

WOODBRIIDGE BOARD OF FIRE COMMISSIONERS - DISTRICT 9

REQUESTS FOR BIDS

FOR

HVAC UPGRADES TO ISELIN FIRE DISTRICT NO. 9 FIREHOUSE

BID OPENING: NOVEMBER 15, 2024

LOCATION:

**BOARD OF FIRE COMMISSIONERS WOODBRIDGE TOWNSHIP
BOARD OF FIRE COMMISSIONERS – ISELIN FIRE DISTRICT 9
BUSINESS ADMINISTRATION OFFICE
1222 GREEN STREET
ISELIN, NEW JERSEY 08830**

BID ADVERTISEMENT DATE: October 20, 2024.

PROPOSED BID AWARD DATE: TBD

**MIDDLESEX COUNTY
WOODBIDGE BOARD OF FIRE COMMISSIONERS - DISTRICT 9
NOTICE OF BID**

Sealed bids will be received by the Purchasing Agent for the Board of Fire Commissioners – Iselin Fire District 9 on **November 15, 2024** at **1:00 PM** prevailing time in Board of Fire Commissioners, Woodbridge Fire District 9 at which time and place bids will be opened and read in public for:

HVAC UPGRADES – FIRE DISTRICT NO. 9 FIREHOUSE

The BID is issued in accordance with the Code of the Woodbridge Board of Fire Commissioners – Iselin District 9 which requires that the Board of Fire Commissioners – Iselin District 9 utilize a fair and open procurement process in selecting professional services, including legal services. The BID also satisfies the requirements of the New Jersey Local Public Contracts Law.

The BID documents may be obtained from the Business Administrator at 1222 Green Street, Iselin, NJ 08830 between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, or can be downloaded from the district’s website: www.iselinfire.com

An **original copy of the response** to the BID must be submitted in a sealed envelope, clearly marked on the outside with the word, “HVAC Upgrades – Iselin Fire District 9”. In addition, Respondents must provide **a copy of their submission on a flash drive in Word or PDF format.** Responses must be addressed to: Purchasing Agent, Woodbridge Board of Fire Commissioners - District 9, 1222 Green Street, Iselin New Jersey 08830 to be received no later than **1:00 PM prevailing time on November 15, 2024.**

Respondents are required to comply with the requirements of P.L. 1975, c.127 (Affirmative Action Program, Equal Employment Opportunity), N.J.S.A. 10:5-31 et.seq. and N.J.S.A. 17:27 et.seq. (contract Compliance and Equal Opportunities in Public Contracts); N.J.S.A. 52:25-24.2, Disclosure of Interest; N.J.S.A. 52:32-44, State Contractor Business Registration Program; and P.L. 2012, C.25, Disclosure of Investments with Iran, Activities in Russia or Belarus, Pursuant to P.L.2022, C.3; New Jersey Prevailing Wage Act N.J.S.A. 34:11-56.25 Et Seq., all as amended and supplement.

The Board of Fire Commissioners – Iselin District 9 - reserves the right to consider submitted Responses for sixty (60) days after receipt, and further reserves the right to reject all Responses, waive informalities, and make an award or take any other action as may be in the best interest of the Board of Fire Commissioners – Iselin District 9, consistent with applicable law.

Any Bid Addenda will be issued on the district’s website and processed in accordance with N.J.S.A. 40A:11-23(c)(1). All interested bidders should check the website from now through bid opening. It is the sole responsibility of the respondent to be knowledgeable of all addenda related to this procurement.

Maria J. Rivera, RPPS, QPA
Purchasing Agent
purchasingd9@yahoo.com

**BOARD OF FIRE COMMISSIONERS WOODBRIDGE TOWNSHIP
FIRE DISTRICT 9
GENERAL INSTRUCTIONS**

1. SUBMISSION OF BIDS

- A. Sealed bids shall be received in accordance with public advertisement as required by law, a copy of said notice being attached hereto and made a part of these specifications.
- B. Each bid shall be submitted on the proposal form attached, in a sealed envelope
- (1) Addressed to the Purchasing Agent
 - (2) Bearing the name and address of the bidder on the outside
 - (3) Clearly marked "BID" with the name of the item(s) being bid. Provide One (1) Original & One (1) copy of the bid. **Faxed or emailed bids will NOT be accepted.**
- C. It is the bidder's responsibility to see that bids are presented to the Purchasing Agent on the hour and at the place designated. Bids may be hand delivered or mailed; however, the Board of Fire Commissioners, Iselin Fire District 9 disclaims any responsibility for bids forwarded by regular or express mail. **If the bid is sent by express mail, the designation in B. above must also appear outside of the express company envelope.** Bids received after the designated time and date will be returned unopened.
- D. The Board of Fire Commissioners for Iselin Fire District 9 reserves the right to postpone the date for presentation and opening of bids and will give written notice of any such postponement to each perspective bidder as required by law.
- E. Sealed bids forwarded to the owner before the time of opening of bids may be withdrawn upon written application of the bidder who shall be required to produce evidence showing that the individual is or represents the principal or principals involved in the bid. Once bids have been opened, they shall remain firm for a period of sixty (60) calendar days.
- F. Each bid proposal form must give the full business address, business phone, fax, e-mail, the contact person of the bidder, and be signed by an authorized representative as follows:
- Bids by partnerships must be signed in the partnership name by one of the members of the partnership or by an authorized representative followed by the signature and designation of the person signing.
 - Bids by corporations must be signed in the legal name of the corporation, followed by the name of the State in which incorporated and must contain the signature and designation of the president, secretary or other person authorized to bind the corporation in the matter.
 - Bids by sole-proprietorship shall be signed by the proprietor.
 - When requested, satisfactory evidence of the authority of the officer signing shall be furnished.
- G. Multiple Bids Not Accepted
More than one bid from an individual, a firm or partnership, a corporation or association under the same or different names shall not be considered.
- H. Official Request for Bid packages are available from the Board of Fire Commissioners at the Iselin Fire District 9 website at www.iselinfire.com at no cost to the prospective bidders. All addenda are posted on the Board of Fire Commissioners for Iselin Fire District 9's website and issued in accordance with N.J.S.A. 40A:11-23(c)(1). Potential bidders are cautioned that they are bidding at their own risk if a third party supplied the specifications that may or may not be complete. The Board of Fire Commissioners, Iselin Fire District 9 is not responsible for third party supplied specifications.
- I. Results of all bids are posted on the Board of Fire Commissioners for Iselin Fire District 9 website.

2. BID SECURITY

The following provisions, *if indicated by an (x)*, shall be applicable to this bid and be made a part of the bidding documents:

A. BID GUARANTEE

Bidder shall submit with the bid a certified check, cashier's check or bid bond in the amount of ten percent (10%) of the total price bid, but not in excess of \$20,000, payable unconditionally to the Board of Fire Commissioners, Iselin Fire District 9.

When submitting a Bid Bond, it shall contain Power of Attorney for full amount of Bid Bond from a surety company authorized to do business in the State of New Jersey and acceptable to the Board of Fire Commissioners, Iselin Fire District 9.

The check or bond of the unsuccessful bidder(s) shall be returned as prescribed by law. The check or bond of the bidder to whom the contract is awarded shall be retained until a contract is executed and the required performance bond or other security is submitted.

The check or bond of the successful bidder shall be forfeited if the bidder fails to enter into contract pursuant to statute. Failure to submit the required guarantee shall be cause for rejection of the bid.

B. CONSENT OF SURETY

Bidder shall submit with the bid a Certificate (Consent of Surety) with Power of Attorney for full amount of bid price from a Surety Company authorized to do business in the State of New Jersey and acceptable to the Board of Fire Commissioners, Iselin Fire District 9 stating that it will provide said bidder to whom the contract is awarded will furnish Performance and Payment Bonds from an acceptable surety company on behalf of said bidder, in performance security equal to the total amount of the contract, pursuant to statute.

Failure to submit this shall be the cause for rejection of the bid.

C. PERFORMANCE BOND

Successful bidder shall simultaneously with the delivery of the executed contract, submit an executed bond in the amount of one hundred percent (100%) of the acceptable bid as security for the faithful performance of this contract.

The performance bond provided shall not be released until final acceptance of the whole work and then only if any liens or claims have been satisfied. The surety on such bond or bonds shall be a duly authorized surety company authorized to do business in the State of New Jersey pursuant to N.J.S.A. 17:31-5. For multi-year contracts, the Performance Bond may be resubmitted each year on the Contract Anniversary Date for the amount remaining on the contract.

Failure to submit this with the executed contract shall be cause for declaring contract null and void pursuant to N.J.S.A. 40A:11-22.

D. LABOR AND MATERIAL (PAYMENT) BOND

The successful bidder shall with the delivery for the performance bond submit an executed payment bond to guarantee payment to laborers and suppliers for the labor and material used in the work performed under the contract.

Failure to submit a labor and material bond with the performance bond shall be cause for declaring the contract null and void.

E. MAINTENANCE BOND

Upon acceptance of the work by the Board of Fire Commissioners, Iselin Fire District 9, the contractor shall submit a maintenance bond (N.J.S.A. 40A:1-16.3) in an amount not to

exceed 100% of the project costs guaranteeing against defective quality of work or materials for the period of:

- 1 Year
 2 Years

3. PREPARATION OF BIDS (PRICING INFORMATION AND FORMS)

A. (1) The Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 is exempt from any local, state or federal sales, use or excise tax. The Board of Fire Commissioners, Iselin Fire District 9 will not pay for New Jersey State Sales and Use Tax that are included in any invoices. The Board of Fire Commissioners, Iselin Fire District 9 will not pay service charges such as interest and late fees.

(2) The Board of Fire Commissioners, Woodbridge Township - Fire District 9 or any of its offices and divisions will not complete credit applications as a result of contract(s) resulting from award based on these specifications.

The Board of Fire Commissioners, Woodbridge Township - Fire District 9 is rated by:
Standard & Poor's Rating Group: AAA
Moody's Investors Services: AAA

- B. Bids shall be ***signed in ink*** (Original Signature Required) by the bidder, all quotations shall be made with a typewriter/computer or pen and ink. Any quotation showing any erasure alteration must be initialed by the bidder in ink. Unit prices and totals are to be inserted in spaces provided.
- C. Failure to sign and give all information in the bid may result in the bid being rejected.
- D. ***Estimated Quantities*** (Open-Ended Contracts, Purchase as Needed) The Board of Fire Commissioners, Iselin Fire District 9 has attempted to identify the item(s) and the estimated amounts of each item bid to cover its requirements; however, past experience shows that the amount ordered may be different than that submitted for bidding. The right is reserved to decrease or increase the quantities specified in the specifications pursuant to N.J.A.C. 5:30-11.2 and 11.10. ***NO MINIMUM PURCHASE IS IMPLIED OR GUARANTEED.***
- E. Bidders shall insert prices for furnishing goods and services required by these specifications. Prices shall be net including any charges for packing, crating, containers etc. All transportation charges shall be fully prepaid by the contractor, F.O.B. destination and placement at locations specified by the Board of Fire Commissioners, Iselin Fire District 9. No additional charges will be allowed for any transportation costs resulting from partial shipments made at the vendor's convenience when a single shipment is ordered.
- F. Any bidder may withdraw his bid at any time before the time set for receipt of bids. No bid may be withdrawn in the 60-day period after the bids are received.
- G. All forms shall be completed and attached to the bid proposal. ***BIDDER IS ALERTED TO THE BID DOCUMENT CHECKLIST PAGE.***
- H. Results of all bids are posted on the Board of Fire Commissioners, Iselin Fire District 9 website www.iselinfire.com

4. INTERPRETATIONS AND ADDENDA

- A. The bidder understands and agrees that its bid is submitted on the basis of the specifications prepared by the Board of Fire Commissioners, Iselin Fire District 9. The bidder accepts the obligation to become familiar with these specifications.
- B. Bidders are expected to examine the specifications and related documents with care and observe all their requirements. Ambiguities, errors or omissions noted by bidders should be promptly reported in writing to the Purchasing Agent. In the event the bidder fails to

notify the Board of Fire Commissioners, Iselin Fire District 9 of such ambiguities, errors or omissions, the bidder shall be bound by the bid.

- C. No oral interpretation of the meaning of the specifications will be made to any bidder. Every request for an interpretation shall be in writing, addressed to the Purchasing Agent, referencing the Contract Name and Contract Number in the subject line, at bdofd9@comcast.net. In order to be given consideration, written requests for interpretation and or clarification must be received at last three (3) business days prior to the date fixed for the opening of the bids.
- D. All interpretations, clarifications and any supplemental instructions will be in the form of written addenda to the specifications, and will be distributed to all prospective bidders. All addenda so issued shall become part of the specification and bid documents, and shall be acknowledged by the bidder by completing the Acknowledgement of Receipt of Addenda form. The Board of Fire Commissioners for Iselin Fire District 9 interpretations or corrections thereof shall be final.

Pursuant to N.J.S.A. 40A:11-23(c)(1) when issuing addenda, the owner shall provide required notice prior to official receipt of bids to any person who has submitted a bid or who has received a bid package. They will be sent via electronic transmissions to those known recipients of the bid specifications.

- E. Discrepancies in Bids
 - 1. If the amount shown in words and its equivalent figures do not agree, the written words shall be binding. Ditto marks are not considered writing or printing and shall not be used.
 - 2. In the event that there is a discrepancy between the unit prices and the extended totals, the unit price shall prevail. In the event there is an error of the summation of the extended totals, the computation by the Board of Fire Commissioners, Iselin Fire District 9 of the extended totals shall govern.

5. **BRAND NAMES, STANDARDS OF QUALITY AND PERFORMANCE**

- A. Brand names and or descriptions used in this bid are to acquaint bidders with the type of commodity desired and will be used as a standard by which alternate or competitive materials offered will be judged. Competitive items must be equal to the standard described and be of the same quality of work.
- B. Variations between the goods and services described and the goods and services offered are to be fully identified and explained by the bidder on a separate sheet and submitted with the bid proposal form. Vendor's literature **will not** suffice in explaining exceptions to these specifications. In the absence of any exceptions by the bidder, it will be presumed and required that materials as described in the proposal be delivered.
- C. It is the responsibility of the bidder to demonstrate the equivalency of goods and services offered. The Board of Fire Commissioners, Iselin Fire District 9 reserves the right to evaluate the equivalence of a product which, in its deliberations, meets its requirements.
- D. In submitting its bid, the bidder certifies that the goods or services to be furnished will not infringe upon any valid patent or trademark and that the successful bidder shall, at its own expense, defend any and all actions or suits charging such infringement, and will save the Board of Fire Commissioners, Iselin Fire District 9 harmless from any damages resulting from such infringement.
- E. Only manufactured and farm products of the United States, wherever available, shall be used pursuant to N.J.S.A. 40A:11-18.

- F. Wherever practical and economical to the Board of Fire Commissioners, Iselin Fire District 9, it is desired that recycled or recyclable products be provided. Please indicate when recycled products are being offered.
- G. The contractor shall guarantee any or all goods and services supplied under these specifications. Defective or inferior goods shall be replaced at the expense of the contractor. The contractor will be responsible for return freight or restocking charges.

6. METHOD OF CONTRACT AWARD

- A. The Board of Fire Commissioners, Iselin Fire District 9 reserves the right to accept or reject any or all bids, to waive identified irregularities and technicalities, and to award in whole or in part to the lowest responsible bidder, if it is in the best interest of the Board of Fire Commissioners, Iselin Fire District 9 to do so. Without limiting the generality of the foregoing, any bid which is incomplete, obscure, or irregular may be rejected, any bid having erasures or corrections in the price sheet may be rejected, any bid in which unit prices are omitted, or in which unit/total prices are unbalanced, may be rejected, any bid accompanied by any insufficient or irregular certified check, cashier's check or bid bond may be rejected.
- B. The Board of Fire Commissioners, Iselin Fire District 9 further reserves the right to award each item separately to the lowest responsible bidder meeting specifications or to make an award based on the total bid to the bidder whose total sum is the low bid meeting the specifications, whichever in the awarding authorities' opinion is in the best interest of the Board of Fire Commissioners, Iselin Fire District 9. Without limiting the generality of the foregoing, the Board of Fire Commissioners, Iselin Fire District 9 reserves the right to award a contract based on either option that may be described in the bid proposal or based on any combination thereof.
- C. The Board of Fire Commissioners, Iselin Fire District 9 may also elect to award the contract on the basis of unit prices.
- D. The Board of Fire Commissioners, Iselin Fire District 9 reserves the right to award equal or tie bids at their discretion to any one of the tie bidders.
- E. Should the bidder to whom the contract is awarded, fail to enter into a contract, the Board of Fire Commissioners, Iselin Fire District 9 may then, at its option, accept the bid of the next lowest responsible bidder.
- F. The effective period of this contract will be three (3) years unless otherwise noted in the specifications. Continuation of the terms of this contract beyond the fiscal year is contingent on availability of funds in the following year's budget. In the event of unavailability of such funds, the Board of Fire Commissioners, Iselin Fire District 9 reserves the right to cancel this contract.
- G. The form of contract shall be submitted by the Board of Fire Commissioners, Iselin Fire District 9, to the successful bidder. Terms of the specifications/bid package prevail. Bidder exceptions must be formally accepted by the Board of Fire Commissioners, Iselin Fire District 9; material exceptions shall not be approved.
- H. Government entities are not private business/consumer clients; therefore, separate company agreements are not honored. Terms of the specifications/bid package prevail unless otherwise noted by the vendor as exceptions.

