draper Complex

Sherwin Williams Paints and Coatings

As of April 6, 2022

Product Guide



Description: ProMar 200 Zero VOC Interior Latex Semi-Gloss Extra White

Product: B31W02651

Substrate: Drywall

Area: CSMS South

Color: E&R UNG Accessible Beige

Order #: 701665-76007



Description: Emerald Interior Latex Semi-Gloss Extra White

Product: K38W00351

Substrate: Drywall

Area: Shower Ceiling

Color: UTNGHQ – Shower Ceiling

Order #: 701661-38964



Description: ProMar 200 Zero VOC Interior Latex Semi-Gloss Extra White

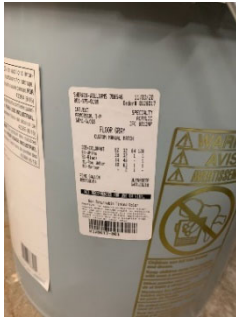
Product: B31W02651

Substrate: Drywall

Area: Walls

Color: UNG – New Off White #2

Order #: 701661-110600



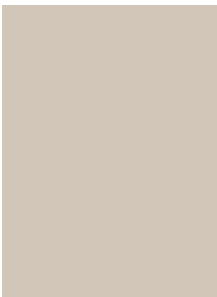
Description: ArmorSeal Tread-Plex 100% Acrylic Floor Coating
Product: B90T00104
Substrate: Concrete Floors
Area: Floors
Color: Floor – Gray
Order #: 708546-128017



Description: Pro Industrial DTM Acrylic Semi-Gloss Ultradeep Base
Product: B66T01154
Substrate:
Area: Doors
Color: 80 – Dark Brown
Order #: 701661-44627



Description: ProMar 200 Zero VOC Interior Latex Semi-Gloss Extra White
Product: B31W02651
Substrate:
Area: Bathroom Walls
Color: Bathroom – Walls
Order #: 701661-112467



Description: ProMar 200 Zero VOC Interior Latex Low Sheen Extra White
Product: B24W02651
Substrate: Drywall
Area: Walls
Color: 7036 – Accessible Beige



SHERWIN-WILLIAMS®

Reference Pages



SHERWIN-WILLIAMS

Care and Cleaning of Interior and Exterior Coatings

Background:

Establish procedures to maintain and clean interior and exterior painted substrates. To assure maximum washability and durability, wait at least two weeks before washing the dry paint film. Exterior coatings typically are very soft and flexible to allow for expansion and contraction of the coating during changes of temperature. Any hard scrubbing of standard exterior coatings is likely to damage the film. To clean and maintain the interior and exterior surfaces, we recommend these procedures.

Concentrated Cleaners, Liquid or Dry:

- Read all the package directions before using. It is always recommended to test any cleaner on a small, inconspicuous area prior to use.
- Mix or dilute the cleaner per package instructions. Solution strength may be adjusted depending on amount and type of soil.
- Remove any heavy debris and contaminants.
- Using a sponge or cloth, wash surface dirt and marks.
- Do not allow the cleaner to dry on the surface.
- Always clean from the bottom of a wall to the top.
- Rinse the surface thoroughly.
- Repeat if necessary.

Premixed Spray Cleaners:

- Read all the package directions before using. It is always recommended to test any cleaner on a small, inconspicuous area prior to use.
- Turn spray nozzle to desired spray pattern. (Open with nozzle facing away from you.)
- Remove any heavy debris and contaminants.
- Apply the cleaner to the dirt and marks; apply just enough to wet the area.
- Using a damp sponge or cloth, wipe to remove the surface dirt and marks and any excess cleaner. For difficult stains, some scrubbing may be necessary.
- Do not allow the cleaner to dry on the surface.
- If recommended on the cleaner package, rinse the surface thoroughly.
- Repeat if necessary.
- Return spray nozzle to the closed position.

Cautions:

- Thoroughly read and understand all the label cautions prior to using any cleaner.
- Be sure that the cleaner is appropriate for the dirt/contamination.
- Do not mix together any cleaning compounds containing bleach and ammonia.
- Abrasive cleansers may damage a paint film, use very carefully.
- Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions would be advised.

WARNING!

- Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.



SHERWIN-WILLIAMS

Care and Cleaning of Interior and Exterior Coatings

The Sherwin-Williams Company Cleaning Products

SuperDeck® Deck Wash is designed to bring back the fresh, natural look of your deck. Enjoy the self-working, no scrub formulation. This product is an excellent choice to restore your surface or to use as a pretreatment for staining, preserving, or sealing. Use on decks and outdoor furniture made of pressure treated wood, cedar, pine, and most other woods. This product is intended for exterior use only.

SuperDeck® Stain & Sealer Remover is specifically designed to remove most semi-transparent and weathered solid latex and oil-based stains from decks and other exterior wood. SuperDeck Stain & Sealer Remover allows you to change the color of your deck or siding by restoring the natural beauty of the wood. SuperDeck Stain & Sealer Remover can be used on most exterior wood surfaces such as decks, siding and fences and will remove the following stains and finishes:

- Polyurethane and some weathered latex paint.
- Oil-based toners, semi-transparent, and weathered solid stains.
- Water-based toners, semi-transparent, and weathered stain.
- Water-reducible toners, semi-transparent and weathered solid stains.
- Old, weathered, clear protective finishes.

SuperDeck Stain & Sealer Remover will restore color to severely weathered and discolored wood.

SuperDeck® Revive® Deck & Siding Brightener is a fast-acting, ready-to-use cleaner specially formulated for cedar, redwood and other highly resinous exterior woods as well as dense woods such as mahogany. Due to the chemical characteristics of these types of woods, traditional cleaners can leave the surface with an unnatural, darkened appearance. SuperDeck Revive Deck & Siding Brightener will help remove dirt and unsightly stains caused by mildew and algae, gray and weathered wood, tannin bleed and nail bleed as well as stubborn mill glaze (a surface barrier to wood coatings found on most newly installed cedar and redwood) and restore the surface to its bright, clean natural look. SuperDeck Revive Deck & Siding Brightener can be used on any new or existing exterior structure including wood decks, fences, siding, shakes, shingles, boat docks, boardwalks, outdoor furniture, picnic tables, hot tubs, planters, benches, trellises and gazebos.

H&C Concrete Etching Solution is a phosphoric acid-based etcher that has been developed to acid etch concrete surfaces before applying H&C Silicone Acrylic Concrete Sealer, H&C Shield Plus Concrete Stain, and other coatings. Uses: • Basement floors and walls • Garage floors, carports and driveways • Porches, patios, walkways, steps • Swimming pool aprons • Recreation areas • Parking structures and parking lots • Retaining walls • Containment areas • Tilt-up construction • Removes efflorescence (alkali salts) • Reduces the pH of new concrete and new mortar joints.

H&C Degreaser is a concentrated heavy-duty cleaner that will remove most automotive fluids (oil, grease, brake fluid, transmission fluid, gear fluid and antifreeze) from concrete and masonry surfaces. Its primary use is to degrease and prepare concrete, block, brick, and masonry. Features: • Removes grease and oil stains • Prepares surfaces for paints, stains, and sealers • Increases any coating's ability to bond with the surface by providing a clean substrate. Recommended Uses: • Stadium Supports • Bridges and Bridge Structures • Parking Garages • Patios and Walkways • Pool Decks • Concrete Driveways • Garage Floors • Block & Stucco Walls • Athletic/Tennis/Shuffleboard Courts • Other Concrete Surfaces • Use prior to etching



SHERWIN-WILLIAMS.

BASICS OF TOUCH-UP

Often a painted area needs repair. Usually, the damaged area is small and is repaired using a brush and roller. The art of repair is called "touching up" and there are many problems in making the repair as invisible as possible. Prerequisites for achieving good "touch-up" are that the paint be of the same color as the original, from the same manufacturer, from the same batch of paint and, ideally, from the same can, and that the area to be repaired has the same texture and appearance of the surrounding area. If the "touch-up" patch is visible under all illumination conditions then it is poorly done; if one must search for it, then the "touch-up" is good.

COMPONENTS OF "TOUCH-UP"

Touch-up complaints are often not specific about what aspect makes the repair visible. In fact, there are three separate and identifiable components that can be included in a "touch-up" problem. All three components contribute to the visibility of the repair and stem from the use of different application techniques for the original paint and the repair. Usually, a brush repair over an airless sprayed original will be very visible. Most of the following comments concern that situation, but they can also be applied to other combinations. On some jobs one problem may be visible, on others they may occur in combinations. It is much easier to understand the cause of the poor "touch-up" if the problem components are identified.

