SECTION 23 11 13

FACILITY FUEL OIL PIPING

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\*\* NOTE TO SPECIFIER \*\* Omega Flex, Inc.; Flexible Metallic Piping.  
This section is based on the products of Omega Flex, Inc., which is located at:451 Creamery WayExton, PA 19341Toll Free Tel: 800-355-1039Tel: 610-524-7272Fax: 610-524-7282Email: [request info (tracpipe@omegaflex.net)](https://arcat.com/rfi?action=email&company=Omega%252BFlex%252C%252BInc.&message=RE%253A%2520Spec%2520Question%2520(15192ogf)%253A%2520&coid=47600&spec=15192ogf&rep=&fax=610-524-7282)  
Web: <https://www.omegaflexcommercial.com>   
 [ [Click Here](https://arcat.com/company/omega-flex-inc-47600) ] for additional information.  
Commercial solutions for all your gas piping needs including natural gas and propane, diesel, gasoline, biofuels, and medical gas. Applications include backup generators, boilers, commercial laundries and restaurants, high rise apartments and condos, hospitals, assisted living and dental.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Double containment flexible steel facility fuel oil piping systems.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 22 63 13 - Flexible Metal Gas Piping for Laboratory and Healthcare Facilities.
    2. Section 23 11 23 - Facility Natural Gas Piping.
    3. Section 23 11 26 - Facility Liquified Petroleum Flexible Gas Piping.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM International (ASTM):
       1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
       2. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
       3. ASTM B117 - Standard Practice for Rating of Electroplated Panels Subjected to Atmospheric Exposure.
    2. American National Standards Institute (ANSI).
    3. International Code Council (ICC):
       1. ICC - International Fire Code.
       2. ICC- International Mechanical Code.
       3. ICC-ES ESR-4565 Evaluation Report for Seismic Performance.
    4. International Standards Association:
       1. ISO 22241-3 - Diesel engines - NOx reduction agent AUS 32.
    5. National Fire Protection Association (NFPA):
       1. NFPA-1 - Fire Code.
       2. NFPA 20 - Installation of Stationary Pumps for Fire Protection.
       3. NFPA 30 - Flammable and Combustible Liquids Code.
       4. NFPA 30A - Code for Motor Fuel Dispensing Facilities and Repair Garages.
       5. NFPA 31 - Installation of Oil-Burning Equipment.
       6. NFPA-37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.
       7. NFPA-407 - Standard for Aircraft Fuel Servicing.
    6. Petroleum Equipment Institute: Recommended Practices of Installation.
       1. PEI/RPI-100 - Recommended Practices for Installation of Underground Liquid Storage Systems.
       2. PEI/RPI-200 - Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling.
       3. PEI/RPI-800 - Recommended Practices for Installation of Bulk Storage Systems.
       4. PEI/RPI-1000 - Recommended Practices for Installation of Marina Fueling Systems.
       5. PEI/RPI-1300 - Recommended Practices for the Design, Installation, Service, Repair and Maintenance of Aviation Fueling Systems.
       6. PEI/RPI-1400 - Recommended Practices for The Design and Installation of Fueling Systems for Emergency Generators, Stationary Diesel Engines and Oil Burner Systems.
    7. United States Environmental Protection Agency:
       1. EPA - 40 CFR Part 280 Federal UST Standards.
    8. Underwriters Laboratories (UL):
       1. UL 971A - Nonmetallic Underground Piping For Flammable Liquids.
       2. UL 1369 - Aboveground Piping for Flammable and Combustible Liquids.
    9. Underwriters Laboratories Canada (ULC):
       1. CAN/ULC-S679:2017 - Standard for Metallic and Nonmetallic Underground Piping for Flammable and Combustible Liquids.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data:
        1. Manufacturer's data sheets on each product to be used.
        2. Preparation instructions and recommendations.
        3. Storage and handling requirements and recommendations.
        4. Typical installation methods.

\*\* NOTE TO SPECIFIER \*\* Delete if not applicable to product type.