7. CAUSES FOR REJECTING BIDS

Bids may be rejected for any of the following reasons:

- A. All bids pursuant to N.J.S.A. 40A:11-13.2;

- B. If more than one bid is received from an individual, firm or partnership, corporation or association under the same name.
 - C. Multiple bids from an agent representing competing bidders.
 - D. The bid is inappropriately unbalanced.
 - E. If the successful bidder fails to enter into a contract within 21 days, Sundays and holidays are excepted, or as otherwise agreed upon by the parties to the contract. In this case at its option, the Board of Fire Commissioners, Iselin Fire District 9 may accept the bid of the next lowest responsible bidder. (N.J.S.A. 40A:11-24b)
8. **NEW JERSEY PREVAILING WAGE ACT (When Applicable) N.J.S.A. 34:11-56.25 et seq.** Pursuant to N.J.S.A. 34:11-56.25 et seq, contractors on projects for public work shall adhere to all requirements of the New Jersey Prevailing Wage Act. The contractor shall be required to submit a certified payroll record to the owner within ten (10) days of the payment of wages. The contractor is also responsible for obtaining and submitting all subcontractors' certified payroll records within the aforementioned time period. The contractor shall submit said certified payrolls in the form set forth in N.J.A.C. 12:60-6.1(c). It is the contractor's responsibility to obtain any additional copies of the certified payroll form to be submitted by contacting the New Jersey Department of Labor and Workforce Development, Division of Workplace Standards. Additional information is available at https://www.nj.gov/labor/wagehour/wagerate/wage_rates.html.
9. **THE PUBLIC WORKS CONTRACTOR REGISTRATION ACT—N.J.S.A. 34:11-56.48 et seq.** N.J.S.A. 34:11-56.48 et seq. requires that a general or prime contractor and any listed subcontractors named in the contractor's bid proposal shall possess a certificate at the time the bid proposal is submitted. After bid proposals are received and prior to award of contract, the successful contractor shall submit a copy of the contractor's certification along with those of all listed subcontractors. All non-listed subcontractors and lower tier sub-subcontractors shall be registered prior to starting work on the project. It is the general contractor's responsibility that all non-listed sub-contractors at any tier have their certificate prior to starting work on the job.

Under the law a "contractor" is "a person, partnership, association, joint stock company, trust, corporation or other legal business entity or successor thereof who enters into a contract" which is subject to the provisions of the New Jersey Prevailing Wage Act (N.J.S.A. 34: 11-56.25, et seq.) It applies to contractors based in New Jersey or in another state.

The law defines "public works projects" as contracts for "public work" as defined in the Prevailing Wage statute (N.J.S.A. 34:11-56.25(5)). The term means:

- "Construction, reconstruction, demolition, alteration, or repair work, or maintenance work, including painting and decorating, done under contract and paid for in whole or in part out of the funds of a public body, except work performed under a rehabilitation program.
- "Public work" shall also mean construction, reconstruction, demolition, alteration, or repair work, done on any property or premises, whether or not the work is paid for from public funds..."
- "Maintenance work" means the repair of existing facilities when the size, type or extent of such facilities is not thereby changed or increased. While "maintenance" includes painting and decorating and is covered under the law, it does not include work such as routine landscape maintenance or janitorial services.

To register, a contractor must provide the State Department of Labor and Workforce Development with a full and accurately complete application form. The form is available online at https://www.nj.gov/labor/wagehour/regperm/pw_cont_reg.html.

N.J.S.A. 34:11-56.55 specifically prohibits accepting applications for registration as a substitute for a certificate or registration.

10. NON-COLLUSION AFFIDAVIT – N.J.S.A. 52:34-15

The Non-Collusion Affidavit, which is part of these specifications, shall be properly executed and submitted intact with the proposal.

11. NEW JERSEY ANTI-DISCRIMINATION – N.J.S.A. 10:2-1

There shall be no discrimination against any employee engaged in the work required to produce the goods and services covered by any contract resulting from this bid, or against any applicant to such employment because of race, religion, sex, national origin, creed, color, ancestry, age, marital status, affectional or sexual orientation, familial status, liability for service in the Armed Forces of the United States, or nationality. This provision shall include, but not be limited to the following: employment upgrading, demotion, transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The contractor shall insert a similar provision in all subcontracts for services to be covered by any contract resulting from this bid.

12. MANDATORY EEO/AFFIRMATIVE ACTION EVIDENCE – N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17-27 et seq.

No firm may be issued a contract unless it complies with the affirmative action provisions of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27-1 et seq. as administered by the Division of Purchase & Property Contract Compliance and Audit Unit (Division) and provided below. The contract will include the language included as attachment A in this specification.

1. Goods, Professional Services and Service Contracts

Each contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

i. A Letter of Federal Approval indicating that the vendor is under an existing federally approved or sanctioned affirmative action program. A copy of the letter must be provided by the vendor to the Public Agency and Division. This letter of approval is valid for one year from the date of issuance.

ii. A Certificate of Employee Information Report (hereafter "Certificate"), issued in accordance with N.J.A.C. 17:27 et seq. The vendor must provide a copy of the Certificate to the Public Agency as evidence of its compliance with the regulations. The Certificate represents the review and approval of the vendor's Employee Information Report, Form AA-302 by the Division

iii. The successful bidder shall complete an Initial Employee Report, Form AA-302 and submit it to the Division with a check or money order for \$150.00 made payable to "Treasurer, State of New Jersey" www.state.nj.us/treasury/contract_compliance

2. Construction Contracts

All successful contractors shall complete and submit an Initial Project Manning Report (AA201-available on-line at www.state.nj.us/treasury/contract_compliance upon notification of award. Proper completion and submission of this Report shall constitute evidence of the contractor's compliance with the regulations. Failure to submit this form may result in the contract being terminated. The contractor also agrees to submit a copy of the Monthly Project Workforce Report, Form AA-202 once a month thereafter for the duration of the contract to the Department of LWD and to the Public Agency.

13. AMERICANS WITH DISABILITIES ACT OF 1990 – 42 U.S.C. S121 01 et seq.

Discrimination on the basis of disability in contracting for the purchase of goods and services is prohibited. Bidders are required to read Americans with Disabilities language that is included in this specification and agree that the provisions of Title II of the Act are made a part of the

contract. The contractor is obligated to comply with the Act and to hold the Board of Fire Commissioners, Iselin Fire District 9 harmless.

14. WORKER AND COMMUNITY RIGHT TO KNOW ACT – N.J.S.A. 34:5A-1 et seq.

The manufacturer or supplier of chemical substances or mixtures shall label them in accordance with the N.J. Worker and Community Right to Know Law (N.J.S.A. 34:5A-1 et seq., and N.J.A.C. 5:89-5 et seq.).

All direct use containers shall bear a label indicating the chemical name(s) and Chemical Abstracts Service number(s) of all hazardous substances in the container, and all other substances which are among the five most predominant substances in the container, or their trade secret registry number(s). (N.J.A.C. 8:59-5) or adhere to the requirements of The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and the U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (HCS) as outlined in the Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations as adopted in the final rule by DEPARTMENT OF LABOR, Occupational Safety and Health Administration, 29 CFR Parts 1910, 1915, and 1926, {Docket No. OSHA-H022K-2006-0062, (formerly Docket No. H022K)}, RIN 1218-AC20, Hazard Communication. Further, all applicable documentation must be furnished.

15. OWNERSHIP DISCLOSURE– N.J.S.A. 52:25-24.2 (P.L. 1977 c.33)

N.J.S.A. 52:25-24.2 provides that no business organization, regardless of form of ownership, shall be awarded any contract for the performance of any work or the furnishing of any goods and services, unless, **prior to the receipt of the bid or accompanying the bid** of said business organization, bidders shall submit a statement setting forth the names and addresses of all persons and entities that own ten percent or more of its stock or interest of any type at all levels of ownership. The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member exceeding the ten percent ownership, have been listed.

The State of Ownership included shall be completed and attached to the bid proposal. This requirement applies to all forms of business organizations, including, but not limited to, corporations and partnerships, publicly owned corporations, limited partnerships, limited liability corporations, limited liability partnerships, sole proprietorship, and Subchapter S corporations. Failure to submit a disclosure document shall result in rejection of the bid as it cannot be remedied after bids have been opened.

Not-for-profit entities should fill in their name, check the not-for-profit box, and certify the form. No other information is necessary.

16. INSURANCE AND INDEMNIFICATION

If it becomes necessary for the contractor, either as principal or by agent or employee, to enter upon the premises or property of the owner in order to construct, erect, inspect, make delivery or remove property hereunder, the contractor hereby covenants and agrees to take use, provide and make all proper, necessary and sufficient precautions, safeguards, and protection against the occurrence of happenings of any accident, injuries, damages, or hurt to person or property during the course of the work herein covered and be his/her sole responsibility.

The contractor further covenants and agrees to indemnify and save harmless the owner from the payment of all sums of money or any other consideration(s) by reason of any, or all, such accidents, injuries, damages, or hurt that may happen or occur upon or about such work and all fines, penalties and loss occurred for or by reason of the violation of any owner regulation, ordinance or the laws of the State, or the United States while said work is in progress.

The contractor shall maintain sufficient insurance to protect against all claims under Workers Compensation, General Liability and Automobile and shall be subject to approval for adequacy of protection and certificates of such insurance shall be provided with the owner named as additional insured.

A. Insurance Requirements

Worker's Compensation and Employer's Liability Insurance

This insurance shall be maintained in full force during the life of this contract by the bidder covering all employees engaged in performance of this contract pursuant to N.J.S.A. 34:15-12(a) and N.J.A.C. 12:35-1.6. Minimum Employer's Liability \$1,000,000.00

General Liability Insurance

This insurance shall have limits of not less than \$1,000,000.00 any one person and \$1,000,000.00 any one accident for bodily injury and \$1,000,000.00 aggregate for property damage, and shall be maintained in force during the life of the contract.

Automobile Liability Insurance

This insurance covering bidder for claims arising from owned, hired and non-owned vehicles with limits of not less than \$1,000,000.00 any one person and \$1,000,000.00 any one accident for bodily injury and \$1,000,000.00 each accident for property damage, shall be maintained in force during the life of this contract by the bidder.

B. Certificates of the Required Insurance

Certificates as listed above shall be submitted along with the contract as evidence covering Comprehensive General Liability, Comprehensive Automobile Liability, and where applicable, necessary Worker's Compensation and Employer's Liability Insurance. Such coverage shall be with acceptable insurance companies operating on an admitted basis in the State of New Jersey and shall name the OWNER as an additional insured.

Self-insured contractors shall submit an affidavit attesting to their self-insured coverage and shall name the OWNER as an additional insured.

C. Indemnification

The Contractor agrees to indemnify and save harmless the Board of Fire Commissioners, Iselin Fire District 9, its officers, agents and employees, from all claims, suits or actions, and damages or costs of every name and description to which the owner may be subjected or put by reason of injury to the person or property of another, or the property of the owner, resulting from:

- a) negligent acts or missions on the part of the contractor, the contractor's agents, servants or subcontractors in the delivery of goods and services, or in the performance of the work under the contract; and,
- b) the use of any copyrighted or copyrighted composition, valid trademark, secret process, patented or unpatented invention or article furnished or used in the performance of this contract.

The Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9, will not accept Mutual Limitation of Liability terms.

17. TERMINATION

- A. If, through any cause, the contractor shall fail to fulfill in a timely manner obligations under the contract or if the contractor shall violate any of the requirements of the contract, the Board of Fire Commissioners, Iselin Fire District 9 shall there upon have the right to terminate the contract by giving written notice to the contractor of such termination and specifying the effective date of termination. Such termination shall relieve the Board of Fire Commissioners, Iselin Fire District 9 of any obligation for balances to the contractor of any sum or sums set forth in the contract. The Board of Fire Commissioners, Iselin Fire District 9 will pay for goods and services accepted prior to termination.

- B. Notwithstanding the above, the contractor shall not be relieved of liability to the Board of Fire Commissioners, Iselin Fire District 9 for damages sustained by the Board of Fire Commissioners, Iselin Fire District 9 by virtue of any breach of the contract by the contractor and the Board of Fire Commissioners, Iselin Fire District 9 may withhold any payments to the contractor for the purpose of compensation until such time as the exact amount of the damage due the Board of Fire Commissioners, Iselin Fire District 9 from the contractor is determined.
- C. The contractor agrees to indemnify and hold the Board of Fire Commissioners, Iselin Fire District 9, harmless from any liability to subcontractors/suppliers concerning payment for work performed or goods supplied arising out of the lawful termination of the contract by the Board of Fire Commissioners, Iselin Fire District 9 under this provision.
- D. In case of default by the contractor, the Board of Fire Commissioners, Iselin Fire District 9, may procure the goods and services from other sources and hold the contractor responsible for any excess cost.
- E. Continuation of the terms of the contract beyond the fiscal year is contingent on availability of funds in the following year's budget. In the event of the unavailability of such funds, the Board of Fire Commissioners, Iselin Fire District 9 reserves the right to cancel the contract.
- F. It is understood by all parties that if, during the life of the contract, the contractor disposes of his/her business concern by acquisition, novation, merger, sale and/or transfer or by any means convey his/her interest(s) to another party, all obligations are transferred to the new party. In this event, the new owner(s) will be required to submit all documentation/legal instruments that were required in the original bid/contract. Any changes shall be approved by the Board of Fire Commissioners, Iselin Fire District 9.
- G. The contractor will not assign any interest in the contract and shall not transfer any interest in the same without the prior written consent of the Board of Fire Commissioners, Iselin Fire District 9.
- H. The Board of Fire Commissioners, Iselin Fire District 9 may terminate the contract for convenience by providing sixty (60) calendar days advanced notice to the contractor.
- I. The contractor shall maintain all documentation related to products, transactions or services under this contract for a period of five years from the date of final payment. Such records shall be available to the New Jersey Office of the State Comptroller upon request.
- J. For contracts that exceed one year, each fiscal year payment obligation of the Board of Fire Commissioners, Iselin Fire District 9 is conditioned upon the availability of the Board of Fire Commissioners, Iselin Fire District 9 funds appropriated or allocated for the payment of such an obligation. If funds are not allocated and available for the continuance of any services performed by the bidder awarded the contract (contractor) hereunder, whether in whole or in part, the Board of Fire Commissioners, Iselin Fire District 9 at the end of any fiscal year may terminate such services. The Board of Fire Commissioners, Iselin Fire District 9 will notify the contractor in writing immediately of any services that will be affected by a shortage of appropriated funds. This provision shall not be construed to permit the Board of Fire Commissioners, Iselin Fire District 9, to terminate the contract during the term, or any service hereunder, merely to acquire identical services from another contractor.
- J. Neither party shall be responsible for any resulting loss or obligation to fulfill duties as specified in any of the terms or provisions of a contract if the fulfillment of any term or provision of the contract is delayed or prevented by any revolutions, insurrections, riots, wars, acts of enemies, national emergencies, strikes, floods, fires, acts of God, or by any cause not within the control of the party whose performance is interfered with which by the exercise of reasonable diligence such party is unable to prevent. Additionally, if the

fulfillment of any of the terms and provisions of the contract is delayed or prevented by any court order, or action or injunction or other such agreement, the contract shall become voidable by the Board of Fire Commissioners, Iselin Fire District 9 by notice to the parties.