1. "HALO"

A "halo" is created at the edge of the repair by tendrils of paint left by the brush as it enters and exits the area around the patch. Human eyes are very good at determining texture changes and are thus very sensitive to touch-up and "halo" in particular. The texture is more raised in these areas than the main part of the repair, so they produce shadows when illuminated from the far side and reflect light back to the observer when illuminated from the same side. A painter can make the situation worse by attempting to feather the repair excessively. This creates more edge texture. Halo is diminished if the paint spreads smoothly and continuously over the original layer. If the repair paint thickens in viscosity rapidly as it is spread then it will not level well and the texture at the edge will be especially bad. Thus, patching over porous paint, e.g. a flat paint, is more likely to cause a "halo" problem. In the field the "halo" problem may be alleviated by stippling with a brush or otherwise trying to duplicate the texture of the original. Diluting the repair paint by 10-15% may help by accommodating the wicking problem.

2. DIFFERENT SHEEN

This part of the "touch up" problem is noticed as a difference over the whole repair patch particularly at oblique angles. The patch appears either shiny or dull compared to the background. The effect may be accompanied by a "halo". Features larger than three mil, e.g., brush marks, roller stipple, etc., produce shadowing or reflections like the "halo", but not a change in sheen. Sheen differences are due to changes in the way the light is scattered from smaller features, i.e., roughness, in the paint surface. The shape and the arrangement of the paint ingredients are what determine this. Changes in surface roughness are most visible at grazing angles of observation and illumination. This is often the way that poor touch-ups are first noticed. Drying conditions and application technique are important factors in determining surface roughness. Although paint can be formulated to minimize their importance, sheen differences may be seen when the original paint and the repair paint are applied differently or under widely different temperature and/or humidity conditions.

3. COLOR DEVELOPMENT

This problem is much less likely to occur than the other two types of touch-up problem. It most often appears as a difference in the depth of the color rather than a color shift and can be seen at almost any angle of observation, but particularly near the perpendicular (90° angle) in contrast to the "halo" and "sheen" components above. Changes in the way light is scattered from within the body of the paint film are most visible straight on for both observation and illumination. Poor color touch-up results from differences in pigment particle separation caused by the differences in application techniques, e.g., brush vs. airless spray. Airless spraying inputs a very great deal of energy into paint and disperses pigment very well. Brushing or rolling shear rates are two to three orders of magnitude less severe and may not disperse paint components in the same way.

Reprinted from The Sherwin-Williams Materials Science R&D 1991, edited August 2008



SHERWIN-WILLIAMS®

Data Pages

ProMar® 200 Zero V.O.C. Interior Latex Semi-Gloss

B31-2600 Series



CHARACTERISTICS

ProMar 200 Zero V.O.C. Interior Latex Semi-Gloss is a durable, professional quality, interior vinyl acrylic finish for use on walls, ceilings, and trim of primed plaster, wallboard, wood, masonry, and primed metal.

Color: Most Colors
To optimize hide and color development, always use the recommended P-Shade primer

Coverage: 350 - 400 sq.ft. per gallon
@ 4 mils wet;
1.5 mils dry

Drying Time, @ 77°F, 50% RH:

Touch: 1 Hour
Recoat: 4 Hours

Drying and recoat times are temperature, humidity, and film thickness dependent

Finish: 25-35 units @ 60°

Tinting with CCE only:

Base:	oz. per gallon	Strength:
High Ref White	0-7	SherColor
Extra White	0-8	SherColor
Deep Base	4-12	SherColor
Ultra-deep Base	10-12	SherColor
Real Red	0-12	SherColor
Bright Yellow	0-12	SherColor
Dover White		do not tint

Extra White B31W02651
(may vary by color)

V.O.C. (less exempt solvents):

less than 50 grams per litre; 0.42 lbs. per gallon
As per 40 CFR 59.406

Volume Solids: 38 ± 2%

Weight Solids: 50 ± 2%

Weight per Gallon: 10.30 lbs

Flash Point: N/A

Vehicle Type: Vinyl Acrylic

Shelf Life: 36 months unopened

WVP Perms (US): 85.75 grains/(hr ft² in Hg)

Anti-microbial

This product contains agents which inhibit the growth of mold and mildew on the surface of this paint film.

COMPLIANCE

As of 08/10/2020, Complies with:

OTC	Yes
OTC Phase II	Yes
SCAQMD	Yes
CARB	Yes
CARB SCM 2007	Yes
Canada	Yes
LEED® v4 & v4.1 Emissions	Yes
LEED® v4 & v4.1 V.O.C.	Yes
EPD-NSF® Certified	Yes
MIR-Product Lens Certified	Yes
MPI®	Yes

APPLICATION

Apply at temperatures above 50°F.
No reduction needed.

Brush:
Use a nylon-polyester brush.

Roller:
Use a 3/8 to 3/4 inch nap synthetic cover.

For specific brushes and rollers, please refer to our Brush and Roller Guide on sherwin-williams.com

Spray—Airless

Pressure 2000 p.s.i.
Tip .017-.021 inch

APPLICATION TIPS

Make sure product is completely agitated (mechanically or manually) before use.

Priming and application of two coats at the recommended film thickness can help where hiding of a previous coating or application to new drywall is a factor.

Using the same method of application and batch to touch up with as that originally used will help improve touch up.

When original application was by spray, preconditioning of touch up paint by running it through the spray tip will help touch up appearance.

SPECIFICATIONS

Block:

1 coat ConFlex Block Filler*
2 coats ProMar 200 Zero V.O.C. Interior Latex

Drywall:

1 coat ProMar 200 Zero V.O.C. Latex Primer
2 coats ProMar 200 Zero V.O.C. Interior Latex

Masonry:

1 coat Loxon Concrete & Masonry Primer*
2 coats ProMar 200 Zero V.O.C. Interior Latex

Plaster:

1 coat Loxon Concrete & Masonry Primer*
2 coats ProMar 200 Zero V.O.C. Interior Latex

Wood:

1 coat Premium Wall & Wood Primer*
2 coats ProMar 200 Zero V.O.C. Interior Latex

*These primers contain less than 50 grams per litre V.O.C.

Other primers may be appropriate.

When repainting involves a drastic color change, a coat of primer will improve the hiding performance of the topcoat color.

ProMar® 200 Zero V.O.C. Interior Latex Semi-Gloss

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Glossy surfaces should be sanded dull. Stains from water, smoke, ink, pencil, grease, etc. should be sealed with the appropriate primer-sealer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Caulking:

Gaps between walls, ceilings, crown moldings, and other interior trim can be filled with the appropriate caulk after priming the surface.

Drywall:

Fill cracks and holes with patching paste/spackle and sand smooth. Joint compounds must be cured and sanded smooth. Remove all sanding dust.

Masonry, Concrete, Cement, Block:

All new surfaces must be cured according to the supplier's recommendations—usually about 30 days. Remove all form release and curing agents. Rough surfaces can be filled to provide a smooth surface. If painting cannot wait 30 days, allow the surface to cure 7 days and prime the surface with Loxon Concrete & Masonry Primer.

SURFACE PREPARATION

Mildew:

Prior to attempting to remove mildew, it is always recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions may be advised.

Mildew may be removed before painting by washing with a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach-water solution.

Plaster:

Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

Wood:

Sand any exposed wood to a fresh surface. Patch all holes and imperfections with a wood filler or putty and sand smooth.

CAUTIONS

For interior use only.
Protect from freezing.
Non-photochemically reactive.

Before using, carefully read **CAUTIONS** on label

Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. **FIRST AID:** In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. **WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.**

HOTW 08/10/2020 B31W02651 32 00
FRC,SP

CLEANUP INFORMATION

Clean spills, spatters, hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with compliant cleanup solvent to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using solvents.

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative or visit www.paintdocs.com to obtain the most current version of the PDS and/or an SDS.

101.08SG

Emerald® Interior Latex Semi-Gloss

K38 Series



CHARACTERISTICS

Emerald Interior Acrylic Latex is our "Best-In-Class" interior architectural coating.

Premium performance in washability, stain resistance, block resistance, adhesion, burnish and hiding.