* + 1. Verification Samples: Two representative units of each type, size, pattern and color.
    2. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
     2. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
        1. Each installer must meet applicable state and local requirements established by the Authority Having Jurisdiction (AHJ) and must be successfully trained through the TracPipe CounterStrike manufacturer's installation program.
     3. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
       1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
       2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
       3. Retain mock-up during construction as a standard for comparison with completed work.
       4. Do not alter or remove mock-up until work is completed or removal is authorized.
  1. PRE-INSTALLATION CONFERENCE
     1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
        1. Pipe and fittings shall be protected from damage due to impact and point loading. Pipe shall be properly supported to avoid damage due to flexural strain. The contractor shall not allow dirt, debris or other extraneous materials to get into the pipe and fittings.
     2. Protect from damage due to weather, excessive temperature, and construction operations.
  3. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  4. WARRANTY
     1. Manufacturer's standard limited warranty unless indicated otherwise.
        1. The piping system manufacturer shall provide a 30-year warranty for underground pipe and 15-year warranty for above ground pipe per its standard warranty terms.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Omega Flex, Inc., which is located at:451 Creamery WayExton, PA 19341Toll Free Tel: 800-355-1039Tel: 610-524-7272Fax: 610-524-7282Email: [request info (tracpipe@omegaflex.net)](https://arcat.com/rfi?action=email&company=Omega%252BFlex%252C%252BInc.&message=RE%253A%2520Spec%2520Question%2520(15192ogf)%253A%2520&coid=47600&spec=15192ogf&rep=&fax=610-524-7282);Web: <https://www.omegaflexcommercial.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
  1. DOUBLE CONTAINMENT FLEXIBLE STEEL PIPING SYSTEMS
     1. Basis of Design: DoubleTrac Double Containment Flexible Steel Piping System as Manufactured by OmegaFlex.
        1. Delivery Piping System: Suction or pressure applications.
        2. Construction: Semi-rigid coaxial type double wall.
           1. Primary Pipe: Stainless steel. Fits snug into the secondary pipe.
           2. Secondary Pipe: Includes an integral EFEP barrier standoff allowing for rapid migration of any leaks from the primary pipe into the secondary pipe and then to a designated accumulation point.
        3. All System Components: To be approved for use in above ground and underground applications.
           1. Underground Piping: For direct burial. Pipe runs can be joined with the use of transition sumps only.
        4. Piping System: Compatible with chemicals naturally found in the ground and resistant to bacterial attack.
        5. Piping: Supplied in flexible coils for pipe runs with no joints.
        6. Pipe and Fittings: Must be dual listed by Underwriters Laboratories:
           1. UL 971A Underground Piping for Flammable Liquids
           2. UL 1369 Aboveground Piping for Flammable and Combustible liquids.
        7. Where desired, coaxial pipe can be installed within a 3 or 4 inch (76 or 102 mm) thermoplastic corrugated gravel guard pipe chase to permit replacement of the product piping without the need of excavation.
        8. Non stainless-steel primary pipe shall not be allowed for product bearing piping. This includes FRP, polyethylene or multilayered flex pipe with bonded, swedged, glued, or fusion weld.
        9. Entry fittings, when used in conjunction with HDPE tank, dispenser or transition sumps, shall be made of rubber, Acetal, or fiberglass and sized for the appropriate pipe outer dimension.
        10. Termination fittings shall include primary and secondary termination with integral secondary containment test port for use in future testing of the containment piping system. Test ports may have internal valves removed to provide draining of primary pipe leaks into low point accumulation sumps.
     2. Standards Compliance Listings:
        1. UL971A - Outline of Investigation for Metallic Underground Piping. (File No. MH45578)
        2. CAN/ULC-S679:2017 - Standard for Metallic and Nonmetallic Underground Piping. (File No. MH45578)
        3. ANSI/CAN/UL/ULC 1369: 2020 - Standard for Aboveground Piping for Flammable and Combustible Liquids with a rating for marina use on fixed piers, semi-fixed piers and floating docks. (File No. MH45578)
        4. ICC-ES ESR-4565 Evaluation Report for Seismic Performance.
        5. APPROVED FUELS: General-use Fuels, Motor Vehicle (MV), High Blend (HB), Concentrated (CT).
        6. Aviation and Marine (A and M) Fuels, B100 and blends, DEF and Ammonia Hydroxide.
        7. NFPA 37 - Stationary Combustion and Gas Turbines.
        8. NFPA 407 - Aircraft Fuel Servicing.
        9. NFPA 1 - Uniform Fire Code.
        10. International Fire Code published by the International Fire Council.
        11. International Mechanical Code published by the International Code Council.
        12. PEI/RPI-100 - Recommended Practices for Installation of Underground Liquid Storage Systems.
        13. PEI/RPI-200 - Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling.
        14. PEI/RPI-800 - Recommended Practices for Installation of Bulk Storage Systems.
        15. PEI/RPI-1000 - Recommended Practices for Installation of Marina Fueling Systems.
        16. PEI/RPI-1300 - Recommended Practices for the Design, Installation, Service, Repair and Maintenance of Aviation Fueling Systems.
        17. PEI/RPI-1400 - Recommended Practices for The Design and Installation of Fueling Systems for Emergency Generators, Stationary Diesel Engines and Oil Burner Systems.
        18. EPA - 40 CFR Part 280 Federal UST Standards.
     3. Compatibility: The piping system and fittings shall be resistant to the following:
        1. Motor Vehicle Fuels (MV): Petroleum based hydrocarbon fuel typically found in consumer dispensing, boiler operations, and emergency generation systems using gasoline or diesel fuels including blended fuels with a maximum 15 percent MTBE or Methanol or 30 percent Ethanol.
        2. Concentrated Fuels (CT): Alternate un-blended fuels for up to 100 percent concentrations of Toluene, Methanol and Ethanol.
        3. High Blend Fuels (HB): Fuels with higher than normal gasoline blends with maximum 50 percent Methanol or Ethanol.
        4. Aviation and Marine Fuels (A and M): Specialty aviation and Marine use fuels for up to 100 percent kerosene or leaded gasoline.
        5. Bio-Fuels: All grades and types of Bio-Fuels.
        6. Diesel Exhaust Fluid: Per ISO 22241-3.
     4. Materials:
        1. Primary Pipe: ASTM A240 S31603 / SS316L Series Stainless Steel.
           1. Piping shall not be subjected to heat treating or annealing after the corrugation forming operation.
           2. Piping shall be suitable for operation with all fuels as defined in UL 971A and UL 1369.
        2. Outer Jacket: Nonmetallic Nylon 12. Resistant to hydrocarbons, chemical and water i.e. soil contact exposure. UV stabilized for above ground and marina use.
        3. Secondary Barrier: Ethylene Fluorinated Ethylene Propylene (EFEP). Permeation resistant.
        4. Mechanical Joint Stainless Steel Fittings: Per ASTM A276 S31600.
           1. Fitting to Primary Piping Joint: Provide a metal-to-metal seal; no gaskets permitted.
           2. Fittings meet Salt Spray Test requirements of ASTM B117-90.
           3. Fittings shall incorporate a port for interstitial space monitoring and or testing.
     5. Pipe Sizes and Pressure Ratings:

\*\* NOTE TO SPECIFIER \*\* Delete pipe size options not required.

* + - 1. Part No.: UGF-FSP-16 Pipe Size: 1 inch (25 mm).
         1. Jacket OD, Nominal: 1.550 inches (39.37 mm).
         2. Inside Diameter, Nominal: 1.060 inches (26.92 mm).
         3. Minimum Bend Radius: 12 inches (305 mm).
         4. Weight: 0.75 lbs per ft (kg per m).
         5. Primary Maximum Operating Pressure: 125 psig (862 kPa).
         6. Secondary Maximum Operating Pressure: 50 psig (345 kPa).
      2. Part No.: UGF-FSP-24. Pipe Size: 1-1/2 inch (38 mm).
         1. Jacket OD, Nominal: 2.300 inches (58.42 mm).
         2. Inside Diameter, Nominal: 1.525 inches (38.73 mm).
         3. Minimum Bend Radius: 24 inches (610 mm).
         4. Weight: 1.5 lbs per ft (kg per m).
         5. Primary Maximum Operating Pressure: 100 psig (689 kPa).
         6. Secondary Maximum Operating Pressure: 50 psig (345 kPa).
      3. Part No.: UGF-FSP-32. Pipe Size: 2 inch (51 mm).
         1. Jacket OD, Nominal: 2.925 inches (74.29 mm).
         2. Inside Diameter, Nominal: 2.060 inches (52.32 mm).
         3. Minimum Bend Radius: 32 inches (813 mm).
         4. Weight: 2.00 lbs per ft (kg per m).
         5. Primary Maximum Operating Pressure: 75 psig (517 kPa).
         6. Secondary Maximum Operating Pressure: 50 psig (3.45 kPa).
    1. Temperature Maximum Operating Ranges:
       1. Aboveground: Minus 22 to 122 degrees F (-5.6 to 50.0 degrees C).
       2. Underground: Minus 40 to 150 degrees F (4.4 to 65.6 degrees C).
    2. Piping Support Hangers and Supports:
       1. Supported from permanent structures. Comply with MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