18. ACQUISITION, MERGE, SALE AND/OR TRANSFER OF BUSINESS, ETC.

It is understood by all parties that if, during the life of the contract, the contractor disposes of his/her business concern by acquisition, merger, sale and/or transfer or by any means convey his/her interest(s) to another party, all obligations are transferred to that new party. In this event, the new owners(s) will be required to submit, when required, a performance bond in the amount of the open balance of the contract.

19. ADDITIONS/DELETIONS OF SERVICE

The Board of Fire Commissioners, Iselin Fire District 9 reserves the right to add and/or delete services to this contract. Should a service requirement be deleted, payment to the Contractor will be reduced proportionally to the amount of service deleted in accordance with the bid price. Should additional services be required, payment to the Contractor will be increased proportionally to the amount of service added in accordance with the bid price.

20. Vendor's literature and/or pricing sheets will not be accepted in lieu of completing the proposal blank(s) set forth in these specifications.

21. Bidders shall not write in margins or alter the official content or requirements of the Board of Fire Commissioners, Iselin Fire District 9 bid documents.

22. SPECIFICATIONS

Any prospective bidder who wishes to challenge a bid specification shall file such challenges in writing with the contracting agent no less than three business days prior to the opening of the bids. Challenges filed after that time shall be considered void and have no impact on the contracting unit or the award of contract.

23. OWNERSHIP OF MATERIAL

The owner shall retain all of its rights and interest in any and all documents and property, both hard copy and digital furnished by the owner to the contractor for the purpose of assisting the contractor in the performance of this contract. All such items shall be returned immediately to the owner at the expiration or termination of the contract or completion of any related services, pursuant thereto, whichever comes first. None of the documents and/or property shall, without the written consent of the owner, be disclosed to others or used by the contractor or permitted by the contractor to be used by their parties at any time except in the performance of the resulting contract.

Ownership of all data, materials and documentation originated and prepared for the owner pursuant to this contract shall belong exclusively to the owner. All data, reports, computerized information, programs and materials related to this project shall be delivered to and become the property of the owner upon completion of the project. The contractor shall not have the right to use, sell, or disclose the total of the interim or final work products, or make them available to third parties, without the prior written consent of the owner. All information supplied to the owner may be required to be supplied with USB media compatible with the owner's computer operating system, windows based, Microsoft Office Suite 2010.

24. TRUTH IN CONTRACTING LAW

- N.J.S.A. 2C:21-34, et seq. governs false claims and representation. It is a serious crime for the bidder to knowingly submit a false claim and/or knowingly make material misrepresentation.
- N.J.S.A. 2C:27-10 provides that a person commits a crime if said person offers a benefit to a public servant for an official act performed or to be performed by a public servant, which is a violation of official duty.
- N.J.S.A. 2C:27-11 provides that a bidder commits a crime if said person, directly or indirectly, confers or agrees to confer any benefit not allowed by law to a public servant.
- Bidder should consult the statutes or legal counsel for further information.

25. PROOF OF N.J. BUSINESS REGISTRATION CERTIFICATE N.J.S.A. 52:32-44

Pursuant to N.J.S.A. 52:32-44, The Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 (“Contracting Agency”) is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in a bid/proposal/contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to contract award or authorization, the contractor shall provide the Contracting Agency with its proof of business registration and that of any named subcontractor(s).

Subcontractors named in a bid or proposal shall provide proof of business registration to the bidder, who in turn shall provide it to the Contracting Agency prior to the time of contract, purchase order, or another contracting document is awarded or authorized.

During contract performance:

- (1) The contractor shall not enter into a contract with a subcontractor unless the subcontractor first provides the contractor with valid proof of business registration.
- (2) The contractor shall maintain and submit to the Contracting Agency a list of subcontractors and their addresses that may be updated from time to time.
- (3) The contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered in the State. Any questions in this regard can be directed to the Division of Taxation at (609) 292-6400. Form NJ-REG can be filed online at www.state.nj.us/treasury/revenue/busregcert.shtml.

Before final payment is made under the contract, the contractor shall submit to the Contracting Agency a complete and accurate list of all subcontractors used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of \$25.00 for each day of violation, not to exceed \$50,000, for each proof of business registration not properly provided under a contract with a contracting agency.

Emergency Purchases or Contracts

For purchases of an emergent nature, the contractor shall provide its Business Registration Certificate within two weeks from the date of purchase or execution of the contract or prior to payment for goods or services, whichever is earlier.

26. PAY TO PLAY – NOTICE OF DISCLOSURE REQUIREMENT

Business entities are advised of their responsibility to file an annual disclosure statement of political contributions with the New Jersey Election Law Enforcement Commission (ELEC) pursuant to N.J.S.A. 19:44A-20.27 if they receive contracts in excess of \$50,000 from public entities in a calendar year. Business entities are responsible for determining if filing is necessary. Additional information on this requirement is available from ELEC at 888-313-3532 or at www.elec.state.nj.us.

27. PAYMENT

Payment will be made after a properly executed Board of Fire Commissioners, Iselin Fire District 9 voucher has been received and formally approved. The voucher will be certified correct by the department/division head who received the goods or services.

28. NON-PAYMENT OF PENALTIES AND INTEREST ON OVERDUE BILLS

Public funds may be used to pay only for goods delivered or services rendered. The Board of Fire Commissioners, Iselin Fire District 9, will not pay penalties and/or interest on overdue bills. No employee is authorized to sign a letter of credit or any other document that represents legal commitment on the part of the Board of Fire Commissioners, Iselin Fire District 9 to pay additional fees.

29. W-9

Successful bidder/respondent shall complete W-9 Form and submit to Purchasing prior to contract award. The form is available at the following link: www.irs.gov/pub/irs-pdf/fw9.pdf

30. Health Insurance Portability and Accountability Act of 1996-HIPAA (If Applicable)

Both parties agree to comply with all requirements of the Federal Health Insurance Portability and Accountability Act of 1996 ("HIPAA") as maybe amended from time to time, and the corresponding HIPAA regulations for the confidentiality and security of medical information.

The Contractor shall:

- Not to use or disclose protected health information other than as permitted or required by law
- Use appropriate safeguards to protect the confidentiality of the information
- Report any use or disclosure not permitted

The contractor, by execution of the contract, shall thereby indemnify and hold the Board of Fire Commissioners, Iselin Fire District 9 harmless from any and all liabilities, claims, actions, costs and penalties which may be incurred as the result of the failure of the contractor to comply with the requirements of the Health Insurance Portability and Accountability Act (HIPAA) or any other statute or case law protecting the privacy of persons using its services.

31. PUBLIC EMERGENCY

In the event of a Public Emergency declared at the Local, State or Federal Level, if the Board of Fire Commissioners, Iselin Fire District 9 opts to extend the terms and conditions of this bid, the contractor agrees to extend the terms and conditions of this bid, whether existing, expiring or expired no longer than six months, for goods and/or services for the duration of the emergency. In the event the original contractor cannot meet this requirement, the Board of Fire Commissioners, Iselin Fire District 9 may solicit the goods and/or services from any bidder on this contract.

32. The owner and the Contractor each bind themselves and their successors, executors, administrators, heirs and assigns and legal representatives of the other party respecting all covenants and agreements and obligations of this contract.

33. The terms of this Agreement shall be construed and interpreted, and all respective rights and duties of the parties shall be governed by the laws of the State of New Jersey.

34. FORCE MAJEURE

Neither party shall be responsible for any resulting loss or obligation to fulfill duties as specified in any of the terms or provisions of this Agreement if the fulfillment of any term or provision of this Agreement is delayed or prevented by any revolutions, insurrections, riots, wars, acts of enemies, national emergencies, strikes, floods, fires, acts of God, or by any cause not within the control of the party whose performance is interfered with which by the exercise of reasonable diligence such party is unable to prevent. Additionally, if the fulfillment of any of the terms and provisions of this Agreement is delayed or prevented by any court order, or action or injunction or other such agreement, this Agreement shall become voidable by the Board of Fire Commissioners, Woodbridge Township - Fire District 9 by notice to each party.

35. DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

N.J.S.A. 52:3255 prohibits State and Local public contracts with persons or entities engaging in certain investment activities in energy or finance sectors of Iran. Bidders must indicate if

they comply with the law by certifying the form. Pursuant to N.J.S.A. 40A:11-2.1 the Board of Fire Commissioners, Iselin Fire District 9 is required to notify the New Jersey Attorney General if it determines a false certification has been submitted.

- 36. PROMPT PAYMENT – GOODS & SERVICES – P.L. 2019, C.127 (LFN 2019-02 1/23/19)**
P.L. 2018, c. 127 establishes a prompt payment requirement that applies to goods and services contracts a contracting unit award to a “business concern” under the Local Public Contracts Law (LPCL). The law applies to all goods and services contracts awarded on or after February 1, 2019 (the law’s effective date) regardless of dollar amount and any contracts requiring either a single payment or multiple payments. The law does not change the prompt payment requirements for improvements to real property and structures as set forth in N.J.S.A. 2A:30A-1 et seq. and described in LFN 2006-21. The law defines “Business Concern” as any person engaged in a trade or business, including a private nonprofit entity operating as an independent contractor, providing goods and services directly to a contracting unit or to a designated third party and operating pursuant to a contract with a contracting unit which requires either a single payment or multiple payments, but shall not include a “public utility” as defined in N.J.S.A. 48:2.13.
- 37. PRICE ADJUSTMENT –** The Board of Fire Commissioners, Iselin Fire District 9 recognizes this product, or service has a price component that may have a commodity with changing costs. The Contractor/Supplier may request a Price Adjustment no more frequently than once each year. A Price Adjustment request must be made in writing and include the reason for the request, documentation supporting the request (i.e., commodity increases), the current pricing, and the requested revised pricing. The Board of Fire Commissioners, Iselin Fire District 9, will review the Price Adjustment request. If the Price Adjustment is deemed reasonable the Price Adjustment request will be accepted by written acknowledgement. If the request is not accepted by the Board of Fire Commissioners, Iselin Fire District 9 may entirely reject the request or may counter with revised pricing. In either case the Board of Fire Commissioners, Iselin Fire District 9, will provide a written explanation in support of the decision. The Director of Purchasing may use available indexes (e.g. CPI or PPI) to determine if the requested Price Adjustment is reasonable. Typically, a Price Adjustment that exceeds 5% will not be approved unless very unusual and significant changes have occurred in the industry. In the event of industry costs decline, the Board of Fire Commissioners, Iselin Fire District 9 shall have the right to receive, from the Contractor, a reasonable reduction in prices/pricing that reflect such cost changes in the industry. The Board of Fire Commissioners, Iselin Fire District 9 will make a written request to the Contractor for a Price Adjustment in writing with supporting documentation.

GENERAL BID SPECIFICATIONS TO FOLLOW

DRAWINGS AVAILABLE UPON REQUEST

Email Requests to:

MATTHEW LUBESKI AT: mlubeski@cmeusa1.com

PROPOSAL FOR HVAC UPGRADES – FIRE DISTRICT NO. 9 FIREHOUSE

Pricing Breakdown

Item Description	Quantity	Unit Price (\$)	Total Price (\$)
HVAC Unit	_____	_____	_____
Ductwork Replacement	_____	_____	_____
Thermostat (Smart)	_____	_____	_____
Labor (Installation) Hrs	_____	_____	_____
Total Proposal Amount			_____

NAME OF COMPANY: _____

ADDRESS: _____

PHONE NUMBER: _____

FAX NUMBER: _____

CONTACT PERSON: _____

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP – ISELIN FIRE DISTRICT 9
BID DOCUMENT CHECKLIST**

Required With Bid		Read, Signed & Submitted Bidder's Initial
A. FAILURE TO SUBMIT ANY OF THESE ITEMS IS MANDATORY CAUSE FOR REJECTION OF BID		
<input checked="" type="checkbox"/>	Ownership Disclosure Form	_____
<input checked="" type="checkbox"/>	Acknowledgement of Receipt of Addenda (To be Completed if Addenda are Issued)	_____
<input checked="" type="checkbox"/>	Required Evidence EEO/Affirmative Action Regulations Questionnaire	_____
<input checked="" type="checkbox"/>	Non-Collusion Affidavit	_____
<input checked="" type="checkbox"/>	Bid Guarantee (bid bond or certified/cashier's check) (with Power of Attorney for full amount of Bid Bond)	_____
<input checked="" type="checkbox"/>	Consent of Surety (Certificate from Surety company)	_____
<input checked="" type="checkbox"/>	Surety Disclosure Statement and Certification	_____
<input type="checkbox"/>	Performance Bond	_____
<input type="checkbox"/>	Labor and Material (Payment) Bond	_____
<input type="checkbox"/>	Maintenance Bond	_____
<input checked="" type="checkbox"/>	Disclosure of Investment Activities in Iran- Submit with bid response	_____
<input checked="" type="checkbox"/>	Disclosure of Activities with Russia and Belarus	_____
B. MANDATORY ITEM(S), REQUIRED NO LATER THAN TIME PERIOD INDICATED		
<input checked="" type="checkbox"/>	Business Registration Certificate – Bidder – Prefer with Bid Response. Required by Law prior to award of contract	_____
<input checked="" type="checkbox"/>	Business Registration Certificate – Designated Subcontractor(s) – Prefer with Bid Response. Required by Law prior to award of contract	_____
<input checked="" type="checkbox"/>	Public Works Contractor Registration Certificate(s) for the Bidder and Designated Subcontractors (Prior to Award, but effective at time of bid)	_____
<input checked="" type="checkbox"/>	License(s) or Certification(s) Required by the Specifications	_____
C. FAILURE TO SUBMIT ANY OF THESE ITEMS AT TIME OF BID MAY BE CAUSE FOR REJECTION		
<input checked="" type="checkbox"/>	Three (3) references for similar projects	_____
<input type="checkbox"/>	Authorization for Background Check	_____
<input checked="" type="checkbox"/>	Catalog/Price List	_____
<input type="checkbox"/>	Product Samples	_____
<input checked="" type="checkbox"/>	Certification of Available Equipment	_____
<input type="checkbox"/>	Other: Printed Original and one Copy (Referenced in section 1., B., (3) of General Instructions)	_____
D. READ ONLY		
	Americans With Disability Act of 1990 Language	

This checklist is provided for bidder's use in assuring compliance with required documentation; however, it does not include all specifications requirements and does not relieve the bidder of the need to read and comply with the specifications.

Name of Bidder: _____ Date: _____

By Authorized Representative:

Signature: _____

Print Name & Title: _____

**Board of Fire Commissioners, Woodbridge
Township – Iselin Fire District 9 New Jersey**

1222 Green Street
Iselin, NJ 08830

OWNERSHIP DISCLOSURE FORM

BID SOLICITATION #: _____

VENDOR {BIDDER}: _____

PART 1

**PLEASE COMPLETE THE QUESTIONS BELOW BY CHECKING EITHER THE "YES" OR THE "NO" BOX.
ALL PARTIES ENTERING INTO A CONTRACT WITH THE STATE ARE REQUIRED TO
COMPLETE THIS FORM PURSUANT TO N.J.S.A. 52:25-24.2**

PLEASE NOTE THAT IF THE VENDOR/BIDDER IS A NON-PROFIT ENTITY, THIS FORM IS NOT REQUIRED.

	YES	NO
1. Are there any individuals, corporations, partnerships, or limited liability companies owning a 10% or greater interest in the Vendor {Bidder}?	<input type="checkbox"/>	<input type="checkbox"/>
IF THE ANSWER TO QUESTION 1 IS "NO", PLEASE SIGN AND DATE THE FORM. IF THE ANSWER TO QUESTION 1 IS "YES", PLEASE ANSWER QUESTION 2-4 BELOW.		
2. Of those parties owning a 10% or greater interest in the Vendor {Bidder}, are any of those parties individuals?	<input type="checkbox"/>	<input type="checkbox"/>
3. Of those parties owning a 10% or greater interest in the Vendor {Bidder}, are any of those parties corporations, partnerships, or limited liability companies ?	<input type="checkbox"/>	<input type="checkbox"/>
4. If you answer to Question 3 is "YES" , are there any parties owning a 10% or greater interest in the corporation, partnership, or limited liability company referenced in Question 3?	<input type="checkbox"/>	<input type="checkbox"/>

IF ANY OF THE ANSWERS TO QUESTION 2-4 ARE "YES", PLEASE PROVIDE THE REQUESTED INFORMATION IN PART 2 BELOW.

PART 2

PLEASE PROVIDE FURTHER INFORMATION RELATED TO QUESTIONS 2-4 ANSWERED AS "YES".

If you answered **"YES"** for questions 2, 3, or 4, you must disclose identifying information related to the individuals, corporations, partnerships, and/or limited liability companies owning a 10% or greater interest in the Vendor Bidder. Further, if one or more of these entities is itself a corporation, partnership, or limited liability company, you must also disclose all parties that own a 10% or greater interest in that corporation, partnership, or limited liability company. This information is required by statute.

INDIVIDUALS

NAME	_____		
ADDRESS 1	_____		
ADDRESS 2	_____		
City	STATE	ZIP	

NAME	_____		
ADDRESS 1	_____		
ADDRESS 2	_____		
City	STATE	ZIP	

NAME	_____		
ADDRESS 1	_____		
ADDRESS 2	_____		
City	STATE	ZIP	

NAME	_____		
ADDRESS 1	_____		
ADDRESS 2	_____		
City	STATE	ZIP	

Attach Additional Sheets If Necessary

PART 2 continued

PARTNERSHIPS / CORPORATIONS / LIMITED LIABILITY COMPANIES

ENTITY NAME	_____
PARTNER NAME	_____

ADDRESS 1			
ADDRESS 2			
City	STATE		ZIP

ENTITY NAME			
PARTNER NAME			
ADDRESS 1			
ADDRESS 2			
City	STATE		ZIP

ENTITY NAME			
PARTNER NAME			
ADDRESS 1			
ADDRESS 2			
City	STATE		ZIP

Attach Additional Sheets if Necessary

In the alternative, to comply with the ownership disclosure requirement, a Vendor {Bidder} with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10 percent or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10 percent or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest. N.J.S.A. 52:25-24.2.

**PART 3
PUBLICLY TRADED PARENT COMPANY DISCLOSURE**

Ownership disclosure (name and address) can be met by submitting the last annual filing of an SEC or similar foreign regulator document or providing the website link to such documents, and include relevant page numbers. See N.J.S.A 52:25-24.2.

<u>TITLE OF ATTACHED DOCUMENTS OR WEBLINK</u>	<u>PAGE #</u>

Attach Additional Sheets if Necessary

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor {Bidder}, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the Board of Fire Commissioners, Iselin Fire District 9 of Iselin, NJ is relying on the information contained herein, and that the Vendor {Bidder} is under a continuing obligation from the date of this certification through the completion of any contract(s) with the Board of Fire Commissioners, Iselin Fire District 9 to notify the Board of Fire Commissioners, Iselin Fire District 9 in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the Board of Fire Commissioners, Iselin Fire District 9, permitting the Board of Fire Commissioners, Iselin Fire District 9 to declare any contract(s) resulting from this certification void and unenforceable.

Signature (Do not enter Vendor ID as a signature)

Date

Print Name and Title

FIN/EIN

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
ISELIN FIRE DISTRICT 9
NON-COLLUSION AFFIDAVIT
(N.J.S.A. 52:34-15)**

State of _____

City of: _____

I, _____ residing in _____
(Name of Affiant) (Name of Municipality)

being duly sworn according to law on my oath depose and say that:

I am _____ of the Company of _____
(Title or Position) (Name of Firm/Company)

the Bidder/Respondent making this Proposal for the Bid/RFP numbered _____

and that I executed the said Proposal with full authority to do so; that said Bidder/Respondent has not, directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the above numbered project; and that all statements contained in said Proposal and in this affidavit are true and correct, and made with full knowledge that the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 relies upon the truth of the statements contained in said Proposal

and in the statements contained in this affidavit in awarding the contract. I further warrant that no person

or selling agency has been employed or retained to solicit or secure such contract upon an agreement

or understanding for a commission, percentage, brokerage, or contingent fee, except bona fide employees

or bona fide established commercial or selling agencies maintained by _____
(Name of Firm/Company)

(Signature of Affiant)

(Type of Print Name of Affiant)

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
ISELIN FIRE DISTRICT 9, NEW JERSEY
EXHIBIT A
EEO/AFFIRMATIVE ACTION COMPLIANCE NOTICE
N.J.S.A. 10:5-31 and N.J.A.C. 17:27
GOODS, PROFESSIONAL SERVICE AND GENERAL SERVICE CONTRACTS**

All successful bidders are required to submit evidence of appropriate affirmative action compliance to the Board of Fire Commissioners, Iselin Fire District 9 and Division of Public Contracts Equal Employment Opportunity Compliance. During a review, Division representatives will review the Board of Fire Commissioners, Iselin Fire District 9 files to determine whether the affirmative action evidence has been submitted by the vendor/contractor. Specifically, each vendor/contractor shall submit to the Board of Fire Commissioners, Iselin Fire District 9, prior to execution of the contract, one of the following documents:

Goods and General Service Vendors

1. Letter of Federal Approval indicating that the vendor is under an existing federally approved or sanctioned affirmative action program. A copy of the approval letter is to be provided by the vendor to the Board of Fire Commissioners, Iselin Fire District 9 and the Division. This letter of approval is valid for one year from the date of issuance.

Do you have a federally approved or sanctioned EEO/AA program? Yes No
If yes, please submit a photo static copy of such approval.

2. A Certificate of Employee Information Report (hereafter "Certificate"), issued in accordance with N.J.A.C. 17:27-1.1 et seq. The vendor must provide a copy of the Certificate to the Board of Fire Commissioners, Iselin Fire District 9 as evidence of its compliance with the regulations. The Certificate represents the review and approval of the vendor's Employee Information Report, Form AA-302 by the Division. The period of validity of the Certificate is indicated on its face. Certificates must be renewed prior to their expiration date in order to remain valid.

Do you have a State Certificate of Employee Information Report Approval? Yes No
If yes, please submit a photo static copy of such approval.

3. The successful vendor shall complete an Initial Employee Report, Form AA-302 and submit it to the Division with \$150.00 Fee and forward a copy of the Form to the Board of Fire Commissioners, Iselin Fire District 9. Upon submission and review by the Division, this report shall constitute evidence of compliance with the regulations. Prior to the execution of the contract, the EEO/AA evidence must be submitted.

The successful vendor may obtain the Affirmative Action Employee Information Report (AA302) on the Division website www.state.nj.us/treasury/contract_compliance.

The successful vendor(s) must submit the AA302 Report to the Division of Public Contracts Equal Employment Opportunity Compliance, with a copy to Public Agency.

The undersigned vendor certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27 and agrees to furnish the required forms of evidence.

The undersigned vendor further understands that his/her bid shall be rejected as non-responsive if said contractor fails to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27.

COMPANY: _____ SIGNATURE: _____

PRINT NAME: _____ TITLE: _____

DATE: _____

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
ISELIN FIRE DISTRICT 9 , NEW JERSEY
EXHIBIT A
MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127)
N.J.A.C. 17:27
GOODS, PROFESSIONAL SERVICE AND GENERAL SERVICE CONTRACTS**

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunities shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union of the contractor's commitments under this chapter and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

The contractor or subcontractor agrees to make good faith efforts to meet targeted Board of Fire Commissioners, Iselin Fire District 9 employment goals established in accordance with N.J.A.C. 17:27-5.2.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, and labor unions, that it does not discriminate on the basis of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

- Letter of Federal Affirmative Action Plan Approval
- Certificate of Employee Information Report
- Employee Information Report Form AA302 (electronically provided by the Division and distributed to the public agency through the Division's website at www.state.nj.us/treasury/contract_compliance).

The contractor and its subcontractors shall furnish such reports or other documents to the Division of Purchase & Property, CCAU, EEO Monitoring Program as may be requested by the office from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Purchase & Property, CCAU, EEO Monitoring Program for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code at N.J.A.C. 17:27.**

SAMPLE CERTIFICATE OF EMPLOYEE INFORMATION REPORT

Certification 111XX

CERTIFICATE OF EMPLOYEE INFORMATION REPORT

INITIAL

This is to certify that the contractor listed below has submitted an Employee Information Report pursuant to N.J.A.C. 17:27-1.1 et. seq. and the State Treasurer has approved said report. This approval will remain in effect for the period of 15-DEC-2000 to 15-DEC-200X

**SAMPLE COMPANY, INC.
33 WEST STATE STREET
TRENTON, NJ 08625**



State Treasurer

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
ISELIN FIRE DISTRICT 9 , NEW JERSEY**

**AMERICANS WITH DISABILITIES ACT OF 1990
Equal Opportunity for Individuals with Disability**

The Contractor and the Owner, do hereby agree that the provisions of Title II of the Americans With Disabilities Act of 1990 (the "Act") (42 U.S.C. S121 01 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules and regulations promulgated pursuant there unto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the owner pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event that the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the owner in any action or administrative proceeding commenced pursuant to this Act. The contractor shall indemnify, protect, and save harmless the owner, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the owner's grievance procedure, the contractor agrees to abide by any decision of the owner which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the owner, or if the owner incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The owner shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with full and complete particulars of the claim, If any action or administrative proceeding is brought against the owner or any of its agents, servants, and employees, the *owner shall* expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or other process received by the owner or its representatives.

It is expressly agreed and understood that any approval by the owner of the services provided by the contractor pursuant to this contract will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the owner pursuant to this paragraph.

It is further agreed and understood that the owner assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the owner from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
ISELIN FIRE DISTRICT 9,
NEW JERSEY**

THESE ARE **SAMPLES** OF THE **ONLY** ACCEPTABLE
BUSINESS REGISTRATION CERTIFICATES.

PREFER SUBMITTED WITH BID RESPONSE
REQUIRED BY LAW PRIOR TO AWARD OF CONTRACT

STATE OF NEW JERSEY BUSINESS REGISTRATION CERTIFICATE FOR STATE AGENCY AND CASINO SERVICE CONTRACTOR		DEPARTMENT OF TREASURY DIVISION OF REVENUE PO BOX 252 TRENTON, NJ 08646-0252
TAXPAYER NAME: TAX REGISTRATION TEST ACCOUNT	TRADE NAME: CLIENT REGISTRATION	
TAXPAYER IDENTIFICATION#: 970-007-382/000	SEQUENCE NUMBER: 0107230	
ADDRESS: 847 ROEBLING AVE TRENTON NJ 08611	ISSUANCE DATE: 07/14/04	
EFFECTIVE DATE: 09/01/04		<i>John S. Tully</i> Acting Director
FORM BR-004 (02/01)	This Certificate is NOT assignable or transferable. It must be continuously displayed at above address.	

STATE OF NEW JERSEY BUSINESS REGISTRATION CERTIFICATE	
Taxpayer Name:	TAX REG TEST ACCOUNT
Trade Name:	
Address:	847 ROEBLING AVE TRENTON, NJ 08611
Certificate Number:	1093907
Date of Issuance:	October 14, 2004
For Office Use Only:	
	2004E014112823533

Board of Fire Commissioners, Woodbridge Township
Iselin Fire District 9, New Jersey
Disclosure of Investment Activities in Iran

Bidder Name:	
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Part 1: Certification

*BIDDERS ARE TO COMPLETE PART 1 BY CHECKING **EITHER BOX.***

Pursuant to Public Law 2012, c.25, any person or entity that submits a bid or proposal or otherwise proposes to enter our certification. Failure to complete the certification may render a bidder's proposal non-responsive. If the Purchasing Agent finds a person or entity to be in violation of law, she/he shall act as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

Check the Appropriate Box

I certify, pursuant to Public Law 2012, c. 25, that neither the bidder listed above nor any of the bidder's parents, subsidiaries, or affiliates is listed on the N.J. Department of the Treasury's list of entities determined to be engaged in prohibited activities in Iran pursuant to P.L. 2012, c. 25 ("Chapter 25 List"). I further certify that I am the person listed above, or I am an officer or representative of the entity listed above and am authorized to make this certification on its behalf. I will skip Part 2 and sign and complete the Certification below.

OR

I am unable to certify as above because the bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the Department's Chapter 25 list. I will provide a detailed, accurate and precise description of the activities in Part 2 below and sign and complete the Certification below. Failure to provide such will result in the proposal being rendered as nonresponsive and appropriate penalties, fines and/or sanctions will be assessed as provided by law.

Part 2 – Additional Information

PLEASE PROVIDE FURTHER INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN. You must provide a detailed, accurate and precise description of the activities of the bidding person/entity, or one of its parents, subsidiaries or affiliates, engaging in the investment activities in Iran on additional sheets provided by you.

Part 3: Certification

I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments there to the best of my knowledge are true and complete. I attest that I am authorized to execute this certification on behalf of the above-referenced person or entity. I acknowledge that the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 is relying on the information contained herein and thereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 to notify the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 in writing of any changes to the answers of information contained herein. I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 and that the Board of Fire Commissioners, Woodbridge Township – Iselin Fire District 9 at its option may declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	

**CERTIFICATION OF NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS
PURSUANT TO P.L.2022, c.3
ISELIN FIRE DISTRICT 9**

SOLICITATION TITLE: _____

CHECK THE APPROPRIATE BOX

I, the undersigned, am authorized by the person or entity seeking to enter or renew the contract identified above, to certify that the Vendor/Bidder is not engaged in prohibited activities in Russia or Belarus as such term is defined in P.L.2022, c.3,¹ section 1.e, except as permitted by federal law.

I understand that if this statement is willfully false, I may be subject to penalty, as set forth in P.L.2022, c.3, section 1.d.

OR

I, the undersigned am unable to certify above because the person or entity seeking to enter into or renew the contract identified above, or one of its parents, subsidiaries, or affiliates may have engaged in prohibited activities in Russia or Belarus. A detailed, accurate and precise description of the activities is provided below.

Failure to provide such description will result in the Quote/Bid/Proposal being rendered as non-responsive, and the Department/Division will not be permitted to contract with such person or entity, and if a Quote/Bid/Proposal is accepted or contract is entered into without delivery of the certification, appropriate penalties, fines and/or sanctions will be assessed as provided by law.

Description of Prohibited

Attach Additional Sheets If Necessary.

If you certify that the bidder is engaged in activities prohibited by P.L. 2022, c. 3, the bidder shall have 90 days to cease engaging in any prohibited activities and on or before the 90th day after this certification, shall provide an updated certification. If the bidder does not provide the updated certification or at that time cannot certify on behalf of the entity that it is not engaged in prohibited activities, the **Iselin Fire District 9** shall not award the business entity any contracts, renew any contracts, and shall be required to terminate any contract(s) the business entity holds with the State that were issued on or after the effective date of P.L. 2022, c. 3.

Signature of Vendor's Authorized Representative

Date

Print Name and Title of Vendor's Authorized Representative

Vendor Name

Vendor Phone Number

Vendor Address (Street Address)

Vendor Fax Number

Vendor Address (City/State/Zip Code)

Vendor Email Address for

Signature of Authorized Representative

¹ Engaged in prohibited activities in Russia or Belarus" means (1) companies in which the Government of Russia or Belarus has any direct equity share; (2) having any business operations commencing after the effective date of this act that involve contracts with or the provision of goods or services to the Government of Russia or Belarus; (3) being headquartered in Russia or having its principal place of business in Russia or Belarus, or (4) supporting assisting or facilitating the Government of Russia or Belarus in their campaigns to invade the sovereign country of Ukraine, either through in-kind support or for profit.

**BOARD OF FIRE COMMISSIONERS, WOODBRIDGE TOWNSHIP
FIRE DISTRICT 9, ISELIN NEW JERSEY**

ACKNOWLEDGMENT OF RECEIPT OF ADDENDA

The undersigned Bidder hereby acknowledges receipt of the following Addenda:

ADDENDUM NUMBER	DATE	ACKNOWLEDGE RECEIPT (Initial)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Acknowledged for: _____
(Name of Bidder)

By: _____
(Signature of Authorized Representative)

Name: _____
(Print or Type)

Title: _____

Date: _____

FORM REQUIRED EVEN IF NO ADDENDA WAS ISSUED

HVAC UPGRADES – FIRE DISTRICT NO. 9 FIREHOUSE

SPECIFICATION TABLE OF CONTENTS

DIVISION 23 HVAC

230517	Sleeves and Sleeve Seals for HVAC Piping.
230529	Hangers and Supports for HVAC Piping and Equipment.
230553	Identification for HVAC Piping and Equipment.
230593	Testing, Adjusting, and Balancing for HVAC.
230719	HVAC Piping Insulation.
231123	Natural Gas Piping.
232300	Refrigerant Piping.
238126	Small Capacity Split-System Air Conditioners with Gas Furnaces

**SECTION 230517
SLEEVES AND SLEEVE SEALS FOR HVAC PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Pipe-sleeve seals.

1.02 RELATED REQUIREMENTS

- A. Section 230553 - Identification for HVAC Piping and Equipment: Piping identification.
- B. Section 230719 - HVAC Piping Insulations.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- C. FM (AG) - FM Approval Guide current edition.
- D. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Valve Stem Packings: One; Two for each type and size of valve.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years None - N/A; documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
 - 1. Minimum three years' experience.
 - 2. Approved by manufacturer.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

- A. Correct defective Work within a two-years period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. **Manufacturers:**
 - 1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
- B. **Vertical Piping:**
 - 1. Sleeve Length: 1 inch; 12 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- C. **Plastic; Sheet Metal; Moisture-Resistant Fiber:** Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D. **Pipe Passing Through Below Grade Exterior Walls:**
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- E. **Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:**
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. **Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:**
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- G. **Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.**
- H. **Clearances:**
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.

2.02 PIPE-SLEEVE SEALS

- A. **Manufacturers:**
 - 1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com/#sle.
 - 2. American Polywater Corporation ; PGKD Modular Seals ; ; PHSD Mechanical Seals: www.polywater-haufftechnik.com/#sle.
 - 3. Flexicraft Industries; PipeSeal: www.flexicraft.com/#sle.
- B. **Modular Mechanical Sleeve-Seal:**
 - 1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
 - 2. Watertight seal between pipe and wall-sleeve, wall or casing opening, 20 psi.
 - 3. Size and select seal component materials in accordance with service requirements.
 - 4. **Service Requirements:**
 - a. Corrosion resistant.
 - b. Oil, fuel, gas, and solvent resistant.
 - c. Underground, buried, and wet conditions.
 - d. Fire Resistant: 1 hour; 3 hour, FM (AG); UL (DIR) approved.
 - e. High Temperature, up to 400 degrees F.
 - f. Low temperature, down to minus 67 degrees F.
 - 5. Glass-reinforced plastic pressure end plates.

- C. Sealing Compounds:
 - 1. Provide packing and sealing compound to fill pipe to sleeve thickness.
 - 2. Combined packing and seal compound is to match partition fire-resistance hourly rating.
- D. Pipe Sleeve Material:
 - 1. Bearing Walls: Steel, cast iron, or terra-cotta pipe.
 - 2. Masonry Structures: Sheet metal or fiber.
- E. Wall Sleeve: PVC; HDPE; Steel material with waterstop collar, and nailer endcaps.
- F. Sleeve-Forming Disk: Non-conductive plastic-based material, 3 inch; 4 inch thick.
- G. Pipeline-Casing Seals:
 - 1. Coated; Painted; Stainless steel; Nonmetallic boltless casing-spacer for 4 inch; 37-1/2 inch carrier pipe.
 - 2. Coated; Painted; Stainless steel; Nonmetallic boltless modular seal for 6 inch ; 12 inch carrier pipe.
 - 3. Carbon steel; Stainless steel; Thermoplastic band with risers for 12 inch; 120 inch carrier pipe.
 - 4. End Seals: 1/8-inch, pull-on type; self-curing wrap-around type, rubber or synthetic rubber based.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe; None - N/A
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above; flush with top of; recessed into and grouted flush with slab.
- E. Structural Considerations:
 - 1. Do not penetrate building structural members unless indicated.
- F. Provide sleeves when penetrating footings; floors; walls; partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 - 2. Aboveground Piping:
 - a. Pack solid using mineral fiber in compliance with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- G. **Manufactured Sleeve-Seal Systems:**
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a water-tight seal.
 6. Install in accordance with manufacturer's recommendations.
- H. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

**SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components.
- B. Retrofit piping cover system.

1.02 RELATED REQUIREMENTS

- A. Section 232300 Refrigeration piping.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2014 (Reapproved 2020).
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2018).
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.
- K. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2018.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- M. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.
- N. FM (AG) - FM Approval Guide current edition.
- O. MFMA-4 - Metal Framing Standards Publication 2004.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- Q. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- R. UL (DIR) - Online Certifications Directory Current Edition.
- S. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems; nonpenetrating rooftop supports; post-installed concrete and masonry anchors; thermal insulated pipe supports.
 - 1. Fiberglass Channel (Strut) Framing Systems: Include requirements for strength derating according to ambient temperature.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution; upon request.
 - 1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
- C. Derating Calculations for Fiberglass Channel (Strut) Framing Systems: Indicate load ratings adjusted for applicable service conditions.
- D. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request; .
- E. Installer's Qualifications: Include evidence of compliance with specified requirements.
- F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D. Installer Qualifications for Field-Welding: As specified in Section 055000.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 20% ; or. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use wire; chain; perforated pipe strap; wood for permanent supports unless specifically indicated or permitted.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel; approved equivalent unless otherwise indicated.
 - b. Outdoor and damp or Wet Indoor Locations: Use galvanized steel; stainless steel; approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Materials for Metal Fabricated Supports.
- C. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
 - a. ABB Installation Products; electrification.us.abb.com/#sle.
 - b. B-Line, a brand of Eaton Corporation; www.eaton.com/#sle.
--THE FOLLOWING MANUFACTURER HAS REGIONAL AVAILABILITY--
 - c. Custom Strut and Roll Forming, LLC; www.customstrut.com/#sle.
 - d. Elgen Manufacturing Company, Inc; www.elgenmfg.com/#sle.
 - e. Gripple, Inc; Fast Track - Low Profile; Fast Track - Side Loading; Fast Track - Standard; www.gripple.com/#sle.
 - f. Unistrut, a brand of Atkore International Inc; www.unistrut.com/#sle.
 - g. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MFMA-4 compliant, pre-fabricated, MSS SP-58 type 59, low profile;, continuous-slot metal strut channel with associated tracks, fittings, and related accessories.
 3. MFMA-4 compliant, prefabricated, side-loading continuous-slot metal strut channel bracket with associated tracks, fittings, and related accessories.
 4. Strut Channel or Bracket Material:
 - a. Indoor Dry Locations: Use painted steel; zinc-plated steel; galvanized steel.
 - b. Outdoor and damp or Wet Indoor Locations: Use galvanized steel.
 5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch ; 14 gauge, 0.0747 inch
 6. Minimum Channel Dimensions: 1-5/8 inch ; 1-1/2 inch width by 13/16 inch ; 1-5/8 inch height.
 7. Accessories: Provide bracket covers; cable basket clips; cable tray clips; clamps; conduit clamps; fire-retarding brackets; j-hooks; protectors; vibration dampeners; and
- D. Prefabricated Trapeze-Framed Fiberglass Strut Systems:
1. Manufacturers:
 - a. Enduro Composites; www.endurocomposites.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 type 59, prefabricated continuous-slot fiberglass strut channel, associated fittings, and related accessories.
 3. Channel Material: Use polyester resin; vinyl ester resin.

4. Minimum Channel Dimensions: 1-5/8 inch (41 mm); 1-1/2 inch width by 1 inch ; 1-5/8 inch height.
 5. Flammability: Fire retardant with NFPA 101, Class A flame spread index (maximum of 25) when tested in accordance with ASTM E84; self-extinguishing in accordance with ASTM D635.
- E. Strut Channels; Low Profile Strut-Channel Brackets; Strut-Channel Brackets:
1. Manufacturers:
 - a. B-Line, a brand of Eaton Corporation;www.eaton.com/#sle.
 - b. Gripple, Inc; Low Profile Bracket Kit; Universal Bracket;www.gripple.com/#sle.
 - c. Unistrut, a brand of Atkore International Inc;www.unistrut.com/#sle.
 - d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
 3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- F. Channel Nuts:
1. Manufacturers:
 - a. FNW; 7821;www.fnw.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Provide carbon steel; malleable iron; 304 stainless steel; 316 stainless steel channel nut with epoxy copper; epoxy plated; galvanized steel; stainless steel; zinc finish and long; regular; short spring.
- G. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
 2. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch ; diameter.
 - b. Piping up to 1 inch: 1/4 inch ; diameter.
 - c. Piping larger than 1 inch: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8-inch diameter.
- H. Steel Cable:
1. Manufacturers:
 - a. Ductmate Industries, Inc, a DMI Company; Clutcher Cable Hanging System;www.ductmate.com/#sle.
 - b. Elgen Manufacturing Company, Inc;www.elgenmfg.com/#sle.
 - c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
- I. Cable Hanging System Kits:
1. Manufacturers:
 - a. B-Line, a brand of Eaton Corporation;www.eaton.com/#sle.
 - b. Ductmate Industries, Inc;ductmate.com/#sle.
 - c. Gripple, Inc;www.gripple.com/#sle.
 - d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Provide cable-wire in bulk or precut lengths with respective cable hangers as required to hold minimum weight of 120 lb (54.4 kg); 240 lb (108.8 kg).
 3. Accessories: Provide brackets, clip or c-clip hangers, covers, and y-hook hangers.
- J. Thermal Insulated Pipe Supports:
1. Manufacturers:

- a. Buckaroos, Inc; www.buckaroos.com/#sle.
 - b. KB Enterprises; www.snappitz.com/#sle.
2. General Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84; UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch.
 - d. Insulation inserts to consist of rigid phenolic foam; rigid polyisocyanurate (urethane); calcium silicate insulation surrounded by a 360 degree; PVC; galvanized steeljacketing.
 3. PVC Jacket:
 - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam; .
 - b. Minimum Service Temperature: Minus 40 degrees F.
 - c. Maximum Service Temperature: 180 degrees F.
 - d. Moisture Vapor Transmission: 0.0071 per inch (0.0092 ng/Pa s m) when tested in accordance with ASTM E96/E96M.
 - e. Thickness: 60 mil inches.
 - f. Connections: Brush on welding adhesive.
 4. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
 5. Products:
 - a. Buckaroos, Inc; CoolDry; 3300E; 4300E; 1200ECM; www.buckaroos.com/#sle.
- K. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 2. Liquid Temperatures Up To 122 degrees F :
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12; Types 24 and 26 .
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 3. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12 with appropriate saddle of MSS SP-58 Type 40; for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46 with appropriate saddle of MSS SP-58 Type 39; for insulated pipe.
 - c. Sliding Support: MSS SP-58 Types 35 through 38.
- L. Roller Chairs:
1. Manufacturers:
 - a. ASC Engineered Solutions; www.asc-es.com/#sle.
 - b. FNW; 7901; 7902; www.fnw.com/#sle.
 - c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 type 43 based on required load, nonconductive and corrosion resistant.
 3. Steel Yoke Type: MSS SP-58 type 44, vertically adjustable, nonconductive, and corrosion resistant.
 4. Material: Zinc plated ASTM A36/A36M carbon steel or ASTM A47/A47M malleable iron.
- M. Pipe Stanchions:
1. Manufacturers:
 - a. Anvil International; H-Block; www.anvilintl.com/#sle.

- b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
 4. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
- N. Beam Clamps:
 1. Manufacturers:
 - a. FNW; 7201; 7202; 7203; 7204; 7205; 7206; www.fnw.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
 3. Beam C-Clamp: MSS SP-58 type 23, malleable iron; steel; with plain; stainless steel; zinc finish.
 4. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain; zinc finish. For inverted usage provide manufacturer listed size(s).
 5. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
 6. Center load Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
 7. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish; plated finish,
 8. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
 9. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- O. Riser Clamps:
 1. Manufacturers:
 - a. FNW; 7020; 7022; 7023; www.fnw.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 3. MSS SP-58 type 1 or 8, carbon steel; steel with epoxy plated; plain; stainless steel; zinc plated finish.
 4. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel; stainless steel with epoxy plated; plain; stainless steel; zinc plated finish.
 5. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 6. UL (DIR) listed: Pipe sizes 1/2 to 8 inch ; 3/4 to 8 inch; 1/2 to 12 inch.
- P. U-Bolts:
 1. Manufacturers:
 - a. FNW; 7610; www.fnw.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 Type 24, carbon steel; zinc-coated carbon steel; 304 stainless steel u-bolt for pipe support or anchoring.
- Q. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.
- R. Strut Clamps:
 1. Manufacturers:
 - a. FNW; 7815; 7816; 7872; 7873; www.fnw.com/#sle.
 - b. Gripple Inc; GCS; www.gripple.com/#sle.

- c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Pipe Clamp: Two-piece rigid; universal; outer diameter type, carbon steel; malleable iron; 304 stainless steels; 316 stainless steel with epoxy copper; epoxy plated; galvanized steel; stainless steel; zinc finish.
 3. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil (26,398,000 V/m).
 4. Service Temperature Range: Minus 65 to 275 degrees
- S. Insulation Clamps:
1. Manufacturers:
 - a. FNW; 7897; 7899; www.fnw.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Two bolt-type clamps designed for installation under insulation.
 3. Material: Carbon steel; Malleable iron; 304 Stainless steel; 316 Stainless steel with epoxy copper; epoxy plated; galvanized steel; stainless steel; zinc finish.
- T. Pipe Hangers:
1. Split Ring Hangers:
 - a. Manufacturers:
 - 1) FNW; 7001; : www.fnw.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. Provide hinged split ring; yoke roller; hanger with epoxy copper; plain; zinc finish.
 - c. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - d. Provide hanger rod and nuts of the same type and material for a given pipe run.
 - e. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
 2. Band Hangers, Adjustable:
 - a. Manufacturers:
 - 1) Gripple, Inc; Universal Clamp (Threaded);: www.gripple.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. MSS SP-58 Type 7 or 9, Zinc-plated ASTM A1011/A1011M steel; ASTM A653/A653M carbon steel.
 3. J-Hangers, Adjustable:
 - a. Manufacturers:
 - 1) FNW; 7025; 7026; www.fnw.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. MSS SP-58 Type 5, Zinc-plated ASTM A1011/A1011M steel; ASTM A653/A653M carbon steel.
 - c. Felt-Lining: Provide for uninsulated pipe to reduce noise and prevent static issues.
 4. Swivel Ring Hangers, Adjustable:
 - a. Manufacturers:
 - 1) FNW; 7010; 7012; www.fnw.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. MSS SP-58 Type 10, epoxy-painted, zinc-colored.
 - c. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
 - d. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
 - e. Felt-Lining: Provide for uninsulated pipe to reduce noise and prevent static issues.

5. Clevis Hangers, Adjustable:
 - a. Manufacturers:
 - 1) FNW; 7005; 7006; 7007; 7008; www.fnw.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
 - c. Felt-Lined: MSS SP-58 Type 1, epoxy-plated, zinc; zinc-plated, silicone-free carbon steel.
 - d. Light-Duty: MSS SP-58 Type 1, plain finish; zinc-plated; zinc-colored, epoxy plated.
 - e. Standard-Duty: MSS SP-58 Type 1, plain finish; stainless steel; zinc-plated; zinc-colored, epoxy plated.
 - f. UL (DIR) listed: Pipe sizes 1/2 to 4 inch; 3/4 to 4 inch; 2-1/2 to 8 inch.
 - g. FM (AG) listed: Pipe sizes 1/2 to 4 inch; 3/4 to 4 inch; 2-1/2 to 8 inch.
- U. Nonmetallic Pipe Hangers:
 1. Manufacturers:
 - a. DecoShield Systems, Inc; Snap-2 Hangers; www.decoshield.com/#sle.
- V. Intermediate Pipe Guides:
 1. Manufacturers:
 - a. Anvil International; www.anvilintl.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Pipe Diameter 6 inch and smaller: Provide minimum clearance of 0.16 inch.
 3. Pipe Sizes 8 inch; 0.625 inch ; U-bolt with double nuts providing minimum clearance of 0.28 inch .
 4. Pipe Size 10 inch; 0.75 inch; U-bolt.
 5. Pipe Sizes 12 to 16 inch; 0.875 inch; U-bolt.
 6. Pipe Sizes 18 to 30 inch; 1 inch; U-bolt.
 7. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
- W. Pipe Alignment Guides: Galvanized steel.
 1. Manufacturers:
 - a. Anvil International; www.anvilintl.com/#sle.
 - b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Pipe Sizes 8 inch and smaller: Spider or sleeve type.
 3. Pipe Sizes 10 inch and larger: Roller type.
 4. Pipe Sizes 18 to 30 inch; 1 inch; U-bolt.
- X. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- Y. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
 1. Manufacturers:
 - a. Anvil International; H-Block; www.anvilintl.com/#sle.
 - b. B-Line, a brand of Eaton Corporation; www.eaton.com/#sle.
 - c. Erico International Corporation, a brand of Pentair: www.erico.com/#sle.
 - d. PHP Systems/Design: www.phpsd.com/#sle.
 - e. Unistrut, a brand of Atkore International Inc; www.unistrut.com/#sle.
 2. Provide steel pedestals with thermoplastic; rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- Z. Pipe Shields for Insulated Piping:
1. Manufacturers:
 - a. Anvil International; www.anvilintl.com/#sle.
 - b. FNW; 7750; 7753; www.fnw.com/#sle.
 - c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. MSS SP-58 Type 40, ASTM A1011/A1011M steel; ASTM A653/A653M carbon steel
 3. General Construction and Requirements:
 - a. Surface Burning Characteristics: Comply with ASTM E84; UL 723.
 - b. Shields Material: UV-resistant polypropylene with glass fill; PVC.
 - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
 - d. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- AA. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
 - a. FNW; 7502; www.fnw.com/#sle.
 - b. Hilti, Inc: www.us.hilti.com/#sle.
 - c. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - d. Powers Fasteners, Inc: www.powers.com/#sle.
 - e. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 2. Manufacturers - Powder-Actuated Fastening Systems:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Ramset, a division of Illinois Tool Works, Inc: www.ramset.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 4. Concrete: Use preset concrete inserts; expansion anchors; screw anchors.
 5. Solid or Grout-Filled Masonry: Use expansion anchors; screw anchors.
 6. Hollow Masonry: Use toggle bolts.
 7. Hollow Stud Walls: Use toggle bolts.
 8. Steel: Use beam-ceiling clamps; beam clamps; machine bolts; welded threaded studs.
 9. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron; stainless steel with copper; plain; stainless steel; zinc finish.
 10. Sheet Metal: Use sheet metal screws.
 11. Wood: Use wood screws.
 12. Plastic and lead anchors are not permitted; permitted only as follows.
 13. Powder-actuated fasteners are not permitted; permitted only as follows:
 - a. Where approved by Architect.
 - b. Use only threaded studs; do not use pins.
 14. Hammer-driven anchors and fasteners are not permitted; permitted only as follows:
 - a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
 - b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).

15. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Minimum Channel Thickness: Steel sheet, 12-gauge, 0.1046-inch minimum base metal thickness.
 - d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
 16. Post-Installed Concrete and Masonry; Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
- BB. Pipe Installation Accessories:
1. Copper Pipe Supports:
 - a. Manufacturers:
 - 1) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 2. Thermal Insulated, Surface-Mounted Pipe Supports:
 - a. Manufacturers:
 - 1) FNW; 7701; 7706: www.fnw.com/#sle.
 - 2) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 3) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. Material: Carbon steel; Malleable iron; 304 Stainless steel; 316 Stainless steel with epoxy copper; epoxy plated; galvanized steel; stainless steel; zinc finish.
 - c. Weather and UV light resistant foam, plastic, or rubber material with built-in strut. Maximum Load: 50 lb for single pipe or multiple landed on top strut.
 3. Overhead Pipe Supports:
 - a. Manufacturers:
 - 1) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 4. Plenum Pipe Supports:
 - a. Manufacturers:
 - 1) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 5. Telescoping Pipe Supports:
 - a. Manufacturers:
 - 1) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 6. Inserts and Clamps:
 - a. Manufacturers:
 - 1) HoldRite, a brand of Reliance Worldwide Corporation; www.holdrite.com/#sle.
 - 2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - b. Cable Sway Bracing Systems:
 - 1) Manufacturers:
 - (a) B-Line, a brand of Eaton Corporation; www.eaton.com/#sle.
 - (b) nVent Caddy, a brand of nVent; www.erico.com/#sle.
 - (c) Gripple, Inc; Standard Hanger; Express Hanger; www.gripple.com/#sle.
 - (d) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

- 2) Cable wire hanger with fix and release; pushbutton spring mechanism enclosed using zinc housing with 302 stainless steel components for pipe or equipment suspension to surface-mounted end-fixing fittings.
- 3) Provide cable wire and end-fixing as required to hold minimum weight of 25 lb; 100 lb; 200 lb; 495 lb; 715 lb.

2.02 RETROFIT PIPING COVER SYSTEM

- A. Manufacturers:
 1. DecoShield Systems, Inc; www.decoshield.com/#sle.
- B. General Requirements:
 1. Surface Burning Characteristics: Flame spread index/smoke developed index of 20/250, maximum, when tested in accordance with ASTM E84; UL 723.
- C. Materials:
 1. Piping Cover System: Removal-resistant, modular, snap-fit cover units, clips, and anchors for use with CPVC, steel, and copper piping systems.
 2. Cover Units: L-shaped and U-shaped cross-section units of flame-retardant resin material, paintable finish.
 3. Unit Length: 7.5 feet (2.29 m); Per manufacturer.
 4. Provide coupling fittings for joining units end to end and prefabricated inside and outside corner fittings and end caps as required.
 5. Provide mounting clips to secure covers to wall-ceiling per manufacturer requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer; Architect.
- G. Field-Welding (where approved by Architect): Comply with Section 055000.
- H. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- I. Equipment Support and Attachment:
 1. Use metal fabricated supports; supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch (80 mm); 4 inch (100 mm) high concrete pad constructed.

- 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- J. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- K. Secure fasteners according to manufacturer's recommended torque settings.
- L. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

**SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Stencils.
- E. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.03 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Samples: Submit two labels; tags in size.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates; Stencilled painting.
- B. Control Panels: Nameplates.
- C. Main Ductwork: Nameplates; Stencilled painting.
- D. Instrumentation: Tags.
- E. Major Control Components: Nameplates.
- F. Piping: Pipe markers; Stencilled painting; Tags.
- G. Relays: Tags.
- H. Small-sized Equipment: Tags.
- I. Thermostats: Nameplates.
- J. Valves: Tags and ceiling tacks where located above lay-in ceiling; or None - N/A.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC; www.advancedgraphicengraving.com/#sle.
 - 2. Brimar Industries, Inc; www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
 - 5. Seton Identification Products, a Tricor Direct Company; www.seton.com/#sle.
- B. Letter Color: White; Black.

- C. Letter Height: 1/4 inch; 1/2 inch.
- D. Background Color: Black; Red; Green; Yellow.
- E. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving; www.advancedgraphicengraving.com/#sle.
 - 2. Brady Corporation; www.bradycorp.com/#sle.
 - 3. Brimar Industries, Inc; www.pipemarket.com/#sle.
 - 4. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 5. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
 - 6. Seton Identification Products, a Tricor Company; www.seton.com/#sle.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass; Aluminum; Stainless Steel with stamped letters; tag size minimum 1-1/2 inch diameter; square with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 ADHESIVE-BACKED DUCT MARKERS

- A. Manufacturers:
 - 1. Brimar Industries, Inc; www.pipemarket.com/#sle.
 - 2. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 3. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
- B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; or none - N/A; printed with UV and chemical resistant inks.
- C. Style: Individual Label; Multiple Markers on a Roll.
- D. Color: Yellow/Black; Green/White; Blue/White.

2.05 STENCILS

- A. Manufacturers:
 - 1. Brady Corporation; www.bradycorp.com/#sle.
 - 2. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 3. Insite Solutions, LLC; www.stop-painting.com/#sle.
 - 4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
 - 5. Seton Identification Products, a Tricor Company; www.seton.com/#sle.
- B. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
 - 5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
 - 6. Ductwork and Equipment: 2-1/2 inch high letters.

2.06 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation; www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc; www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
 - 5. Seton Identification Products, a Tricor Company; www.seton.com/#sle.
- B. Color: Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- E. Ammonia Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
 - 1. Products:
 - a. Kolbi Pipe Marker Co; Ammonia Pipe Markers; www.kolbipipemarkers.com/#sle.
- F. Color code as follows:
 - 1. Heating, Cooling: Green with white letters.
 - 2. Toxic and Corrosive Fluids: Orange with black letters.
 - 3. Compressed Air: Blue with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Install ductwork with plastic nameplates; stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

**SECTION 230593
TESTING, ADJUSTING, AND BALANCING (TAB) FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of refrigerating and natural gas systems.
- C. Measurement of final operating condition of HVAC systems.
- D. Sound measurement of equipment operating conditions.
- E. Vibration measurement of equipment operating conditions.
- F. Commissioning activities.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.
- B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods 2016, with Errata.
- C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).
- D. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems 2015, with Errata (2017).
- E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.03 SUBMITTALS

- A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Engineer.
 - 2. Submit to the Construction Manager.
 - 3. Submit six weeks prior to starting the testing, adjusting, and balancing work.

4. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
5. Include at least the following in the plan:
 - a. Preface: An explanation of the intended use of the control system.
 - b. List of all air flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - d. Identification and types of measurement instruments to be used and their most recent calibration date.
 - e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - f. Final test report forms to be used.
 - g. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) AHUS.
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - h. Expected problems and solutions, etc.
 - i. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - j. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.

- k. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - n. Method of checking building static and exhaust fan and/or relief damper capacity.
 - o. Proposed selection points for sound measurements and sound measurement methods.
 - p. Methods for making coil or other system plant capacity measurements, if specified.
 - q. Time schedule for TAB work to be done in phases (by floor, etc.).
 - r. Description of TAB work for areas to be built out later, if any.
 - s. Time schedule for deferred or seasonal TAB work, if specified.
 - t. False loading of systems to complete TAB work, if specified.
 - u. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - v. Interstitial cavity differential pressure measurements and calculations, if specified.
 - w. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - x. Procedures for formal progress reports, including scope and frequency.
 - y. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- D. Progress Reports.
- E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to the Construction Manager after completion of testing, adjusting, and balancing.

2. Revise TAB plan to reflect actual procedures and submit as part of final report.
3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in I-P (inch-pound) units only.
8. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer.
 - g. Project Contractor.
 - h. Project altitude.
 - i. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.

3. SMACNA (TAB).
 4. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of three years documented experience.
 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.

7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Proper strainer baskets are clean and in place.
 11. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
 2. Discrepancies, deficient or uncompleted work by others.
 3. Contract interpretation requests.
 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure.

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Cooled Refrigerant Condensers.
 - 2. Packaged Roof Top Gas Heating/Cooling Units.
 - 3. Electrical Baseboard.
 - 4. DX Coils.
 - 5. Air Handling Units.
 - 6. Fans.
 - 7. Air Filters.
 - 8. Gas Furnace

3.08 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.

3. Driven sheave, diameter and RPM.
 4. Belt, size and quantity.
 5. Motor sheave diameter and RPM.
 6. Center to center distance, maximum, minimum, and actual.
- C. Combustion Equipment:
1. Gas Furnace manufacturer.
 2. Model number.
 3. Serial number.
 4. Firing rate.
 5. Overfire draft.
 6. Gas meter timing dial size.
 7. Gas meter time per revolution.
 8. Gas pressure at meter outlet.
 9. Gas flow rate.
 10. Heat input.
 11. Burner manifold gas pressure.
 12. Percent carbon monoxide (CO).
 13. Percent carbon dioxide (CO₂).
 14. Percent oxygen (O₂).
 15. Percent excess air.
 16. Flue gas temperature at outlet.
 17. Ambient temperature.
 18. Net stack temperature.
 19. Percent stack loss.
 20. Percent combustion efficiency.

21. Heat output.

D. Air Cooled Condensers:

1. Identification/number.
2. Location.
3. Manufacturer.
4. Model number.
5. Serial number.
6. Entering DB air temperature, design and actual.
7. Leaving DB air temperature, design and actual.
8. Number of compressors.

E. DX-Refrigerant Coils:

1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Gas Pressure.
7. Entering air DB temperature, design and actual.
8. Entering air WB temperature, design and actual.
9. Leaving air DB temperature, design and actual.
10. Leaving air WB temperature, design and actual.
11. Air pressure drop, design and actual.

F. Air Handling Equipment:

1. Location.
2. Manufacturer.

3. Model number.
 4. Serial number.
 5. Arrangement/Class/Discharge.
 6. Air flow, specified and actual.
 7. Return air flow, specified and actual.
 8. Outside air flow, specified and actual.
 9. Total static pressure (total external), specified and actual.
 10. Inlet pressure.
 11. Discharge pressure.
 12. Sheave Make/Size/Bore.
 13. Number of Belts/Make/Size.
 14. Fan RPM.
- G. Return Air/Outside Air:
1. Identification/location.
 2. Design air flow.
 3. Actual air flow.
 4. Design return air flow.
 5. Actual return air flow.
 6. Design outside air flow.
 7. Actual outside air flow.
 8. Return air temperature.
 9. Outside air temperature.
 10. Required mixed air temperature.
 11. Actual mixed air temperature.
 12. Design outside/return air ratio.

13. Actual outside/return air ratio.

H. Exhaust Fans:

1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

I. Duct Traverses:

1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.

10. Air correction factor.

J. Duct Leak Tests:

1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
 - a. Blower.
 - b. Orifice, tube size.
 - c. Orifice size.
 - d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

K. Sound Level Reports:

1. Location.
2. Octave bands - equipment off.
3. Octave bands - equipment on.

L. Vibration Tests:

1. Location of points:
 - a. Fan bearing, drive end.
 - b. Fan bearing, opposite end.
 - c. Motor bearing, center (if applicable).
 - d. Motor bearing, drive end.

- e. Motor bearing, opposite end.
 - f. Casing (bottom or top).
 - g. Casing (side).
 - h. Duct after flexible connection (discharge).
 - i. Duct after flexible connection (suction).
2. Test readings:
 - a. Horizontal, velocity and displacement.
 - b. Vertical, velocity and displacement.
 - c. Axial, velocity and displacement.
 3. Normally acceptable readings, velocity and acceleration.
 4. Unusual conditions at time of test.
 5. Vibration source (if non-complying).

END OF SECTION

**SECTION 230719
HVAC PIPING INSULATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Weather barrier coatings.
- C. Jacketing and accessories.
- D. Engineered wall outlet seals and refrigerant piping insulation protection.

1.02 RELATED REQUIREMENTS

- A. Section 232300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar 2015.
- B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation 2017.
- G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- H. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2019.
- I. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- J. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- K. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- L. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing 2010 (Reapproved 2016).
- M. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation 2021.
- N. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation 2017.
- O. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- P. ASTM C1126 - Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation 2019.
- Q. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation 2021.
- R. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation 2017.

- S. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation 2021.
- T. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service 2020.
- U. ASTM C1775 - Standard Specification for Laminate Protective Jacket and Tape for Use over Thermal Insulation for Outdoor Applications 2014.
- V. ASTM D93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester 2020.
- W. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- X. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces 2008 (Reapproved 2019).
- Y. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber 2020.
- Z. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics 2016.
- AA. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics 2017.
- BB. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay 2017 (Reapproved 2021).
- CC. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- DD. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- EE. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- FF. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. **Product Data:** Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. **Samples:** Submit two samples of any representative size illustrating each insulation type.
- C. **Manufacturer's Instructions:** Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. **Applicator Qualifications:** Company specializing in performing the type of work specified in this section with minimum 3 years of experience; with minimum 3 years of documented experience; and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. **Accept materials on site,** labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24.

1.08 WARRANTY

- A. Correct defective Work within a two-years period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84; UL 723.

2.02 POLYETHYLENE

- A. Manufacturers:
 - 1. Armacell LLC; www.armacell.us/#sle.
- B. Insulation: Flexible closed-cell polyethylene tubing, slit lengthwise for installation, complying with applicable requirements of ASTM D1056.
 - 1. K (Ksi) Value: ASTM C177; 0.25 at 75 degrees F.
 - 2. Maximum Service Temperature: 300 degrees F.
 - 3. Density: 2 pcf (32 kg/cu m).
 - 4. Maximum Moisture Absorption: 1.0 percent by volume.
 - 5. Moisture Vapor Permeability: 0.05 perm inch; perm inch, when tested in accordance with ASTM E96/E96M.
 - 6. Connection: Contact adhesive.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT); www.aeroflexusa.com/#sle.
 - 2. Armacell LLC; ArmaFlex Ultra with Flame Defense; AP ArmFlex; www.armacell.us/#sle.
 - 3. K-Flex USA LLC; Insul-Lock DS; Insul-Tube; Insul-Sheet; K-Flex HT; K-Flex Clad AL Sheet; K-Flex Titan; K-Fonik GK; www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; Grade 2; Grade 3; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F (82 degrees C); 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D. Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.
 - 1. Manufacturers:
 - a. Vimasco Corporation; www.vimasco.com/#sle.

2.04 WEATHER BARRIER COATINGS

- A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.

1. Manufacturers:
 - a. H.B. Fuller Construction Products, Inc; Childers - CP Series Weather Barrier Coating; www.fosterproducts.com/#sle.
2. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
3. Water Vapor Permeance: Greater than 1.0 perm (57 ng/(Pa s m)) in accordance with ASTM E96/E96M.
4. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.
5. Color: As selected by Architect; White; Metallic gray; Black.

2.05 JACKETING AND ACCESSORIES

- A. Aluminum Jacket:
 1. Manufacturers:
 - a. JOHNS MANVILLE: <https://www.jm.com/en/>.
 2. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.
 3. Thickness: 0.016 inch; 0.020 inch; 0.025 inch; 0.032 inch; 0.040 inch; sheet.
 4. Type: Factory-applied, self-adhesive jacketing.
 5. Finish: Smooth; Embossed.
 6. Joining: Longitudinal slip joints and 2 inches laps.
 7. Fittings: 0.016 inch; thick die-shaped fitting covers with factory-attached protective liner.
 8. Metal Jacket Bands: 3/8 inch wide; 0.015 inch; thick aluminum.
 9. Metal Jacket Bands: 3/8 inch wide; 0.010 inch; thick stainless steel.
- B. Aluminum-Foil Laminate Jacket:
 1. Manufacturers:
 - a. Ideal Tape Co., Inc; www.idealtape.com/#sle.
 2. Factory-applied, pressure sensitive adhesive jacketing on paper release liner.
 3. Finish: Aluminum smooth; Aluminum embossed; Gloss white; Embossed white.
 4. Comply with ASTM C1775.
- C. Aluminum-Foil Laminate Jacket:
 1. Manufacturers:
 - a. H.B. Fuller Construction Products, Inc; Foster - Vapor-Fas; www.fosterproducts.com/#sle.
 2. Factory-applied, pressure sensitive adhesive jacketing to comply with ASTM C1775.
- D. Stainless Steel Jacket: ASTM A666, Type 302; 304; 316 stainless steel.
 1. Thickness: 0.010 inch ; 0.016 inch ; 0.018 inch.
 2. Finish: Smooth; Corrugated
 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch ; thick stainless steel.
- E. Reinforced Tape:
 1. Manufacturers:
 - a. Ideal Tape Co., Inc; www.idealtape.com/#sle.
 2. FSK; All Service Jacket; PS tape suitable for sealing seams between insulation, insulated pipe bends, and fittings resulting in a tight, smooth surface without wrinkles.
 3. Comply with UL 723, ASTM E84.
 4. Moisture Vapor Permeability: 0.00 perm inch , when tested in accordance with ASTM E96/E96M.
 5. Finish: Match insulation.
- F. Plain Foil Tape:
 1. Manufacturers:
 - a. Ideal Tape Co., Inc; www.idealtape.com/#sle.
 2. Aluminum foil with pressure-sensitive adhesive on paper release liner.
 3. Finish: Plain foil.

2.06 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION

- A. Manufacturers:
 - 1. Airex Manufacturing, Inc; www.airexmfg.com/#sle.
- B. Basis of Design: Airex Manufacturing, Inc; www.airexmfg.com/#sle.
 - 1. Pipe Penetration Wall Seal: Airex Titan Outlet.
 - 2. Refrigeration Pipe Insulation Protection System: Airex E-Flex Guard.
 - 3. Pipe Penetration Wall Seal and Insulation Protection System: Airex Pro-System Kit.
- C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
 - 1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
 - a. Elastomeric Sleeve Diameter: 1-11/16 inch; 2-3/8 inch ; 3-3/16 inch.
 - 2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
 - a. Elastomeric Sleeve Diameter: 1-11/16 inch; 2-3/8 inch.
 - 3. Outlet Cover Color: Gray; White.
 - 4. Water Penetration: Comply with ASTM E331.
 - 5. Air Leakage: Comply with ASTM E283.
 - 6. Air Permeance: Comply with ASTM E2178.
- D. Insulation Protection System: Refrigerant piping insulation PVC protective cover.
 - 1. PVC Insulation Cover Color: Black; White; with full-length velcro fastener.
 - 2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
 - 3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
 - 4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
 - 5. Flame Spread and Smoke Development Rating of 24/450: Comply with ASTM E84; UL 723.
 - 6. Carbon Arc Light Exposure: Comply with ASTM G153.
 - 7. Tensile Strength After UV Exposure and Water Immersion: Comply with ASTM D412.
 - 8. Water Absorption of Plastics: Comply with ASTM D570.
 - 9. Adhesive free.

2.07 ACCESSORIES

- A. General Requirements:
 - 1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
 - 2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
 - 3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
 - 4. Supply materials that are asbestos free.
- B. Corrosion Inhibitors:
 - 1. Corrosion Control Gel:
 - a. Manufacturers:
 - 1) Poly guard Products; RG2400LT; RG2400CHW;
www.polyguardproducts.com/#sle.
 - b. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches; 2 inches diameter or larger.
 - 2. Shields: Galvanized steel; Steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations.
- K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet) above finished floor): Finish with canvas jacket sized for finish painting; PVC jacket and fitting covers; ABS jacket and fitting covers; aluminum jacket; stainless steel jacket.
- L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum; stainless steel jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.
- M. Buried Piping: Provide factory-fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil, 0.001 inch (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.
- N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum; stainless steel jacket with seams located on bottom side of horizontal piping.

END OF SECTION

**SECTION 231123
FACILITY NATURAL-GAS PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for natural gas piping systems.

1.02 REFERENCE STANDARDS

- A. ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing 2019.
- B. ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators 2019.
- C. ANSI Z21.80/CSA 6.22 - Line Pressure Regulators 2019.
- D. ANSI Z223.1 - National Fuel Gas Code 2021.
- E. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2021.
- F. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- G. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes 2018.
- H. ASME B31.1 - Power Piping 2020.
- I. ASME B31.9 - Building Services Piping 2020.
- J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- L. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2019.
- N. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed 2019.

- O. ASTM B75/B75M - Standard Specification for Seamless Copper Tube 2020.
- P. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2020.
- Q. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- R. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service 2020.
- S. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- T. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- U. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings 2020.
- V. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing 2020.
- W. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- X. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992, with Editorial Revision (2018).
- Y. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2021).
- Z. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2018.
- AA. AWWA C606 - Grooved and Shouldered Joints 2015.
- BB. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2015.
- CC. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements 2015.
- DD. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2015.
- EE. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2016.
- FF. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

GG. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends 2011.

HH. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata.

1.03 SUBMITTALS

- A. **Product Data:** Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. **Welders' Certificates:** Submit certification of welders' compliance with ASME BPVC-IX; AWS D1.1/D1.1M.
- C. **Shop Drawings:** For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. **Sustainable Design Documentation:** For soldered copper joints, submit installer's certification that the specified installation method and materials were used.
- E. **Project Record Documents:** Record actual locations of valves.
- F. **Maintenance Materials:** Furnish the following for Owner's use in maintenance of project.
 - 1. **Valve Repacking Kits:** One for each type and size of valve.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. **Valves:** Manufacturer's name and pressure rating marked on valve body.
- C. **Welding Materials and Procedures:** Comply with ASME BPVC-IX and applicable state labor regulations.
- D. **Welder Qualifications:** Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM specification.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 NATURAL GAS PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.
 - 2. Joints: ANSI Z223.1; ASME B31.1; ASME B31.9; ASME BPVC-IX, welded.
 - 3. Mechanical Press Sealed Fittings: Double pressed type and approved or certified, utilizing EPDM, nontoxic synthetic rubber sealing elements.
- B. Flexible Gas Piping:
 - 1. Corrugated Stainless Steel Tubing: Comply with ANSI LC 1/CSA 6.26.
 - 2. Fittings: Provided by piping system manufacturer.

2.02 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
 - 1. Manufacturers:
 - a. Wheatland Tube Company: www.wheatland.com/#sle.
 - b. Or Equal.
 - 2. Fittings: ASTM A234/A234M, wrought steel welding type.
 - 3. Joints: ANSI Z223.1; ASME B31.1; ASME B31.9; ASME BPVC-IX; or welded.

4. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.
5. Mechanical Press Sealed Fittings: Double pressed type and approved or certified, utilizing EPDM, nontoxic synthetic rubber sealing elements.

B. Flexible Gas Piping:

1. Corrugated Stainless Steel Tubing: Comply with ANSI LC1 / CSA 6.26.
2. Fittings: Provided by piping system manufacturer.

2.03 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.

1. Manufacturers:
 - a. Wheatland Tube Company: www.wheatland.com/#sle.
 - b. Or Equal
2. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
3. Joints: Threaded or welded to ASME B31.1; ANSI Z223.1; ASME B31.9; ASME BPVC-IX.
4. Mechanical Press Sealed Fittings: Double pressed type and approved or certified, utilizing EPDM, nontoxic synthetic rubber sealing elements.

B. Flexible Gas Piping:

1. Corrugated Stainless Steel Tubing: Comply with ANSI LC 1/CSA 6.26.
2. Comply with ASTM E84.
3. Fittings: Provided by piping system manufacturer.
4. Provide piping with integral lightning protection.

2.04 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:

1. Ferrous Pipe: Class 150 malleable iron threaded unions.

- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 - 3. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - a. Cold and Hot Pipe Sizes 6 Inches and over: Double hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
 - 6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not

penetrating the roofing assembly, with support fixtures as specified; and as follows:

- a. Bases: High density polypropylene.
- b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
- c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
- d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
- e. Height: Provide minimum clearance of 6 inches.

2.06 BALL VALVES

A. Manufacturers:

1. Apollo Valves.
2. Grinnell Products.
3. Milwaukee Valve Company.
4. Nibco, Inc.
5. Viega LLC.
6. Or Equal

2.07 PLUG VALVES

- A. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.08 STRAINERS

A. Manufacturers:

1. Armstrong International, Inc.
2. Green Country Filter Manufacturing.

3. WEAMCO.
 4. Or Equal.
- B. Size 2 inch and Under:
1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.09 LINE PRESSURE REGULATORS AND APPLIANCE REGULATORS INDICATORS

- A. Compliance Requirements:
1. Appliance Regulator: ANSI Z21.18/CSA 6.3.
 2. Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
- B. Materials in Contact with Gas:
1. Housing: Aluminum, steel (free of non-ferrous metals).
 2. Seals and Diaphragms: NBR-based rubber.
- C. Maximum Inlet Operating Pressure: 10 psi;
1. Appliance Regulator: 2 psi.
 2. Line Pressure Regulator: 10 psi.
- D. Maximum Body Pressure: 15 psi
- E. Output Pressure Range: Coordinate with final approved submittal for each appliance.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
 - 1. Coordinate size and location of access doors with fuel gas code.
- I. Establish elevations of buried piping outside the building to ensure adequate cover.
- J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

- L. Provide support for utility meters in accordance with requirements of utility companies.
- M. Install valves with stems upright or horizontal, not inverted.
- N. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- O. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813.
- P. Sleeve pipes passing through partitions, walls and floors.
- Q. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above; flush with top of; recessed into and grouted flush with slab.
- R. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping; sheet lead packing between hanger or support and piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install ball valves for throttling, bypass, or manual flow control services.
- E. Provide plug valves in natural gas systems for shut-off service.

3.05 SERVICE CONNECTIONS

- A. Provide new gas service complete with gas meter and regulators in accordance with fuel gas code. Gas service distribution piping to have initial minimum pressure of 7 inch wg.
- B. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment

END OF SECTION

**SECTION 232300
REFRIGERANT PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Pressure regulators.
- H. Pressure relief valves.
- I. Filter-driers.
- J. Solenoid valves.
- K. Expansion valves.
- L. Receivers.
- M. Flexible connections.
- N. Engineered wall seals and insulation protection.
- O. Exterior penetration accessories.

1.02 RELATED REQUIREMENTS

- A. Section 230716 - HVAC Equipment Insulation.
- B. Section 230719 - HVAC Piping Insulations.
- C. Section 235400 - Furnaces.
- D. Section 236213 - Packaged Air-Cooled Refrigerant Compressor and Condenser Units.
- E. Section 236313 - Air Cooled Refrigerant Condensers.
- F. Section 237313 - Modular Indoor Central-Station Air-Handling Units
- G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers 2005.
- B. AHRI 710 (I-P) - Performance Rating of Liquid-Line Driers 2009.
- C. AHRI 711 (SI) - Performance Rating of Liquid-Line Driers 2009.
- D. AHRI 730 (I-P) - Flow Capacity Rating of Suction Line Filters and Suction Line Filter Driers 2013 (Reapproved 2014).
- E. AHRI 750 - Thermostatic Refrigerant Expansion Valves 2007.
- F. AHRI 760 (I-P) - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants 2014.
- G. AHRI 761 (SI) - Performance Rating of Solenoid Valves for Use with Volatile Refrigerants 2014.
- H. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2019, with All Amendments and Errata.
- I. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants 2019.

- J. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2021.
- K. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2021.
- L. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- M. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes 2018.
- N. ASME B31.5 - Refrigeration Piping and Heat Transfer Components 2020.
- O. ASME B31.9 - Building Services Piping 2020.
- P. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- Q. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- R. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2019.
- S. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2020.
- T. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- U. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service 2020.
- V. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).
- W. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen 2004 (Reapproved 2012).
- X. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- Y. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- Z. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.
- AA. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992, with Editorial Revision (2018).
- BB. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials 2013 (Reapproved 2021).
- CC. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- DD. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- EE. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2021).
- FF. ICC (IMC)-2018 - International Mechanical Code 2018.
- GG. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- HH. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical Current Edition, Including All Revisions.
- II. UL 429 - Electrically Operated Valves Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. **Product Data:** Provide general assembly of specialties, including manufacturer's catalogue information. Provide manufacturers catalog data including load capacity.
- B. **Sustainable Design Documentation:** Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- C. **Shop Drawings:** Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- D. **Design Data:** Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. **Test Reports:** Indicate results of leak test, acid test.
- F. **Manufacturer's Installation Instructions:** Indicate support, connection requirements, and isolation for servicing.
- G. **Submit welders certification of compliance with ASME BPVC-IX; AWS D1.1/D1.1M.**
- H. **Designer's qualification statement.**
- I. **Installer's qualification statement.**
- J. **Project Record Documents:** Record exact locations of equipment and refrigeration accessories on record drawings.
- K. **Maintenance Data:** Include instructions for changing cartridges, assembly views, spare parts lists.
- L. **Maintenance Materials:** Furnish the following for Owner's use in maintenance of project.
 - 1. **Extra Filter-Dryer Cartridges:** One; Two of each type and size.
 - 2. **Refrigeration Oil Test Kits:** One; Two, each containing everything required to conduct one test.
 - 3. **Extra Refrigerant:** One container; Two containers of refrigerant,

1.05 QUALITY ASSURANCE

- A. **Designer Qualifications:** Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work.
- B. **Designer Qualifications:** Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. **Installer Qualifications:** Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver and store piping and specialties in shipping containers with labeling in place.**
- B. **Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.**
- C. **Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.**

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. **Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.**
- B. **Provide pipe hangers and supports in accordance with ASME B31.5; MSS SP-58 unless indicated otherwise.**

- C. **Liquid Indicators:**
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. If receiver is provided, install in liquid line leaving receiver.
 - 3. Use line size on leaving side of liquid solenoid valves.
- D. **Valves:**
 - 1. Use service valves on suction and discharge of compressors.
 - 2. Use gauge taps at compressor inlet and outlet.
 - 3. Use gauge taps at hot gas bypass regulators, inlet and outlet.
 - 4. Use check valves on compressor discharge.
 - 5. Use check valves on condenser liquid lines on multiple condenser systems.
- E. **Refrigerant Charging (Packed Angle) Valve:** Use in liquid line between receiver shut-off valve and expansion valve.
- F. **Strainers:**
 - 1. Use line size strainer upstream of each automatic valve.
 - 2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
 - 3. On steel piping systems, use strainer in suction line.
 - 4. Use shut-off valve on each side of strainer.
- G. **Pressure Relief Valves:** Use on ASME receivers and pipe to outdoors.
- H. **Filter-Driers:**
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
 - 2. Use a filter-drier on suction line just ahead of compressor.
 - 3. Use sealed filter-driers in lines smaller than 1/2 inch; 3/4 inch outside diameter.
 - 4. Use sealed filter-driers in low temperature systems.
 - 5. Use sealed filter-driers in systems utilizing hermetic compressors.
 - 6. Use replaceable core filter-driers in lines of 1/2 inch; 3/4 inch outside diameter or greater.
 - 7. Use replaceable core liquid-line filter-driers in systems utilizing receivers.
 - 8. Use filter-driers for each solenoid valve.
- I. **Solenoid Valves:**
 - 1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.
 - 2. Use in liquid line of single or multiple evaporator systems.
 - 3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.
- J. **Receivers:**
 - 1. As per manufacturer recommendation.
- K. **Flexible Connectors:** Utilize at or near compressors where piping configuration does not absorb vibration.

2.02 REGULATORY REQUIREMENTS

- A. Comply with ASME B31.9 for installation of piping system.
- B. **Welding Materials and Procedures:** Comply with ASME BPVC-IX and applicable state labor regulations.
- C. **Welders Certification:** In accordance with ASME BPVC-IX; AWS D1.1/D1.1M.
- D. **Products Requiring Electrical Connection:** Listed and classified by UL, as suitable for the purpose indicated.

2.03 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
 - 3. Mechanical Press Sealed Fittings: Double pressed type complying with UL 207 and ICC (IMC)-2018.
 - a. Manufacturers:
 - 1) RLS, LLC; RLS Cu (Copper): www.rlspressfittings.com/#sle.
- B. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
 - 1. Fittings: ASME B16.26 cast copper.
 - 2. Joints: Flared.
 - 3. Mechanical Press Sealed Fittings: Double pressed type complying with UL 207 and ICC (IMC)-2018.
 - a. Manufacturers:
 - 1) RLS, LLC; RLS Cu (Copper): www.rlspressfittings.com/#sle.
- C. Pipe Supports and Anchors:
 - 1. Provide hangers and supports that comply with MSS SP-58.
 - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron; Carbon steel adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support: Steel riser clamp.
 - 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 10. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 11. Inserts: Malleable iron case of galvanized; steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
 - 12. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High density, UV tolerant, polypropylene or reinforced PVC.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
 - f. Manufacturers:
 - 1) PHP Systems/Design: www.phpsd.com/#sle.
 - 2) Portals Plus; Pedestal Plus: www.portalsplus.com/#sle.

2.04 REFRIGERANT

- A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

2.05 MOISTURE AND LIQUID INDICATORS

- A. Manufacturers:
1. Henry Technologies: www.henrytech.com/#sle.
 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Indicators: Single; Double port type, UL listed, with copper or brass body, flared or soldered ends, sight glass, color coded paper moisture indicator with removable element cartridge; and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi; 460 psi; 430 psi.

2.06 VALVES

- A. Manufacturers:
1. Hansen Technologies Corporation: www.hantech.com/#sle.
 2. Henry Technologies: www.henrytech.com/#sle.
 3. Flomatic Valves: www.flomatic.com/#sle.
- B. Diaphragm Packless Valves:
1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, soldered or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- C. Packed Angle Valves:
1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, soldered or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- D. Ball Valves:
1. Two piece bolted; forged brass body with teflon ball seals and copper tube extensions, brass bonnet and; seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F; 325 degrees F.
- E. Service Valves:
1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or soldered ends, for maximum pressure of 500 psi.

2.07 STRAINERS

- A. Manufacturers:
1. Hansen Technologies Corporation: www.hantech.com/#sle.
 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Straight Line or Angle Line Type:
1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.
- C. Straight Line, Noncleanable Type:
1. Steel shell, copper plated fittings, stainless steel wire screen, for maximum working pressure of psi.

2.08 CHECK VALVES

- A. Manufacturers:
 - 1. Hansen Technologies Corporation: www.hantech.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Globe Type:
 - 1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F and maximum working pressure of 425 psi; 450 psi; 500 psi.
- C. Straight Through Type:
 - 1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 degrees F; 250 degrees F.

2.09 PRESSURE REGULATORS

- A. Manufacturers:
 - 1. Hansen Technologies Corporation: www.hantech.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Brass body, stainless steel diaphragm, direct acting; pilot operated with remote pressure pilot, adjustable over 0 to 80 psi range, for maximum working pressure of 450 psi.

2.10 PRESSURE RELIEF VALVES

- A. Manufacturers:
 - 1. Hansen Technologies Corporation: www.hantech.com/#sle.
 - 2. Henry Technologies: www.henrytech.com/#sle.
 - 3. Sherwood Valve/Harsco Corporation: www.sherwoodvalve.com/#sle.
- B. Straight Through or Angle Type: Brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification NB, selected to ASHRAE Std 15, with standard setting of 235 psi; 300 psi; 350 psi; 400 psi; 425 psi; 450 psi.

2.11 FILTER-DRIERS

- A. Manufacturers:
 - 1. Flow Controls Division of Emerson Electric: www.emersonflowcontrols.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Performance:
 - 1. Flow Capacity - Liquid Line: ton; as indicated in schedule, minimum, rated in accordance with AHRI 710 (I-P) (AHRI 711 (SI)).
 - 2. Flow Capacity - Suction Line: ton; as indicated in schedule, minimum, rated in accordance with AHRI 730 (I-P).
 - 3. Water Capacity: drops at 75 degrees F, drops at 125 degrees F, rated in accordance with AHRI 710 (I-P) (AHRI 711 (SI)).
 - 4. Water Capacity: As indicated in schedule, rated in accordance with AHRI 710 (I-P) (AHR 711 (SI)).
 - 5. Pressure Drop: 2 psi; as indicated in schedule, maximum, when operating at full connected evaporator capacity.
 - 6. Design Working Pressure: 350 psi; 500 psi; as indicated in schedule, minimum.
- C. Cores: Molded or loose-fill; Molded; Loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns , with secondary filtration to 20 microns of construction that will not pass into refrigerant lines.

- D. Construction: UL listed.
 - 1. Replaceable Core Type: Steel shell with removable cap.
 - 2. Sealed Type: Copper; Steel shell.
 - 3. Connections: As specified for applicable pipe type.

2.12 SOLENOID VALVES

- A. Manufacturers:
 - 1. Flow Controls Division of Emerson Electric www.emersonflowcontrols.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Valve: AHRI 760 I-P, pilot operated, copper, or brass; brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, soldered, or threaded ends; for maximum working pressure of 500 psi; 450 psi; 300 psi.
- C. Coil Assembly: UL 429; UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color-coded lead wires, integral junction box with pilot light.
- D. Electrical Characteristics: watts, volts, single phase, 60 Hz.

2.13 EXPANSION VALVES

- A. Manufacturers:
 - 1. Flow Controls Division of Emerson Electric: www.emersonflowcontrols.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole; mechanical pressure limit (maximum operating pressure MOP feature), adjustable; nonadjustable superheat setting, replaceable inlet strainer, with nonreplaceable; replaceable capillary tube and remote sensing bulb and remote bulb well.
- C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.14 ELECTRONIC EXPANSION VALVES

- A. Manufacturers:
 - 1. Flomatic Valves: www.flomatic.com/#sle.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 - 3. Sporlan, a Division of Parker Hannifin: www.parker.com/#sle.
- B. Valve:
 - 1. Brass body with flared or soldered connection, needle valve with floating needle and machined seat, stepper motor drive.
- C. Evaporation Control System:
 - 1. Electronic microprocessor based unit in enclosed case, proportional integral control with adaptive superheat, maximum operating pressure function, preselection allowance for electrical defrost and hot gas bypass.
 - 2. Electrical Characteristics: VA, 115 volts, single phase, 50/60 Hz or as per selected equipment.

- D. Refrigeration System Control: Electronic microprocessor-based unit in enclosed case, with proportional integral control of valve, on/off thermostat, air temperature alarm (high and low), solenoid valve control, liquid injection adaptive superheat control, maximum operating pressure function, night setback thermostat, timer for defrost control.

2.15 RECEIVERS

- A. Manufacturers:
1. Henry Technologies: www.henrytech.com/#sle.
 2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com/#sle.
 3. Sherwood Valve/Harsco Corporation: www.sherwoodvalve.com/#sle.
- B. Internal Diameter 6 inch and Smaller:
1. AHRI 495, UL listed, steel, brazed; 400 psi maximum pressure rating, with tappings for inlet, outlet, and pressure relief valve.
- C. Internal Diameter Over 6 inch:
1. AHRI 495, welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; 400 psi with tappings for liquid inlet and outlet valves, pressure relief valve, and magnetic liquid level indicator.

2.16 FLEXIBLE CONNECTORS

- A. Manufacturers:
1. Circuit Hydraulics Ltd: www.circuit-hydraulics.co.uk/#sle.
 2. Flexicraft Industries: www.flexicraft.com/#sle.
 3. Penflex: www.penflex.com/#sle.
- B. Corrugated stainless steel; bronze hose with single layer of stainless steel; exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi; 400 psi; 350 psi; 300 psi.

2.17 ENGINEERED WALL SEALS AND INSULATION PROTECTION

- A. Manufacturers:
1. Airex Manufacturing, Inc: www.airexmfg.com/#sle.
- B. Basis of Design: Airex Manufacturing, Inc; www.airexmfg.com/#sle.
1. Pipe Penetration Wall Seal: Airex Titan Outlet.
 2. Refrigeration Pipe Insulation Protection System: Airex E-Flex Guard.
 3. Pipe Penetration Wall Seal and Insulation Protection System: Airex Pro-System Kit.
- C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
 - a. Elastomeric Sleeve Diameter: 1-11/16 inch; 2-3/8 inch; 3-3/16 inch.
 2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
 - a. Elastomeric Sleeve Diameter: 1-11/16 inch; 2-3/8 inch.
 3. Outlet Cover Color: Gray; White.
 4. Water Penetration: Comply with ASTM E331.
 5. Air Leakage: Comply with ASTM E283.
 6. Air Permeance: Comply with ASTM E2178.
- D. Insulation Protection System: Mechanical line insulation and PVC cover.
1. PVC Insulation Cover Color: Black; White with full-length velcro fastener.
 2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
 3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
 4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
 5. Flame Spread and Smoke Development Rating of 25/450: Comply with ASTM E84.
 6. Adhesive free.

2.18 EXTERIOR PENETRATION ACCESSORIES

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
 - 1. Manufacturers:
 - a. Quickflash Weatherproofing Products, Inc www.quickflashproducts.com/#sle.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above; flush with top of; recessed into and grouted flush with slab.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5; ASTM F708; MSS SP-58; and.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping; sheet lead packing between hanger or support and piping.
- H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access to concealed valves and fittings.
- K. Flood piping system with nitrogen when brazing.

- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Insulate piping and equipment.
- O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- T. Fully charge completed system with refrigerant after testing.

3.03 FIELD QUALITY CONTROL

- A. Test refrigeration system in accordance with ASME B31.5.
- B. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch; electronic leak detector. Test to no leakage.

3.04 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet ; minimum rod size, 1/4 inch.
 - 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
 - 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 7. 3-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 8. 3-5/8 inch OD: Maximum span, 11 feet; minimum rod size, 1/2 inch.
 - 9. 4-1/8 inch OD: Maximum span, 12 feet; minimum rod size, 1/2 inch.
- B. Hanger Spacing for Steel Piping.
 - 1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 - 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 - 6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 - 7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.

END OF SECTION

SECTION 238126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS WITH GAS FURNACES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air cooled condensing units.
- B. Indoor air handling (fan and coil) units for ducted systems.
- C. Forced air furnaces.
- D. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 230913 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.
- B. Section 231123 - Facility Natural-Gas Piping.
- C. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- B. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment 2015, with Addendum.
- C. AHRI 520 - Performance Rating of Positive Displacement Condensing Units 2004.
- D. AHRI 610 (I-P) - Standard for Performance Rating of Central System Humidifiers for Residential Applications 2014.
- E. AHRI 611 (SI) - Performance Rating Of Central System Humidifiers for Residential Applications 2014.
- F. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2019, with All Amendments and Errata.
- G. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant 2019.
- H. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size 2017, with Addendum (2022).
- I. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. ASHRAE Std 90.2 - Energy-Efficient Design of Low-Rise Residential Buildings 2018, with Addendum (2021).
- K. ASHRAE Std 103 - Methods of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers 2022.
- L. NEMA MG 1 - Motors and Generators 2018.
- M. NFPA 31 - Standard for the Installation of Oil Burning Equipment 2020.
- N. NFPA 54 - National Fuel Gas Code 2021.

- O. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- P. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- Q. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.
- R. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. **Product Data:** Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- B. **Shop Drawings:** Indicate assembly, required clearances, and location and size of field connections.
- C. **Design Data:** Indicate refrigerant pipe sizing.
- D. **Manufacturer's Instructions:** Indicate rigging, assembly, and installation instructions.
- E. **Sustainable Design Documentation:** Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- F. **Operation and Maintenance Data:** Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. **Warranty:** Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. **Project Record Documents:** Record actual locations of components and connections.

1.05 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. **Installer Qualifications:** Company specializing in performing the work of this section with minimum two years of experience and approved by manufacturer.

1.06 WARRANTY

- A. Provide two-year manufacturer's warranty for solid state ignition modules.
- B. Provide two-year manufacturer's warranty for heat exchangers, condensing units, compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com/#sle.
- B. Trane Inc: www.trane.com/#sle.
- C. York International Corporation / Johnson Controls: www.york.com/#sle.
- D. Or Engineer Approved Equal.

2.02 SYSTEM DESIGN

- A. **Split-System Heating and Cooling Units:** Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
 - 1. Heating: Natural gas fired.
 - 2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.

3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Schedule for all requirements. See Schedule for additional requirements. See Drawings for additional requirements.

2.03 INDOOR AIR HANDLING UNITS FOR DUCTED SYSTEMS

- A. Manufacturers:
 1. Bosch Thermotechnology.
 2. Carrier.
 3. Trane.
 4. Or Engineer Approved Equal.
- B. Air Filters: 1 inch (25 mm) thick urethane, washable type arranged for easy replacement.
- C. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 2. Manufacturers: System manufacturer.
- D. Natural Gas Furnace connected directly to indoor cooling unit casing.

2.04 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 1. Comply with AHRI 210/240.
 2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
 3. Refrigerant: R-410A.
 4. Cabinet: Galvanized steel or Steel with baked enamel or powder coat paint finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
 5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
 6. Sound Rating: 69 dBA, when measured in accordance with AHRI 270.
- B. Compressor: Scroll resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.
- C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
 1. Condenser Fans: Direct-drive propeller type.
 2. Condenser Fan Motor: Enclosed, 1-phase type, permanently lubricated.
- D. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- E. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
 1. Provide thermostatic expansion valves.
 2. Provide heat pump reversing valves.
- F. Operating Controls:
 1. Control by room thermostat to maintain room temperature setting.

2.05 GAS FURNACE COMPONENTS

- A. Heat Exchanger: Aluminized steel or Stainless-steel ceramic coated, clamshell type or welded construction.
- B. Heat Exchanger: Cast iron combustion chamber with stainless and aluminized steel tailpipe and decoupler, resiliently mounted.
- C. Heat Exchanger: Aluminized and stainless-steel tubular type.
- D. Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element(s), controls, and accessories; wired for single power connection with control transformer.
 - 1. Air Flow Configuration: Horizontal Discharge
 - 2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- E. Coating: Polypropylene.
- F. Insulation: Foil-faced.
- G. Burner: Atmospheric type with adjustable combustion air supply,
 - 1. Gas valve, two stage, provides 100 percent safety gas shut-off.
 - 2. Electronic pilot ignition, with electric spark igniter.
 - 3. Combustion air damper; Automatic vent damper with synchronous spring return damper motor.
 - 4. Non-corrosive combustion air blower with permanently lubricated motor.
- H. Burner Safety Controls:
 - 1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
 - 2. Flame Rollout Switch: Installed on burner box and prevents operation.
 - 3. Vent Safety Shutoff Sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
 - 4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- I. Operating Controls:
 - 1. Cycle burner by room thermostat to maintain room temperature setting.
 - 2. Supply fan energized from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.
 - 3. Provide continuous low speed fan operation.
- J. Flue Termination: Standard roof kit.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.
- D. Verify that water supply is available for humidifier.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Install oil fired furnaces in accordance with NFPA 31.
- E. Provide vent connections in accordance with NFPA 211.
- F. Install refrigeration systems in accordance with ASHRAE Std 15.
- G. Install humidifiers in accordance with AHRI 610 (I-P) or AHRI 611 (SI).
- H. Mount counterflow furnaces installed on combustible floors on additive base.
- I. Pipe drain from cooling coils to nearest floor drain.

3.03 SCHEDULE

END OF SECTION