Anti-Microbial properties*

Can only be tinted with CCE Colorants

Color: Most Colors

To optimize hide and color development, always use the recommended P-Shade primer

Coverage: 350 - 400 sq.ft. per gallon
@ 4 mils wet; 1.5 mils dry

Drying Time, @ 77°F, 50% RH:

Touch: 1 Hour
Recoat: 4 Hours

Drying and recoat times are temperature, humidity, and film thickness dependent

Finish: 35-45 units @ 60°

Tinting with CCE only:

Base:	oz. per gallon	Strength:
High Ref White	0-7	SherColor
Extra White	0-7	SherColor
Deep Base	4-12	SherColor
Ultradeep Base	10-12	SherColor

Extra White K38W00351
(may vary by color)

V.O.C. (less exempt solvents):
less than 50 grams per litre; 0.42 lbs. per gallon
As per 40 CFR 59.406

Volume Solids: 37 ± 2%

Weight Solids: 52 ± 2%

Weight per Gallon: 10.74 lbs

Flash Point: N/A

Vehicle Type: Styrene Acrylic

Shelf Life: 36 months unopened

WVP Perms (US): 18.45 grains/(hr ft² in Hg)

***Anti-microbial**

This product contains agents which inhibit the growth of mold and mildew on the surface of this paint film.

COMPLIANCE

As of 08/17/2020, Complies with:

OTC	Yes
OTC Phase II	Yes
SCAQMD	Yes
CARB	Yes
CARB SCM 2007	Yes
Canada	Yes
LEED® v4 & v4.1 Emissions	Yes
LEED® v4 & v4.1 V.O.C.	Yes
EPD-NSF® Certified	Yes
MIR-Product Lens Certified	Yes
MP1®	Yes

APPLICATION

Apply at temperatures above 50°F.
No reduction needed.

Brush:
Use a nylon-polyester brush.

Roller:
For best final appearance when rolling, finish off in one direction, especially for dark colors.

Use a high quality polyester roller cover. For specific brushes and rollers, please refer to our Brush and Roller Guide on sherwin-williams.com

Spray—Airless
Pressure 2000 p.s.i.
Tip .017-.021 inch

APPLICATION TIPS

Make sure product is completely agitated (mechanically or manually) before use.

Priming and application of two coats at the recommended film thickness can help where hiding of a previous coating or application to new drywall is a factor.

Using the same method of application and batch to touch up with as that originally used will help improve touch up.

When original application was by spray, preconditioning of touch up paint by running it through the spray tip will help touch up appearance.

SPECIFICATIONS

Emerald Interior Latex can be used directly over existing coatings, bare drywall, or plaster (cured with a pH of less than 9)

Drywall:

Self-prime using 2 coats of Emerald Interior Latex

or

1 coat Premium Wall and Wood Primer
2 coats Emerald Interior Latex

Masonry - Block: (can be tiled to provide a smooth surface or primed if it is a high pH substrate)
1 coat Loxon Acrylic Block Surfer

or

1 coat Loxon Concrete & Masonry Primer
2 coats Emerald Interior Latex

Plaster:

Self-prime using 2 coats of Emerald Interior Latex

or

1 coat Premium Wall and Wood Primer
2 coats Emerald Interior Latex

Wood:

1 coat Premium Wall and Wood Primer
2 coats Emerald Interior Latex

If the wood has bleeding (such as tannin or knot-holes), prime with Multi-Purpose Primer.

Other primers may be appropriate.

When repainting involves a drastic color change, a coat of primer will improve the hiding performance of the topcoat color.

Emerald® Interior Latex Semi-Gloss

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Glossy surfaces should be sanded dull. Stains from water, smoke, ink, pencil, grease, etc. should be sealed with the appropriate primer-sealer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Caulking:

Gaps between walls, ceilings, crown moldings, and other interior trim can be filled with the appropriate caulk after priming the surface.

Drywall:

Fill cracks and holes with patching paste/spackle and sand smooth. Joint compounds must be cured and sanded smooth. Remove all sanding dust.

Masonry, Concrete, Cement, Block:

All new surfaces must be cured according to the supplier's recommendations—usually about 30 days. Remove all form release and curing agents. Rough surfaces can be filled to provide a smooth surface. If painting cannot wait 30 days, allow the surface to cure 7 days and prime the surface with Loxon Concrete & Masonry Primer.

SURFACE PREPARATION

Mildew:

Prior to attempting to remove mildew, it is always recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions may be advised. Mildew may be removed before painting by washing with a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach-water solution.

Plaster:

Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

Wood:

Sand any exposed wood to a fresh surface. Patch all holes and imperfections with a wood filler or putty and sand smooth.

CAUTIONS

For interior use only.
Protect from freezing.
Non-photochemically reactive.

Before using, carefully read **CAUTIONS** on label

Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. **FIRST AID:** In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. **WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.**

HOTW 08/17/2020 K38W00351 25 00
FRC,SP

CLEANUP INFORMATION

Clean spills, spatters, hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with compliant cleanup solvent to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using solvents.

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative or visit www.paintdocs.com to obtain the most current version of the PDS and/or an SDS.



ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL® TREAD-PLEX™ 100% ACRYLIC WATER BASED FLOOR COATING

B90 SERIES

Revised: August 12, 2019

PRODUCT INFORMATION

8.12

PRODUCT DESCRIPTION

ARMORSEAL TREAD-PLEX is a general purpose, interior/exterior, 100% acrylic, low odor, waterborne floor coating. This dries rapidly to a tough, alkali resistant finish which will withstand hard wear, abrasion, grease, oils, and cleaning equipment.

- One component
- Fast dry
- Slip resistant properties
- Abrasion resistant
- Outstanding application properties
- Water clean up

PRODUCT CHARACTERISTICS

Finish:	Semi-Gloss
Color:	Wide variety of colors available
Volume Solids:	43% ± 2%, may vary by color
Weight Solids:	55% ± 2%, may vary by color
VOC (EPA Method 24):	<100 g/L; .83 lb/gal

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	3.5 (88)	4.5 (112)
Dry mils (microns)	1.5 (40)	2.0 (50)
~Coverage sq ft/gal (m²/L)	345 (8.4)	460 (11.3)
Theoretical coverage sq ft/gal (m²/L) @ 1 mil / 25 microns dft	688 (16.8)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 4.0 mils wet (100 microns):

	@ 55°F/13°C	@ 77°F/25°C	@ 100°F/38°C
		50% RH	
To touch:	45 minutes	30 minutes	10 minutes
To recoat:	6 hours	4 hours	30 minutes
Foot traffic:	18 hours	8 hours	1 hour
Heavy traffic:	24 hours	18 hours	6 hours
To cure:	7 days	7 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	24 months, unopened Store indoors at 50°F (10°C) to 100°F (38°C)
Flash Point:	>200°F (93°C), PMCC
Reducer/Clean Up:	Water

RECOMMENDED USES

For use over prepared concrete and wood floors, steps, stairwells, aislesways, or previously painted floor surfaces in sound condition.

- Laboratories
- Light assembly and production areas
- Hospitals
- Industrial/commercial office areas
- Helipads
- Not recommended for areas subject to hot tire pickup
- Meets ADA requirements for Slip Resistance for floors
- Suitable for use in USDA inspected facilities

PERFORMANCE CHARACTERISTICS

Substrate*: Concrete

Surface Preparation*: Clean, dry, sound

System Tested*:

2 cts: ArmorSeal Tread-Plex @ 4.0 mils (100 microns) dft
*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	No more than 37 mg loss
Adhesion	ASTM D4541; ASTM D3359	702 psi (ASTM D4541); 5A (ASTM D3359)
Direct Impact Resistance, on steel	ASTM D2794	30 in. lb.
Dry Heat Resistance	ASTM D2485	150°F (66°C), intermittent at 200°F (93°C)
Flexibility	ASTM D522, 180° bend, 1/8" mandrel	Passes
Humidity Resistance	ASTM D4585, 500 hours	Rating 10 per ASTM D714 for blistering
Pencil Hardness	ASTM D3363	F
Scrub Resistance (3 mils dft)	ASTM D2486, Section 8	Passes 1000 cycles minimum
Slip Resistance, Floors	ASTM C1028**, .60 Minimum Static Coefficient of Friction	Passes wet and dry, with and without SharkGrip Additive
Wet Adhesion (one coat @ 2.0 mils dft)	TT-P-1511A, 6000 cycles	Passes

**Test method withdrawn in 2014 without replacement

www.sherwin-williams.com/protective

continued on back



ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL® TREAD-PLEX™ 100% ACRYLIC WATER BASED FLOOR COATING

B90 SERIES

Revised: August 12, 2019

PRODUCT INFORMATION

8.12

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct.	
		Mils	(Microns)
Concrete Floors:			
2 cts.	ArmorSeal Tread-Plex	1.5-2.0	(40-50)
Wood Floors:			
2 cts.	ArmorSeal Tread-Plex	1.5-2.0	(40-50)
Previously Painted Floors in Sound Condition:			
1-2 cts.	ArmorSeal Tread-Plex	1.5-2.0	(40-50)

The systems listed above are representative of the product's use, other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Concrete Floors: SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3

Wood Floors: Clean, smooth, dust free

Do not use hydrocarbon solvents for cleaning

Surface Preparation Standards			
Condition of Surface	ISO 8501-1	SSPC	NACE
White Metal	SA 3	SP 5	1
Near White Metal	SA 2.5	SP 10	2
Commercial Blast	SA 2	SP 7	3
Brush-Off Blast	SA 1	SP 6	4
Hand Tool Cleaning	Rusted	SP 8	5
Pitted & Rusted	OC1	SP 9	6
Rusted	OC2	SP 10	7
Power Tool Cleaning	Pitted & Rusted	SP 11	8
Rusted	OC3	SP 12	9
Pitted & Rusted	OC4	SP 13	10

TINTING

Do not tint package colors. Pastel and Ultradeep bases tint at 100% strength with EnviroToner, BAC, or CCE. Better performance will be achieved with Envirotoners. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

APPLICATION CONDITIONS

Temperature:	50°F (10°C) minimum, 100°F (38°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:	1 gallon (3.78L) and 5 gallon (18.9L) containers
Weight:	10.7 ± 0.2 lb/gal ; 1.3 Kg/L, may vary by color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

www.sherwin-williams.com/protective



ArmorSeal **Heavy** **Duty Floor** **Coatings**

ARMORSEAL® **TREAD-PLEX™** **100% ACRYLIC WATER BASED FLOOR COATING**

B90 SERIES

Revised: August 12, 2019

APPLICATION BULLETIN

8.12

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Do not use hydrocarbon solvent for cleaning.

Concrete and Masonry

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910.

Follow the standard methods listed below when applicable:

- ASTM D4258 Standard Practice for Cleaning Concrete.
- ASTM D4259 Standard Practice for Abrading Concrete.
- ASTM D4260 Standard Practice for Etching Concrete.
- ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
- SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
- ICRI No. 310.2R Concrete Surface Preparation.

Wood

Surface must be clean, dry and sound. Remove any oils and dirt from the surface using a degreasing solvent or strong detergent. Sand to remove any loose or deteriorated surface wood and to obtain a proper surface profile. Prime with recommended primer and paint as soon as possible. No painting should be done immediately after a rain or during foggy weather. Knots and pitch streaks must be scraped, sanded and spot primed before full coat of primer is applied. All nail holes or small openings must be properly caulked.

Previously Painted Surfaces

If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, additional abrasion of the surface and/or removal of the previous coating may be necessary. Retest surface for adhesion. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards			
Condition of Surface	ISO 8501-1 SS7079-A1	SSPC	NACE
White Metal	Sa 3	SSPC-SP 5	1
Near White Metal	Sa 2.5	SSPC-SP 10	2
Commercial Blast	Sa 2	SSPC-SP 7	3
Brush-Off Blast	Sa 1	SSPC-SP 6	4
Hand Tool Cleaning	St 3	SSPC-SP 13	5
Rusted	St 3	SSPC-SP 13	5
Pitted & Rusted	St 3	SSPC-SP 13	5
Power Tool Cleaning	St 3	SSPC-SP 13	5

APPLICATION CONDITIONS

Temperature: 50°F (10°C) minimum, 100°F (38°C) maximum
 (air, surface, and material)
 At least 5°F (2.8°C) above dew point

Relative humidity: 85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean UpWater

Brush

Brush.....Nylon/Polyester
 Reduction.....As needed up to 6% by volume

Roller

Cover1/4"-3/8" woven with solvent resistant core
 Reduction.....As needed up to 6% by volume

If specific application equipment is not listed above, equivalent equipment may be substituted.



ArmorSeal
Heavy
Duty Floor
Coatings

ARMORSEAL®
TREAD-PLEX™
100% ACRYLIC WATER BASED FLOOR COATING

B90 SERIES

Revised: August 12, 2019

APPLICATION BULLETIN

8.12

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Mix paint thoroughly with low speed power agitation prior to use. Avoid vigorous agitation. Make certain no pigment remains on bottom of can.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	3.5 (88)	4.5 (112)
Dry mils (microns)	1.5 (40)	2.0 (50)
~Coverage sq ft/gal (m ² /L)	345 (8.4)	460 (11.3)
Theoretical coverage sq ft/gal (m ² /L) @ 1 mil / 25 microns dft	688 (16.8)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 4.0 mils wet (100 microns):

	@ 55°F/13°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	45 minutes	30 minutes	10 minutes
To recoat:	6 hours	4 hours	30 minutes
Foot traffic:	18 hours	8 hours	1 hour
Heavy traffic:	24 hours	18 hours	6 hours
To cure:	7 days	7 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and splatters immediately with soap and warm water. Clean hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with mineral spirits to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using mineral spirits.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

PERFORMANCE TIPS

During the early stages of drying, the coating is sensitive to rain, dew, high humidity, and moisture condensation. Plan painting schedules to avoid these influences during the first 16-24 hours of curing.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

This product is not slip resistant where moisture, water, grease, or other liquids may be present.

Anti-slip additives, such as H&C SharkGrip®, may be added to the coating to provide some slip resistance. This product should not be used in place of a non-skid finish.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

www.sherwin-williams.com/protective

113.07

Pro Industrial™DTM Acrylic Semi-Gloss

B66-1150 Series



CHARACTERISTICS

Pro Industrial DTM Acrylic coating is an interior-exterior, water based, corrosion resistant acrylic coating for light to moderate industrial use. Designed for new construction or maintenance use and can be used directly over prepared substrates.

- Chemical Resistant
- Corrosion resistant
- Fast dry
- Flash rust-early rust resistance
- Suitable for use in USDA inspected facilities

Finish: Semi-Gloss 38-48" @60"

Color: Most colors

Recommended Spreading Rate per coat:

Wet mils: 6.0-10.0

Dry mils: 2.4-4.0

Coverage: 160-267 sq.ft. per gallon

Theoretical Coverage: 641 sq. ft. per gallon @ 1 mil dry

Approximate spreading rates are calculated on volume solids and do not include any application loss.

Note: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 6.0 mils wet, @ 50% RH:

Drying, and recoat times are temperature, humidity, and film thickness dependent.

	@50°F	@77°F	@110°F
To touch	1 hour	20 minutes	10 minutes
Tack free	2 hours	45 minutes	30 minutes
To recoat	2 hours	1 hour	1 hour

Tinting with CCE only:

Base	oz. per gallon	Strength
Extra White	0-6	SherColor
Deep Base	6-12	SherColor
Ultra-deep Base	10-12	SherColor
Real Red	0-12	SherColor
Vivid Yellow	0-14	SherColor

Extra White B66W01151

(may vary by color)

V.O.C. (less exempt solvents): unreduced less than 50 grams per litre; 0.42 lbs. per gallon

As per 40 CFR 59.408

Volume Solids: 40 ± 2%

Weight Solids: 51 ± 2%

Weight per Gallon: 10.20 lb

Flash Point: N/A

Vehicle Type: Acrylic

Shelf Life: 36 months, unopened

COMPLIANCE

As of 05/14/2021, Complies with:

OTC	Yes
OTC Phase II	Yes
S.C.A.Q.M.D.	Yes
CARB	Yes
CARB SCM 2007	Yes
CARB SCM 2020	Yes
Canada	Yes
LEED® v4 & v4.1 Emissions	Yes
LEED® v4 & v4.1 V.O.C.	Yes
EPD-NSF® Certification	Yes
MIR-Manufacturer Inventory	No
NSF® Certification	Yes
MP®	Yes

APPLICATION

Temperature:
minimum 50°F / 10°C
maximum 110°F / 43°C
air, surface, and material
At least 5°F above dew point

Relative humidity: 85% maximum
The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compatible with the existing environmental and application conditions.

Reducer: Water

Airless Spray:
Pressure 1500 p.s.i.
Hose 1/4 Inch I.D.
Tip .017 - .021 Inch
Filter 60 mesh

Conventional Spray:
Gun Binks 95
Fluid Nozzle 66
Air Nozzle 63 PB
Atomization Pressure 50 p.s.i.
Fluid Pressure 10-20 p.s.i.

Reduction Not recommended
Brush Nylon-polyester
Roller Cover 1/4-3/8 Inch woven

If specific application equipment is listed above, equivalent equipment may be substituted.

Due to this product's fast dry performance, brushing should be limited to small areas where a wet edge can be maintained.

Apply paint at the recommended film thickness and spreading rate as indicated. Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Overspray landing on hot surfaces may adhere to these surfaces. Immediately remove overspray from hot surfaces before adhesion occurs.

SPECIFICATIONS

Steel*

2 coats Pro Industrial DTM Acrylic

Steel:

1 coat Pro Industrial Pro-Cryl Primer or Pro Industrial DTM Primer/Finish or Kern Bonds HS or Zinc Clad Primer

1-2 coats Pro Industrial DTM Acrylic

Aluminum:

1-2 coats Pro Industrial DTM Acrylic

Aluminum (Water Based Primer):

1 coat Pro Industrial Pro-Cryl Primer

1-2 coats Pro Industrial DTM Acrylic

Concrete Block (CMU):

1 coat Pro Industrial Heavy Duty Blockfiller or Loxon Acrylic Block Surfacer

1-2 coats Pro Industrial DTM Acrylic

Concrete-Masonry:

1 coat Loxon Concrete & Masonry Primer (if needed)
or Loxon Conditioner (if needed)
2 coats Pro Industrial DTM Acrylic

Drywall:

1 coat ProMar 200 Zero V.O.C. Primer

1-2 coats Pro Industrial DTM Acrylic

Galvanizing:

2 coats Pro Industrial DTM Acrylic

Pre-Finished Siding: (Baked-on finishes)

1 coat Bond-Plex Waterbased Acrylic or DTM Bonding Primer

1-2 coats Pro Industrial DTM Acrylic

Wood, exterior:

1 coat Exterior Wood Primer

1-2 coats Pro Industrial DTM Acrylic

Wood, interior:

1 coat Premium Wall & Wood Primer

1-2 coats Pro Industrial DTM Acrylic

*Application of coating on unprimed steel may cause

pinpoint rusting. Safety Colors, Deep Base, and ultra-deep colors require a prime coat for maximum

durability, adhesion, and corrosion protection.

Zinc Primers - Refer to the zinc technical data sheet

application procedures and performance tips prior to

topcoating.

05/2021

www.sherwin-williams.com

continued on back

Pro Industrial™DTM Acrylic Semi-Gloss

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (In US) or contact your local health authority.

Do not use hydrocarbon solvents for cleaning.

Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Glossy surfaces should be sanded dull. Stains from water, smoke, ink, pencil, grease, etc. should be sealed with the appropriate primer-sealer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Iron & Steel - Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6. Primer recommended for best performance.

Aluminum - Remove all oil, grease, dirt, oxide and other foreign material per SSPC-SP1.

Galvanizing - Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1. When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP16 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

Concrete Block - Surface should be thoroughly clean and dry. All material and surface temperatures must be at least 55°F (12.7°C) before filling. Use Pro Industrial Heavy Duty Block Filler or Loxon Acrylic Block Surfacer. The filler must be thoroughly dry before topcoating.

Masonry - All masonry must be free of dirt, oil, grease, loose paint, mortar, masonry dust, etc. Clean per SSPC-SP13, Nace 6, ICR No. 310.2R, CSP 1-3. Poured, troweled, or tilt-up concrete, plaster, mortar, etc. must be thoroughly cured at least 30 days at 75°F. Form release compounds and curing membranes must be removed by brush blasting. Brick must be allowed to weather for one year prior to surface preparation and painting. Prime the area the same day as cleaned. Weathered masonry and soft or porous cement board must be brush blasted or power tool cleaned to remove loosely adhering contamination and to get to a hard, firm surface. Apply one coat Loxon Conditioner, following label recommendations.

Wood - Surface must be clean, dry, and sound. Prime with recommended primer. No painting should be done immediately after a rain or during foggy weather. Knots and pitch streaks must be scraped, sanded and spot primed before full coat of primer is applied. All nail holes or small openings must be properly caulked. Sand to remove any loose or deteriorated surface wood and to obtain a proper surface profile.

SURFACE PREPARATION

Previously Painted Surface - If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, additional abrasion of the surface and/or removal of the previous coating may be necessary. Retest surface for adhesion. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Mildew - Prior to attempting to remove mildew, it is always recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions may be advised.

Mildew may be removed before painting by washing with a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach-water solution.

PERFORMANCE

System Tested: (unless otherwise indicated)

Substrate: Steel
Surface Preparation: SSPC-SP10
Finish: 2 coats Pro Industrial DTM Acrylic
B66W01151, 3.0 D.F.T. per coat

Adhesion:
Method: ASTM D4541
Result: 1436 p.s.i.

Corrosion Weathering*:
Method: ASTM D5894, 7 cycles
Result: Rating 10, per ASTM D714 for Blistering, Rating 8.5 per ASTM D1654 for corrosion

Direct Impact Resistance:
Method: ASTM D2794
Result: greater than 175 inch lb.

Dry Heat Resistance:
Method: ASTM D2485
Result: 300°F

Flexibility:
Method: ASTM D522, 1/8 inch mandrel
Result: Pass

Humidity Resistance*:
Method: ASTM D4585, 2186 hours
Result: Rating 10 per ASTM D714 for blistering, Rating 10 per ASTM D1654 for corrosion

Pencil Hardness:
Method: ASTM D3363
Result: 2H

*over Pro Industrial Pro-Cryl Primer

No painting should be done immediately after a rain or during foggy weather. Do not paint on wet surfaces. Check adhesion by applying a test strip to determine the readiness for painting.

SAFETY PRECAUTIONS

Before using, carefully read CAUTIONS on label. Refer to the Safety Data Sheets (SDS) before use.

FOR PROFESSIONAL USE ONLY.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

CLEANUP INFORMATION

Clean spills, spatters, hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with compliant cleanup solvent to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using solvents.

HOTW 05/14/2021 B66W01151 21 35
FRC,SP

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative or visit www.paintdocs.com to obtain the most current version of the PDS and/or an SDS.

ProMar® 200 Zero V.O.C. Interior Latex Low Sheen Eg-Shel

B24-2600 Series



CHARACTERISTICS

ProMar 200 Zero V.O.C. Interior Latex Low Sheen Eg-Shel is a durable, professional quality, interior vinyl acrylic finish which dries to a soft, low angle sheen. ProMar 200 Zero V.O.C. Low Sheen Eg-Shel is recommended for use on walls, ceilings, of primed plaster, wallboard, wood, masonry, and primed metal.

Color: Most Colors

To optimize hide and color development, always use the recommended P-Shade primer

Coverage: 350 - 400 sq. ft. per gallon
@ 4 mils wet;
1.8 mils dry

Drying Time, @ 77°F, 50% RH:

Touch: 1 Hour

Recoat: 4 Hours

Drying and recoat times are temperature, humidity, and film thickness dependent

Finish: 25-30 units @ 85°

0-5 units @ 60°

Tinting with CCE only:

Base:	oz. per gallon	Strength:
High Ref White	0-6	SherColor
Extra White	0-7	SherColor
Deep Base	4-14	SherColor
Ultra Deep Base	10-12	SherColor
Real Red	0-12	SherColor
Bright Yellow	0-12	SherColor

Extra White B24W02651

(may vary by color)

V.O.C. (less exempt solvents):

less than 50 grams per litre; 0.42 lbs. per gallon
As per 40 CFR 59.406

Volume Solids: 44 ± 2%

Weight Solids: 60 ± 2%

Weight per Gallon: 11.69 lbs

Flash Point: N/A

Vehicle Type: Vinyl Acrylic

Shelf Life: 36 months unopened

WVP Perms (US): 64.08 grains/(hr ft² in Hg)

Anti-microbial

This product contains agents which inhibit the growth of mold and mildew on the surface of this paint film.

COMPLIANCE

As of 08/10/2020, Complies with:

OTC	Yes
OTC Phase II	Yes
SCAQMD	Yes
CARB	Yes
CARB SCM 2007	Yes
Canada	Yes
LEED® v4 & v4.1 Emissions	Yes
LEED® v4 & v4.1 V.O.C.	Yes
EPD-NSF® Certified	Yes
MIR-Product Lens Certified	Yes
MP1®	Yes

APPLICATION

Apply at temperatures above 50°F.

No reduction needed.

Brush:

Use a nylon-polyester brush.

Roller:

Use a 3/8 to 3/4 inch nap synthetic cover.

For specific brushes and rollers, please refer to our Brush and Roller Guide on sherwin-williams.com

Spray—Airless

Pressure: 2000 p.s.i.

Tip: .017-.021 inch

APPLICATION TIPS

Make sure product is completely agitated (mechanically or manually) before use.

Priming and application of two coats at the recommended film thickness can help where hiding of a previous coating or application to new drywall is a factor.

Using the same method of application and batch to touch up with as that originally used will help improve touch up.

When original application was by spray, preconditioning of touch up paint by running it through the spray tip will help touch up appearance.

SPECIFICATIONS

Block:

1 coat ConFlex Block Filler*

2 coats ProMar 200 Zero V.O.C. Interior Latex

Drywall:

1 coat ProMar 200 Zero V.O.C. Latex Primer

2 coats ProMar 200 Zero V.O.C. Interior Latex

Masonry:

1 coat Loxon Concrete & Masonry Primer*

2 coats ProMar 200 Zero V.O.C. Interior Latex

Plaster:

1 coat Loxon Concrete & Masonry Primer*

2 coats ProMar 200 Zero V.O.C. Interior Latex

Wood:

1 coat Premium Wall & Wood Primer*

2 coats ProMar 200 Zero V.O.C. Interior Latex

*These primers contain less than 50 grams per litre V.O.C.

Other primers may be appropriate.

When repainting involves a drastic color change, a coat of primer will improve the hiding performance of the topcoat color.

APPENDIX E. Building Automation Systems and Controls Project Checklist

The Contractor will include the following items in the plans and documentation for a successful BAS and Controls Project for the UTNG.

- A. The Contractor will submit shop drawings in groups to be reviewed at appropriate phases of the construction execution. Groups shall be established and submitted such that components and equipment requiring the longest lead time and/or greater coordination efforts are reviewed and approved first. A suggested grouping and order of submission is as follows:
 - 1. First Submission:
 - a. Proposed point names (prior to beginning any programming effort). Do not begin programming effort until the Owner has approved the point names
 - b. Main Valves and their actuators
 - c. Boilers, Chillers
 - d. AHU's, Heat Recovery Units
 - e. System Architecture and System Layout
 - 2. Second Submission
 - a. Unitary Controllers, VAV's
 - b. Dampers and their actuators
 - c. Air Flow Measuring Stations
 - d. Schematic Flow Diagrams
 - e. Schematic Diagrams
 - f. Points List
 - g. Sequences
 - h. Product Data of all control devices, panels, and accessories
 - 3. Third Submission
 - a. Graphics Pages
 - b. Programming: Block Diagram format and native program language with annotation and documentation.
 - c. Schematic Diagrams
 - d. Provide a power line diagram with quantity and location of transformers indicated on the diagram and plan review drawings.
- B. Shop Drawings: Submit Shop Drawings electronically on AutoCAD software for each control system, including a complete drawing for each air handling unit, system, pump, device, etc. with all point descriptors, addresses and point names indicated. Shop Drawings shall contain the following information:
 - 1. Cross-reference all control components and point names in a single table located at the beginning of the submittal with the identical nomenclature used in this section.
 - 2. Submittal shall include a trunk cable schematic diagram depicting operator workstations, control panel locations and a description of the communication type, media, and protocol.

3. System Architecture and System Layout: Provide One-line diagram indicating schematic locations of all control units, workstations, LAN interface devices, gateways, etc. Indicate Ethernet backbone number, network number, device ID, address, device instance, MAC address, object ID (object type, instance number), drawing reference number, and controller type for each control unit. Indicate media, protocol, baud rate, and type of each LAN. All optical isolators, repeaters, end-of-line resistors, junctions, ground locations etc. shall be located on the diagram. Include interface requirements with other systems, including but not limited to, security and surveillance systems, lighting control, elevator status, power monitoring systems and door access systems.

C: Provide floor plans locating all control units, workstations, servers, LAN interface devices, gateways, etc. Include all WAN and LAN communication wiring routing, power wiring, power originating sources, and low voltage power wiring. Indicate Ethernet network number, network number, device ID, address, device instance, MAC address, drawing reference number, and controller type for each control unit. Indicate media, protocol, baud rate, and type of each LAN. All optical isolators, repeaters, end-of-line resistors, junctions, ground locations etc. shall be located on the floor plans. Wiring routing as-built conditions shall be maintained accurately throughout the construction period and the drawing shall be updated to accurately reflect accurate, actual installed conditions.

D. POC's Name & Phone#:

1. Architect
2. Mechanical Engineer
3. Electrical Engineer
4. Controls Project Manager
5. Controls Foreman

E. Project Scope of Work (SOW):

Complete description of the work to be done, including the milestones, reports, deliverables, and end products that are expected to be provided by the contractor. The SOW should also contain a timeline for all deliverables.

F. Energy Code Documentation:

Currently 2018 IECC. A/E Team Code requirements

G: Lighting Controls:

Sweeping on/off control schedule

H. BAS Controls SOW:

100% all-encompassing system

I. Graphics Pages:

1. Named Correctly
2. Shortcuts to Trends
3. Links between related graphics
4. Links to DDC and Block Programming pages both to and from related pages
5. Adjustable setpoints for room, water, and air temperatures
6. Adjustable setpoints for speed
7. Manual control of actuators
8. Occupancy
9. % Loads (Equipment and VAV pages)
10. Equipment Identified on the floorplan and summary graphics with links, including the AHU/RTU serving the spaces
11. All Normal and Expected points for graphical user interface fluidity

J. Trends:

1. Labeled for End User
2. Meters
 - a. Flow
 - b. Power
3. Electrical Vehicle Charging Stations
 - a. KW's Used
 - b. Runtime
4. All Renewable Energy Equipment (Solar PV, Battery Energy Storage System, Wind Turbine, Ground Source Heat Pump, etc.)
 - a. KW's Produced
5. Equipment Points from Sequence of Operation (SOO)
 - a. Lead Lag Changeover
6. Outside Air
 - a. Temp
 - b. Humidity
7. Building Static Pressure
8. AHU/RTU
 - a. Fan Enable (Supply, Return, Relief)
 - b. Fan Status (Supply, Return, Relief)
 - c. Fan Speed (Supply, Return, Relief)
 - d. Damper Positions (Supply, Return, Relief)
 - e. Valve Positions
 - f. Heating and Cooling Loads
 - g. Temperature Sensors (Supply, Return, OAT, Mixed)
 - h. CO2
 - i. Hot and Cold Water Pump Enable
 - j. Hot and Cold Water Pump Status

- k. Occupancy
 - l. O-start
 - m. Supply Setpoint
 - n. Humidity
 - o. Duct static Pressure
 - p. Safeties
 - q. Dampers/Economizer
 - r. Runtime
9. Exhaust Fans
- a. Enable
 - b. Status
 - c. Speed
 - d. Runtime
10. Boilers
- a. Enable
 - b. Status
 - c. Alarms
 - d. Pumps Enable
 - e. Pumps Status
 - f. Pumps Speed
 - g. Pumps Alarm
 - h. Hot Water Differential Pressure
 - i. Hot Water Supply Temp
 - j. Hot Water Return Temp
 - k. Emergency Shut Off Switch/Safeties
 - l. Mixing Valve Position
 - m. Runtimes
11. Chiller
- a. Enable
 - b. Status
 - c. Alarms
 - d. Emergency Shut Off/Safeties
 - e. Compressor Enables
 - f. Compressor Status's
 - g. Supply Temperature
 - h. Return Temperature
 - i. Pumps Enable
 - j. Pumps Status
 - k. Pumps Speed
 - l. Differential Pressure
 - m. Mixing Valve
 - n. Runtimes
12. Cooling Tower

- a. Fans Enable
 - b. Fans Status
 - c. Fans Speed
 - d. Pumps Enable
 - e. Pumps Status
 - f. Pumps Speed
 - g. Supply Temp
 - h. Return Temp
 - i. Drain/Fill Valve
 - j. Differential Pressure
 - k. Runtimes
- 13. Generator
 - a. Runtime
 - b. Call to Run
- 14. UPS
 - a. Power
- 15. Automatic Transfer Switch
 - a. Switching
- 16. PV Array
 - a. KW Production
- 17. Geothermal
 - a. Running
 - b. Valve Position
 - c. Supply Temp
 - d. Return Temp
 - e. Differential Pressure
 - f. Pumps Enable
 - g. Pumps Status
 - h. Pumps Speed
- 18. Sequence of Operations (SOO):
- 19. AHU's
 - a. Economizer
 - b. O-start
 - c. Night Setback
 - d. Unoccupied
 - e. Timed Override
 - f. Demand Ventilation
- 20. RTU's
 - a. Economizer
 - b. O-start
 - c. Night Setback
 - d. Unoccupied
 - e. Timed Override

- f. Motion sensor
 - g. Demand Ventilation
- 21. Boilers
 - a. Outside Air Reset
 - b. Supply Temp
- 22. Chillers
 - a. Outside Air Reset
 - b. Supply Temp
- 23. Cooling Towers
 - a. Outside Air Reset
 - b. Supply Temp
- 24. Geothermal
 - a. Staging
- 25. Pumps
 - a. Pump Fail
 - b. Lead Lag
 - c. Differential Pressure
 - d. Pressure
 - e. Flow
 - f. Call to Run
- 26. Generator
 - a. Staging
- 27. Alarms:
- 28. AHU's/RTU's
 - a. Fan Failure (Supply, Return, Relief)
 - b. Freeze Stat
 - c. Dirty Filter
 - d. Safeties
 - e. Pump Fail (Cold and Hot Water)
 - f. High Temp
 - g. Low Temp
- 29. Boilers
 - a. Boiler Fail
 - b. Emergency Shut Down
 - c. High Temp
 - d. Low Temp
 - e. High Differential Pressure
 - f. Low Differential Pressure
 - g. Pump Fail
- 30. Chillers
 - a. Chiller Fail
 - b. Low Temp
 - c. High Temp

- d. Compressor Fail
 - e. Pump Fail
 - f. Summary
- 31. Cooling Tower
 - a. Fan Fail
 - b. Low Water
 - c. High Water
 - d. Low Temp
 - e. High Temp
 - f. Pump Fail
 - g. Pulse Pure Fail/Purifier/Filter
- 32. CO2 (AHU's, RTU's, Space)
 - a. High
- 33. Humidity
 - a. High
 - b. Low
- 34. Building Static Pressure
 - a. High
 - b. Low
- 35. Exhaust Fans
 - a. Fan Fail
- 36. AS Offline
- 37. Geothermal
 - a. Fail to Run
 - b. Pumps Fail
 - c. High Pressure
 - d. Low Pressure
 - e. High Temp
 - f. Low Temp
- 38. Meters
 - a. Low Flow
 - b. Power Fail
- 39. Generator
 - a. Call To Run
 - b. Fail to Run
 - c. Running
 - d. Fail to Stop
 - e. Low Fuel
 - f. High Temp
 - g. Low Temp
 - h. Fuel Spill
 - i. Summary
 - j. Closed Fuel Valves

40. Automatic Transfer Switch

- a. Fail to Close
- b. Fail to Open
- c. Open
- d. Closed

41. UPS

- a. Call to Run
- b. Fail to Run
- c. Fail to Stop
- d. Low Voltage

42. PV Array

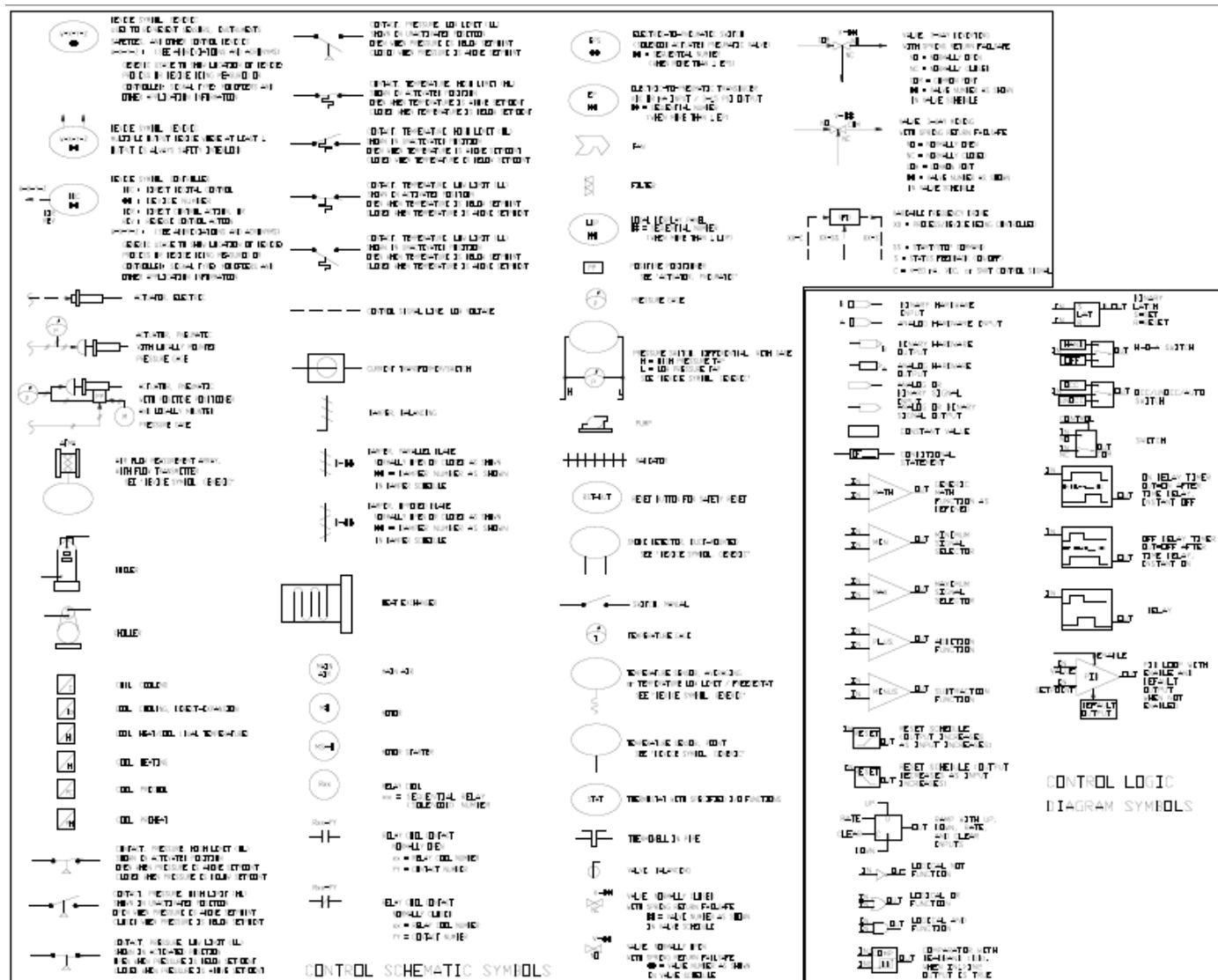
- a. Fail
- b. Low Voltage/Power

K. Project Folder Contents:

1. Inventory of equipment, meters, type of lights installed for project
2. Digital floorplans indicating location of equipment
 - a. Meters
 - b. Lights
 - c. T-stats
 - d. Control boards
 - e. Etc.
3. Digital O & M Manual
4. Mechanical drawings
 - a. Detail sheets and schedule of equipment
 - b. Settings of T-Stats, Water & Air Flows
 - c. Meters
5. Drag and Drop spec manual
6. Lighting plans & controllers
7. Sequences of Operations
8. Points trended
9. Master list of key alarms, priorities and #'s
10. Archive download of all programming
11. Project Closeout:
12. Complete checklist, create Building Folder
13. Controls Checkout
14. After Building Folder is checked for issues, send the Controls Group Manager an e-mail that project is complete
15. All Work Orders generated in Tracker

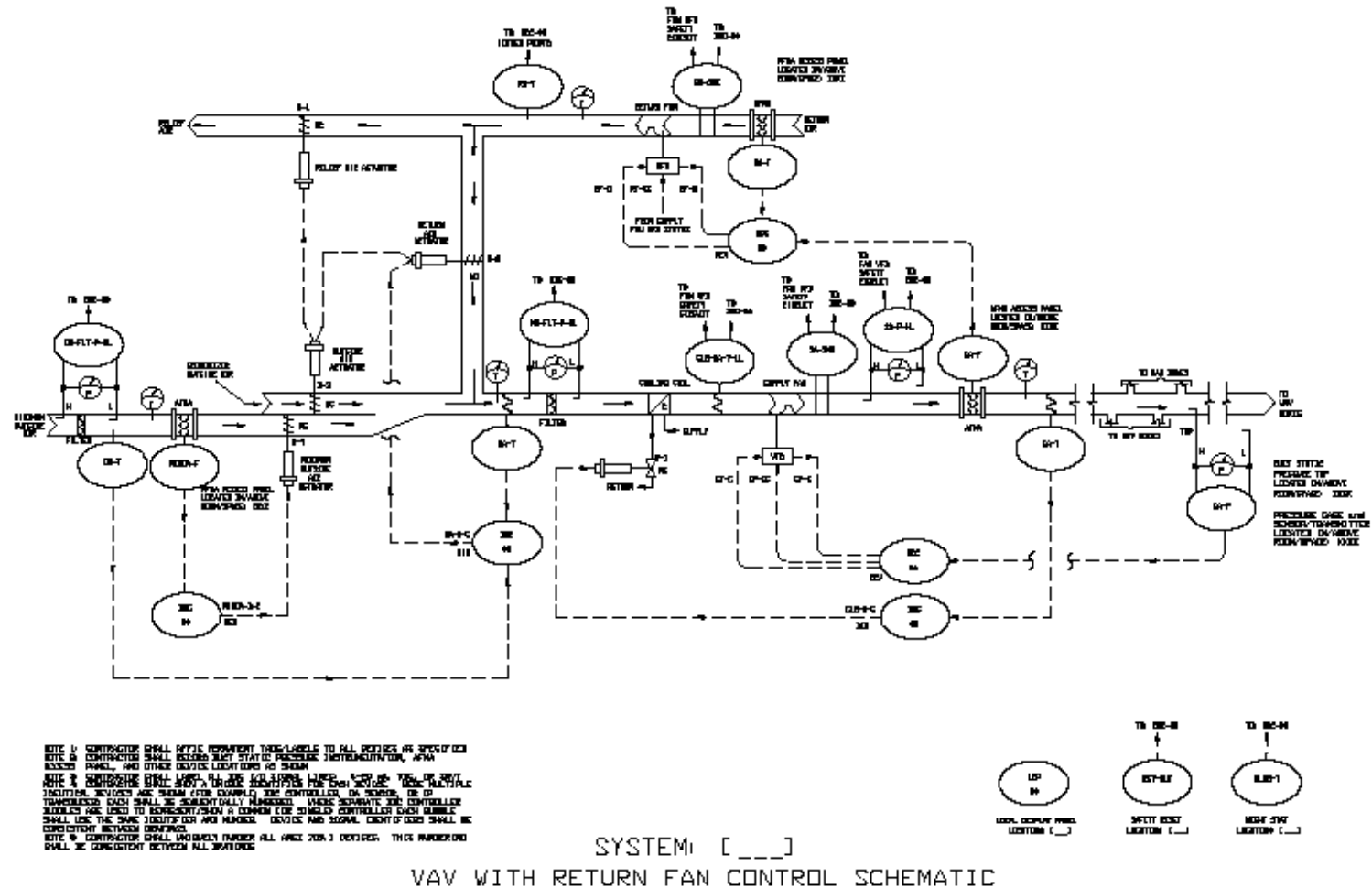


APPENDIX G. Building Automation Symbols Found in One-Line Drawings





APPENDIX H. One-Line Drawing of VAV with Return Fan





UTAH NATIONAL GUARD

CONSTRUCTION FACILITIES MANAGEMENT OFFICE



APPENDIX I. Building Automation Alarm Numbering and Formats

Alarm #	Alarm Description	Type	Trigger Integer	Upper Lmt	Low Lmt	Deadband	Monitored Variable	Reference Variable	Alarm Delay (s)	Reset Delay (s)	Shunt Variable 1	Operator	Shunt Variable 2
CHW System													
100	Chiller Fail	Out of Reference Range	N/A	0	0	0	Status Value	Enable Value	600	0	Outside Air Below 60 Alarm	AND	None
101	Chiller Mode	Multistate	1	N/A	N/A	N/A	Chiller Mode Value	N/A	600	0	Outside Air Below 60 Alarm	AND	None
102	Water Temp Off Setpoint	Out of Reference Range	N/A	5	5	0	Temp Value	Temp Setpoint	600	0	Outside Air Below 60 Alarm	AND	None
103	Water Level												
104	Pump Fail												
105	Low/High DWP	Out of Reference Range					Actual	Setpoint					
106	Runtime												
107	Pump Fail	Out of Reference Range		0	0		Status	Enable	600		Outside Air Below 60 Alarm		
111	Pulse Pure Fail/Purifier/Filter												
112	Compressor Fail												
113	Summary												
HW System													
120	Boiler Fail	Multistate	1	N/A	N/A	N/A	Fail Value	N/A	600	0	None	AND	
121	Emergency Shutdown/Safeties												
122	Low/High Water Temp	Out of Range	N/A	220	110	0	HW Temps	N/A	600	0	Outside Air Below 60 Alarm	AND	
123	Low/High Differential Water Pressure	Out of Range											
124	Pump Fail	Out of Reference Range	N/A	0	0	0	Status	Enable	600	0	None	AND	
125	Exhaust Fan Fail												
126	High Space Temp (Boiler/Mech Room)	Out of Range											
127	Runtime												
Geothermal													
130	Fail to Run												
131	Low/High Water Temp	Out of Range											
132	Low/High Differential Water Pressure	Out of Range											
133	Pump Fail												
134	Runtime												
Gen/ATS/UPS													
140	Gen Call to Run												
141	Gen Fail to Run												
142	Gen Running												
143	Gen Fail to Stop												
144	Gen Low Fuel												
145	Gen Low/High Temp	Out of Range											
146	Gen Fuel Spill												
147	Gen Summary												
148	Gen Closed Fuel Valve												
149	ATS Fail to Close												
150	ATS Fail to Open												
151	ATS Open												
152	ATS Closed												
153	UPS Call to Run												
154	UPS Fail to Run												
155	UPS Fail to Stop												
AHU/RTU/MAU													
160	Fan Fail (Supply, Return, Relief)	Out of Reference Range	N/A	0	0	0	Status Value	Enable Value	600	0	None	AND	None
161	Freeze Stat	Multistate	1	N/A	N/A	N/A	Freeze Stat Value	N/A	600	0	None	AND	None
162	Safeties	Out of Range											
163	Pump Fail	Out of Reference Range											
164	Low/High Supply & Mixed Air Temp	Out of Range	N/A	?	?		Supply/Mixed Temp Value	N/A	600	0	None	AND	None
165	Dirty Filter	Out of Range											
166	High Duct Static Pressure	Out of Range											
167	Runtime	Out of Range											
168	Low/High Space Temp	Out of Reference Range	N/A	10	10	0	Space Temp Value	Space Setpoint Value	600	0	(Invert) Occupancy Value	OR	Controller Fail Alarm (Evaluation State)
169	High CO2	Out of Range											
VAV/FCU/HP/RH/EF/VRF													
170	Low/High Space Temp	Out of Range	N/A	100	40	0	Space Temp Value	N/A	600	0	Controller Fail Alarm (Evaluation State)	AND	None
171	Low/High Supply CFM	Out of Range											
172	Fan Fail	Out of Reference Range	N/A	0	0	0	Status Value	Enable Value	600	0	None	AND	
173	Space Off Setpoint	Out of Reference Range	N/A	10	10	0	Space Temp Value	Space Setpoint Value	600	0	Occupancy Value	OR	Controller Fail Alarm (Evaluation State)
195	Outside Air Below 60	Out of Range	N/A	100	60	0	OSA Temp Value	N/A	600	0	None	AND	
196	Low/High Outside Air CO2	Out of Range											
197	Low/High Outside Air Temp	Out of Range											
198	Controller Offline	Multistate	0	N/A	N/A	N/A	Status	N/A	600	0	None	AND	
199	Automation Server Offline	Out of Range	0	24	0	0	Hour	N/A	600	300	None	AND	