\*\* NOTE TO SPECIFIER \*\* Delete size options not required.

* + - 1. Pipe Size: 1 inch (25 mm).
         1. Clamp ID: 1-1/2 inch (38 mm).
         2. Maximum Horizontal Clamp Spacing: 6 ft (1829 mm).
         3. Maximum Vertical Clamp Spacing: 15 ft (4572 mm).
      2. Pipe Size: 1-1/2 inch (38 mm).
         1. Clamp ID: 2-3/8 inch (60 mm).
         2. Maximum Horizontal Clamp Spacing: 8 ft (2438 mm).
         3. Maximum Vertical Clamp Spacing: 15 ft (4572 mm).
      3. Pipe Size: 2 inch (51 mm).
         1. Clamp ID: 2-7/8 inch (73 mm).
         2. Maximum Horizontal Clamp Spacing: 10 ft (3048 mm).
         3. Maximum Vertical Clamp Spacing: 15 ft (4572 mm).

1. EXECUTION
   1. EXAMINATION
      1. Do not begin installation until substrates have been properly constructed and prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
   2. PREPARATION
      1. Clean surfaces thoroughly prior to installation.
      2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   3. INSTALLATION
      1. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
         1. Piping System: To be installed as specified on contract drawings or at the discretion of the installing contractor to provide a complete pipe conveyance system as required for the project. Pipe Sizes: As shown on the contract drawings.
         2. Pipe and Fittings Installed or Field Constructed To be assembled by technicians of the contractor who have been satisfactorily trained by the manufacturer.
            1. When the installing contractor is not certified, the pipe manufacturer shall provide onsite training and certification of the contractor's technicians in the proper assembly and installation procedures.
            2. Off site, classroom training is not acceptable.
            3. The piping system shall be installed in strict accordance with the manufacturer's current installation instructions.
            4. The installing contractor shall be responsible for all necessary tools required for a complete testable piping installation.
   4. FIELD QUALITY CONTROL
      1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
      2. Testing Underground Product Piping:
         1. General: Contractor shall notify, where required, any authorities having jurisdiction in advance of any piping tests.
            1. Prior to pressure testing, the piping must be isolated from any tanks, pumps, boilers or dispensers.
            2. An air pressure test must be performed on the primary and secondary piping to detect any leaks that may exist.
            3. Test pressure to be in accordance with OmegaFlex Product Installation Manual.
            4. All testing shall be in compliance with the pipe manufacturer's installation instructions.
         2. Prior to Backfill: All new piping shall be tested before being covered, enclosed, or placed into service.
            1. Test pressure to be in accordance with OmegaFlex Installation Manual for a minimum of one hour with no pressure decay.
            2. On double-wall secondary piping systems, after the inner pipe test has been completed, the contractor must pressure test the secondary containment piping at the air pressure required by the manufacturer's instructions.
         3. After Backfilling: Where required by the authority having jurisdiction, all underground primary lines shall be tested with a precision testing system by a third-party independent testing company.
         4. Tightness Certificate: Upon completion of the test, the Contractor shall provide a "Certificate of Tightness" to the Owner.
      3. Tank, Transition and Dispenser Sumps: All Tank Sumps, Transition Sumps and or Dispenser Sumps shall be made of HDPE or Fiberglass and manufactured by S. Bravo Systems or otherwise as specified on contract drawings.

\*\* NOTE TO SPECIFIER \*\* Include if manufacturer provides field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Delete if not required.

* + 1. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.
  1. CLEANING AND PROTECTION
     1. Clean products in accordance with the manufacturers recommendations.
     2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION