GENERAL SERVICES ADMINISTRATION
Federal Supply Service
Authorized Federal Supply Schedule Price List

On-line access to contract ordering information, terms and conditions, up-to-date pricing, and the option to create an electronic delivery order is available through GSA Advantage!™, a menu-driven database system. The INTERNET address for GSA Advantage!™ is: http://www.GSAAdvantage.gov.

Multiple Award Schedule
Federal Supply Group: Professional Services

Contract Number: 47QRAA22D00E6
Contract Period: 08/29/2022 – 08/28/2027

Pricelist current as of Mod PO-0001, effective 08/29/22.

For more information on ordering from Federal Supply Schedules go to the GSA Schedules page at GSA.gov.

Contractor: Management Science and Innovation, Inc.
1712 Clubhouse Road, Suite 120
Reston, VA 20190

Business Size: Small Business, HUBZone

Telephone: 703-437-5236 x 172
FAX Number: 703-437-5236 x 1
Web Site: www.msipros.com
E-mail: dheckman@msipros.com
Contract Administration: Daniel L Heckman
CUSTOMER INFORMATION:

1a. Table of Awarded Special Item Number(s) with appropriate cross-reference to page numbers:

<table>
<thead>
<tr>
<th>SIN</th>
<th>Recovery</th>
<th>SIN Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>541611</td>
<td>541611RC</td>
<td>Management and Financial Consulting, Acquisition and Grants Management Support, and Business Program and Project Management Services</td>
</tr>
<tr>
<td>611430</td>
<td>611430RC</td>
<td>Professional and Management Development Training</td>
</tr>
<tr>
<td>OLM</td>
<td>OLMRC</td>
<td>Order Level Materials</td>
</tr>
</tbody>
</table>

1b. Identification of the lowest priced model number and lowest unit price for each special item number awarded in the contract. This price is the Government price based on a unit of one, exclusive of any quantity/dollar volume, prompt payment, or any other concession affecting price. Those contracts that have unit prices based on the geographic location of the customer, should show the range of the lowest price, and cite the areas to which the prices apply. See Pricing Page 6.

1c. If the Contractor is proposing hourly rates a description of all corresponding commercial job titles, experience, functional responsibility and education for those types of employees or subcontractors who will perform services shall be provided. If hourly rates are not applicable, indicate “Not applicable” for this item. See Labor Category Descriptions Page 7.

2. Maximum Order: For SIN 541611 - $1,000,000.00  
For SIN 611430 - $1,000,000.00  
For SIN OLM - $250,000

3. Minimum Order: $100.00

4. Geographic Coverage (delivery Area): Worldwide

5. Point(s) of production (city, county, and state or foreign country): Same as company address


7. Quantity discounts: For Labor categories more than 500 consecutive hours of service a discount of 2% is offered and more than 1,000 consecutive hours of service a discount of 4% is offered.

8. Prompt payment terms: Net 30 days  
Information for Ordering Offices: Prompt payment terms cannot be negotiated out of the contractual agreement in exchange for other concessions.

9. Foreign items (list items by country of origin): None

10a. Time of Delivery (Contractor insert number of days): Specified on the Task Order
10b. Expedited Delivery. The Contractor will insert the sentence “Items available for expedited delivery are noted in this price list.” under this heading. The Contractor may use a symbol of its choosing to highlight items in its price list that have expedited delivery: Contact Contractor

10c. Overnight and 2-day delivery. The Contractor will indicate whether overnight and 2-day delivery are available. Also, the Contractor will indicate that the schedule customer may contact the Contractor for rates for overnight and 2-day delivery: Contact Contractor

10d. Urgent Requirements. The Contractor will note in its price list the “Urgent Requirements” clause of its contract and advise agencies that they can also contact the Contractor’s representative to effect a faster delivery: Contact Contractor

11. F.O.B Points(s): Destination

12a. Ordering Address(es): Same as Contractor

12b. Ordering procedures: For supplies and services, the ordering procedures, information on Blanket Purchase Agreements (BPA’s) are found in Federal Acquisition Regulation (FAR) 8.405-3.

13. Payment address(es): Same as Contractor

14. Warranty provision: Contractor’s standard commercial warranty.

15. Export Packing Charges (if applicable): N/A

16. Terms and conditions of rental, maintenance, and repair (if applicable): N/A

17. Terms and conditions of installation (if applicable): N/A

18a. Terms and conditions of repair parts indicating date of parts price lists and any discounts from list prices (if applicable): N/A

18b. Terms and conditions for any other services (if applicable): N/A

19. List of service and distribution points (if applicable): N/A

20. List of participating dealers (if applicable): N/A

21. Preventive maintenance (if applicable): N/A

22a. Environmental attributes, e.g., recycled content, energy efficiency, and/or reduced pollutants: N/A

22b. If applicable, indicate that Section 508 compliance information is available on Electronic and Information Technology (EIT) supplies and services and show where full details can be found (e.g. contactor’s website or other location.) The EIT standards can be found at: www.Section508.gov/: N/A

23. Unique Entity Identifier (UEI) number: RL5ANSBM4478
24. Notification regarding registration in System for Award Management (SAM) database: Completed.
MSI provides a suite of services, solutions, training, and products driving operational excellence for our clients. With comprehensive solutions for process improvement, organizational analysis, strategic planning, cost management, lifecycle management, training, program development and deployment, implementation, mentoring, process automation, effective office, and project management, MSI has the ability to drive world class quality into any operation.

This catalog describes the labor categories and services we offer under GSA MAS as referenced above.

Special Item Numbers

SIN 541611: MANAGEMENT AND FINANCIAL CONSULTING, ACQUISITION AND GRANTS MANAGEMENT SUPPORT, AND BUSINESS PROGRAM AND PROJECT MANAGEMENT SERVICES

541611 Provide operating advice and assistance on administrative and management issues. Examples include: strategic and organizational planning, business process improvement, acquisition and grants management support, facilitation, surveys, assessment and improvement of financial management systems, financial reporting and analysis, due diligence in validating an agency's portfolio of assets and related support services, strategic financial planning, financial policy formulation and development, special cost studies, actuarial services, economic and regulatory analysis, benchmarking and program metrics, and business program and project management.

SIN 611430: PROFESSIONAL AND MANAGEMENT DEVELOPMENT TRAINING

611430 Services include offering an array of short duration courses and seminars for management and professional development. Training for career development may be provided directly to individuals or through employers' training programs, and courses may be customized or modified to meet the special needs of customers. Instruction may be provided in diverse settings, such as the establishment's or agency's training facilities, and through diverse means, such as correspondence, television, the Internet, or other electronic and distance-learning methods. The training provided may include the use of simulators and simulation methods.

Examples include Training Services that are instructor led Training or Web Based Training of Education Courses, Course Development and Test Administration, Learning Management, and Internships; Environmental Training Services in order to meet Federal mandates and Executive Orders; training of agency personnel to deal with media and media responses; Logistics Training Services related to system operations, automated tools for supply and value chain management, property and inventory management, distribution and transportation management, and maintenance of equipment and facilities; Audit & Financial training services related to course development and instruction required to support audit, review, financial assessment and financial management activities.

Any firm offering Defense Acquisition Workforce Improvement Act (DAWIA) and Federal Acquisition Certification in Contracting (FAC-C) Training for Acquisition Workforce Personnel will include an identify only DAWIA and FAC-C courses that have been deemed DAU equivalent or approved by the Federal Acquisition Institute (FAI).

NOTE: In accordance with OMB Policy Letter 05-01, civilian agencies must follow the course equivalency determinations accepted by the Defense Acquisition University (DAU) to ensure that core training is comparable across the workforce and qualifies for certification. When procuring FAC-C and DAWIA training for the audience identified below, the task order level Contracting Officer shall confirm that the courses being acquired are listed on one of the following websites: https://www.fai.gov/drupal/certification/verified-contracting-course-vendor-listing OR http://icatalog.dau.mil/appg.aspx (click on commercial vendors). Training Audience Acquisition professionals interested in completing FAC-C or DAWIA.

www.msipros.com
<table>
<thead>
<tr>
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Service Contract Labor Standards: The Service Contract Labor Standards (SCLS) is applicable to this contract as it applies to the entire Multiple Award Schedule and all services provided. While no specific labor categories have been identified as being subject to SCLS due to exemptions for professional employees (FAR 22.1101, 22.1102 and 29 CRF 541.300), this contract still maintains the provisions and protections for SCLS eligible labor categories. If and/or when the contractor adds SCLS labor categories/employees to the contract through the modification process, the contractor must inform the Contracting Officer and establish a SCLS matrix identifying the GSA labor category titles, the occupational code, SCLS labor category titles and the applicable WD number. Failure to do so may result in cancellation of the contract.
Labor Category Descriptions

**Executive Consultant**

**Functional Responsibility:** Strategic planning, organizational assessment, six sigma, lean operations, and process improvement – The executive consultant provides vision and leadership to consulting teams in various quality, assessment, improvement, and technology projects to ensure complex organizational, process, and technology elements are integrated into a highly effective and efficient solution.

**Minimum Education / Minimum General Experience:** The Executive consultant possesses a Master's degree in business, operations management as well as a minimum of fifteen years business and information systems experience with significant experience at an executive level. The Executive Consultant plays a role in client interaction and team leadership.

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**Junior Analyst**

**Functional Responsibility:** Systems analysis, organizational analysis, performance analysis – The Junior Analyst conducts data collection and review on “systems” analysis projects addressing end-to-end, top-to-bottom systems including the customers, inputs, processes, people, technologies, outputs, and customers of the system. Conducts surveys and data collection missions, performs initial data cleansing and transformation. Must demonstrate a clear path of education and experience in the business or engineering area of endeavor.

Shall possess experience with the following:

- cost analysis
- cost estimating
- cost management
- customer satisfaction analysis
- data analysis
- data transformation
- defect analysis
- defect reduction
- evaluation
- performance analysis
- performance assessment
- process engineering
- process improvement
- quality assurance
- quality control
- spc
- sqc
- statistical analysis
- statistical quality control
- survey services

**Minimum Education / Minimum General Experience:** A Bachelor's degree in business, engineering, sciences, computer science, mathematics, or economics and one year of relevant experience or an equivalent combination of education and experience.

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**Midlevel Analyst**

**Functional Responsibility:** Systems analysis, organizational analysis, performance analysis – The Midlevel Analyst administers "systems" analysis projects addressing end-to-end, top-to-bottom systems including the customers, inputs, processes, people, technologies, outputs, and customers of the system. Implements complex organizational change which addresses strategic, structural, process and behavioral factors. Conducts surveys and data collection missions, organizational assessments, cultural change programs and business process improvement recommendations. Assists governmental agencies in implementing the Government Performance and Results Act in strategic planning and the executive order directed toward labor management partnerships.

Shall possess experience with the following:
cost analysis, cost estimating, cost management, customer satisfaction analysis, data analysis, data transformation, defect analysis, defect reduction, evaluation, IV&V, metrics design, organizational assessment, organizational evaluation, performance analysis, performance assessment, process engineering, process improvement, quality assurance, quality control, survey services

**Minimum Education / Minimum General Experience:** A Bachelor’s degree in business, engineering, sciences, computer science, mathematics, or economics and two years of relevant experience or an equivalent combination of education and experience.

**Midlevel Lean Operations Consultant**

**Functional Responsibility:** Lean operations, lean systems, lean six sigma – the Midlevel Lean Operations consultant is an expert in operations management and operations research methods commonly known as Lean techniques. The Midlevel Lean Operations Consultant will provide hands on analysis, guidance, and development of Lean systems in a lead engineer capacity.

Activities that may be performed by the Midlevel Lean Operations Consultant include:

- value stream mapping, queuing theory, logistics planning, supply chain management, demand forecasting, materials resource planning (MRP), control charts, cost analysis, cost management, data analysis, data transformation, Kanban, lean systems, lean, lean six sigma, lean operations, lean systems, metrics design, metrics, operations research, simulation, spc, sqc, statistical analysis, statistical process control, statistical quality control, supply chain integration.

**Minimum Education / Minimum General Experience:** The Midlevel Lean Operations Consultant possesses a Bachelor’s degree in business, operations management, as well as a minimum of five years business experience. The Midlevel Lean Operations Consultant will also possess Certification in Six Sigma, Baldrige, or equivalent from a recognized training organization as well as five years’ experience implementing Quality solutions.

**Midlevel Quality and IT Consultant**

**Functional Responsibility:** Transactional six sigma, lean six sigma, process engineering, information system development and design, quality assessments, organizational assessments, performance assessments. The Midlevel Quality and IT Consultant is a uniquely talented and experienced individual with knowledge of lean, Quality, and supply chain management in addition to depth of knowledge with information systems design and development. This combination of skills provides the ability to engineer true “systems” accounting for the people, processes, and technologies which are automated via appropriate software applications. This approach ensures that end-to-end processes take precedence over software applications.

**Minimum Education / Minimum General Experience:** The Midlevel consultant possesses a Bachelor’s degree in business, operations management as well as a minimum of five years business and information systems experience. The Midlevel Quality and IT Consultant plays a critical role in within the consulting team with hands on work from analysis through
Midlevel Subject Matter Expert

**Functional Responsibility:** The Midlevel Subject Matter Expert possesses hands-on functional knowledge in particular areas of business and operations. Areas of expertise may include areas such as procurement, finance, human resources management, information technology, marketing, construction, healthcare, and education. Midlevel Subject Matter Experts work as an integral part of the consulting team providing insights into methods and best practices while ensuring that solutions are tempered by their perspective. Assists with identifying candidates for outsourcing and privatization while refocusing on core mission objectives.

**Minimum Education / Minimum General Experience:** Subject Matter Experts may possess varied levels of education and experience. However, the Subject Matter Expert will be recognized as an expert in the related field. Relative experience in the field will be well above average in both duration and responsibility.

Program Manager

**Functional Responsibility:** Program management, contract management, project coordination, compliance – Program Managers perform the tasks associated with client and project communication and coordination on large scale engagements involving multiple projects which may or may not be related. Ensures high level contractual, financial, and strategic objectives are recognized and accounted across projects. Has experience in developing downsizing approaches and procedures. Assists in identifying candidates for outsourcing and privatization while refocusing on core mission objectives. Prepares customer reports and presentations. Manages overall engagement Quality management and improvement plans. Coordinates efforts and provides leadership in government and industry meetings. Provides internal planning, guidance, and management structure for tracking accomplishment of work assigned.

**Minimum Education / Minimum General Experience:** A graduate degree in administration, business, engineering, or computer science, economics, or science and eight years of relevant experience; or an equivalent combination of education and experience.

Senior Analyst

**Functional Responsibility:** Systems analysis, organizational analysis, performance analysis – The Senior Analyst designs and administers “systems” analysis projects addressing end-to-end, top-to-bottom systems including the customers, inputs, processes, people, technologies, outputs, and customers of the system. Implements complex organizational change which addresses strategic, structural, process and behavioral factors. Develops data collection plans, conducts surveys and data collection missions, organizational assessments, cultural change programs and business process improvement recommendations. Assists governmental agencies in implementing the Government Performance and Results Act in strategic planning and the executive order directed toward labor management partnerships.
Shall possess experience with the following:

cost analysis, cost estimating, cost management, customer satisfaction analysis, data analysis, data transformation, defect analysis, defect reduction, evaluation, IV&V, Kanban, lean systems, lean six sigma, lean systems, metrics design, organizational assessment, organizational evaluation, performance analysis, performance assessment, process engineering, process improvement, process portfolio management, quality assurance, quality control, six sigma consulting, spc, sqc, statistical analysis, statistical quality control, survey services, CMMi, TQM

Minimum Education / Minimum General Experience: A Bachelor's degree in business, engineering, sciences, computer science, mathematics, or economics and five years of relevant experience or an equivalent combination of education and experience.

Senior Process Engineer

Functional Responsibility: Process engineering, process management, business process re-engineering– Senior Process Engineers are highly trained process experts with more than five years’ experience in process engineering methodologies in numerous environments. Senior Process Engineers will possess knowledge and experience in related operations excellence methods such as Six Sigma, Baldrige, and CMMi. Senior process engineers will also be versed in use and implementation of various process engineering technologies such as statistical analysis tools, surveying, simulation, and business process management (BPM) platforms. Assists with identifying candidates for outsourcing and privatization while refocusing on core mission objectives. Senior Process Engineers provide a lead role at the task level assuring that analysis, design, and improvement tasks are conducting using the best methods and in a timely fashion.

Some of the activities performed by the Midlevel Process Engineer include:

Six Sigma, six sigma consulting, control charts, cost analysis, cost estimating, customer satisfaction analysis, data analysis, data transformation, defect analysis, defect reduction, design for six sigma, DFSS, DMAIC, evaluation, lean six sigma, metrics design, organizational assessment, organizational evaluation, performance analysis, performance evaluation, performance management, process automation, process engineering, process improvement, process management, process portfolio management, quality consulting, quality control, quality function deployment, quality improvement, simulation, spc, sqc, statistical analysis, statistical process control, statistical quality control, transactional six sigma.

Minimum Education / Minimum General Experience: The Senior Process Engineer possesses a Master's degree in business, operations management as well as a minimum of five years business and information systems experience. The Senior Process Engineer will also possess Certification in Six Sigma, Baldrige, or equivalent from a recognized training organization as well as ten years’ experience implementing Quality solutions.

Senior Quality Consultant

Functional Responsibility: Quality consulting, Six Sigma, transactional six sigma, benchmarking, business process management – The Senior Quality Consultant is a professional in multiple quality and operations excellence methods such as those listed above. The Senior Quality Consultant leads consulting teams, manages projects, and works closely with the
customer at a managerial and tactical level. Assists with identifying candidates for outsourcing and privatization while refocusing on core mission objectives. The Senior Quality Consultant will often play a major role in starting projects and will then act in an oversight and communications position as a project progresses.

Activities performed by the Senior Quality Consultant include:

cost analysis, cost estimating, cost management, customer satisfaction analysis, data analysis, data transformation, defect analysis, defect reduction, evaluation, IV&V, Kanban, lean systems, lean six sigma, lean systems, metrics design, organizational assessment, organizational evaluation, performance analysis, performance assessment, process engineering, process improvement, process portfolio management, quality assurance, quality control, six sigma consulting, spc, sqc, statistical analysis, statistical quality control, survey services, CMMi, TQM.

**Minimum Education / Minimum General Experience:** The Senior Quality Consultant possesses a Master's degree in business, operations management as well as a minimum of ten years business and information systems experience.

**Senior Quality and IT Consultant**

**Functional Responsibility:** Transactional six sigma, lean six sigma, process engineering, information system development and design, quality assessments, organizational assessments, performance assessments. The Senior Quality and IT Consultant is a uniquely talented and experienced individual with knowledge of lean, Quality, and supply chain management in addition to depth of knowledge with information systems design and development. This combination of skills provides the ability to engineer true “systems” accounting for the people, processes, and technologies which are automated via appropriate software applications. This approach ensures that end-to-end processes take precedence over software applications.

The Senior Quality and IT Consultant plays a primary role in client interaction, project management, metrics definition, project charter, and team leadership. The unique combination of skills possessed by the consultant are used to assure an end-to-end process system. This consultant is capable of evaluating, designing, and deploying effective and efficient systems leveraging the principles of lean six sigma into a system of people, processes, and technologies that promote effective and proactive management of the organization.

**Minimum Education / Minimum General Experience:** The Senior consultant possesses a Master’s degree in business, operations management as well as a minimum of ten years business and information systems experience.

**Senior Six Sigma Black Belt**

**Functional Responsibility:** 6 sigma, Six Sigma, six sigma consulting – Senior Six Sigma Black Belts are highly trained Six Sigma experts with more than five years’ experience in the entire Six Sigma methodology in numerous environments. Senior Black Belts will possess knowledge and experience in related operations excellence methods such as Baldrige and CMMi. Further, our Black Belts specialize in transactional Six Sigma, the application of Six Sigma to non-manufacturing processes. Senior Black Belts are the leaders and mentors to the consulting team with regard to performing detailed tasks.
Some of the activities performed by the Senior Six Sigma Black Belt include:

- control charts, cost analysis, cost estimating, customer satisfaction analysis, data analysis, data transformation, defect analysis, defect reduction, design for six sigma, DFSS, DMAIC, evaluation, lean six sigma, metrics design, organizational assessment, organizational evaluation, performance analysis, performance evaluation, performance management, process automation, process engineering, process improvement, process management, process portfolio management, quality consulting, quality control, quality function deployment, quality improvement, simulation, spc, sqc, statistical analysis, statistical process control, statistical quality control, transactional six sigma.

**Minimum Education / Minimum General Experience:** The Senior Six Sigma Black Belt possesses a Bachelor's degree in business, operations management as well as a minimum of five years business and information systems experience. The Senior Six Sigma Black Belt will also possess a Six Sigma Black Belt Certification from a recognized training organization as well as five years’ experience implementing Six Sigma or other Quality solutions.

**Senior Strategy Consultant**

**Functional Responsibility:** Strategic planning, business planning, capital planning – The Senior Strategy Consultant provides high level strategic facilitation, guidance, and advice on organization level strategic matters. Senior Strategy Consultants are experts in various business and organization management disciplines such as finance, marketing, operations, sales, and human resources management. Further, Senior Strategy Consultants are educated and experienced with traditional and innovative strategic planning techniques such as SWOT, Porter’s five forces, Process Management, Business Case Analysis, and brainstorming.

Activities performed by the Senior Strategy Consultant may include:

- Facilitation, strategic planning sessions, business case development, capital budgeting analysis, investment analysis, market analysis, customer analysis, business planning, development of organizational goals and objectives, and brainstorming sessions.

**Minimum Education / Minimum General Experience:** The Senior Strategy Consultant will possess a Master of Business Administration (MBA) or Master of Industrial Administration or equivalent graduate education as well as a minimum of ten years’ experience providing strategic level advice and guidance to successful organizations.

**Senior Subject Matter Expert**

**Functional Responsibility:** The Senior Subject Matter Expert possesses a high degree of functional knowledge in particular areas of business and operations. Areas of expertise may include areas such as procurement, finance, human resources management, information technology, marketing, construction, healthcare, and education. Senior Subject Matter Experts work as an integral part of the consulting team providing insights into methods and best practices while ensuring that solutions are tempered by their perspective. Assists with identifying candidates for outsourcing and privatization while refocusing on core mission objectives.
Minimum Education / Minimum General Experience: Subject Matter Experts may possess varied levels of education and experience. However, the Subject Matter Expert will be recognized as an expert in the related field. Relative experience in the field will be well above average in both duration and responsibility. The Senior Subject Matter Expert will be recognized by industry organizations as a leader in the field.

Experience & Degree Substitution Equivalencies
Experience exceeding the minimum shown may be substituted for education. Likewise, education exceeding the minimum shown may be substituted for experience.

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<th>Equivalent Degree</th>
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<td>Associate’s</td>
<td>HS + 2 years relevant experience</td>
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<tr>
<td>Bachelor’s</td>
<td>Associate’s degree + 2 years relevant experience or HS + 4 years relevant experience</td>
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<tr>
<td>Master’s</td>
<td>Bachelor’s + 2 years relevant experience or Associate’s degree + 4 years relevant experience or HS + 6 years relevant experience</td>
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<tr>
<td>PhD</td>
<td>Master’s + 2 years relevant experience, or Bachelor’s + 4 years relevant experience or Associate’s + 6 years relevant experience or HS + 8 years relevant experience</td>
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### SIN 611430 PRICE SCHEDULE

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<th>SKILL CATEGORY</th>
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<td><strong>Courses SIN 611430</strong></td>
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<td>Boiler Operations &amp; Maintenance</td>
<td>$11,199.76</td>
</tr>
<tr>
<td>Safety and Technology: High Voltage Safety w/ Arc Flash</td>
<td>$7,970.90</td>
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<tr>
<td>Safety and Technology: HVAC Controls and Distribution</td>
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<td>Safety and Technology: Low Voltage Safety w/Arc Flash</td>
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<tr>
<td>Safety and Technology: Plumbing and Pipefitting for Plants and Buildings</td>
<td>$11,199.76</td>
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**Detailed descriptions of course are provided in the following section**
MSI038 | Title of Course, Description and Objectives | Duration | Min | Max
---|---|---|---|---
**BOILER OPERATIONS & MAINTENANCE** | 3 Days | 1 | 10

With the dangers inherent to working on and around Boiler Operations & Maintenance systems and equipment, industrial businesses that have maintenance departments must insure that their qualified Boiler personnel are aware of 1) the recent Boiler safety mandates and 2) safe work practices in and around Boiler equipment. MSI’s Boiler Op & Maintenance class – designed to encourage safe work practices and maintenance O&M effectiveness among qualified maintenance people and to emphasize federal and state mandates - focuses on the following topics during the 3-day program:

**COURSE OBJECTIVES:**

II. How Power Plants Work (111)

B. Steam – The Primary Force
   8. Energy for Power Plants
   9. Converting Energy to Electricity
   10. The Importance of Air in Combustion
   11. Removing Ashes and Flue Gases
   12. Heating the Air
   13. Boiler Design
   14. Controlling the Water Level
   15. Feedwater Heater
   16. The Economizer

B. How Heat is Converted to Power
   1. The Turbine
   8. The Generator
   9. Using Exhausted Steam
   10. Producing a Vacuum
   11. Using the Condensate
   12. Improved Coal Handling
   13. Boiler Efficiency

F. Power Plant Efficiency
   1. Thermodynamic Efficiency
   2. Pumps
   3. Feedwater Heating
   4. Air Heating
   5. The Superheater
   6. Circulation Problems in High-Pressure Boilers
   7. Minimum Temperatures in the System
   8. Minor Refinements
   9. Condenser Performance

G. Handling Water, Fuel, and Wastes
   1. Water Requirements
   2. Physical Properties of Water
   3. Chemical Properties of Water
   4. Water Softening and Purification
   5. Cooling Water
   6. Water Disposal Problems
   7. Air Cooling
   8. Fossil Fuel Handling and Wastes
   9. Flue Gases
   10. Particle Removal
   11. Problem Transfer
   12. Looking to the Future

H. Power Plant Operation and Control
1. Operating Features of a Power Plant
2. Power Plant Controls
3. Temperature Measurement
4. Pressure Measurement
5. Special Measurements
6. Other Power Sources
7. Nuclear Power

II. Generating Steam in the Power Plant (112)

F. Transforming Energy into Work
   17. Energy and Matter
   18. Fuels
   19. Combustion
   20. Temperature Measurement
   21. Pressure Measurement
   22. Quantity of Heat
   23. Heat Transfer
   24. Conduction
   25. Radiation
   26. Convection
   27. Sensible and Latent Heat
   28. Vaporization
   29. Boiling Point
   30. Enthalpy
   31. Heat and Work
   32. Basic Steam Generation

G. Boiler Operation
   1. Types of Boilers
   2. Boiler Characteristics
   3. Water Treatment for Boiler Use
   4. Boiler and Cooling Tower Blowdown
   5. Wastewater Disposal
   6. Efficiency in the Power Plant
   7. Thermodynamic Efficiency
   8. Conserving Energy in the Power Plant

H. Boiler Maintenance
   1. Soot Removal
   2. Scale Removal
   3. Corrosion
   4. Casing Corrosion
   5. Refractory
   6. Control Systems
   7. Calibration and Cleaning
   8. Compressed Air Systems
   9. Maintaining Boiler Auxiliaries
  10. Maintaining Stacks and Cyclones
  11. Maintenance Schedules and Reports

I. Combustion and How It Works
   1. Coal Ranks
   2. Coal Analyses
   3. Coal Sizes
   4. Coal Storage
5. Oil Properties
6. Natural Gas
7. Chemistry of Combustion
8. Oil Burners
9. Gas Burners
10. Flame Color
11. Flame Adjustment for Oil and Gas
12. Coal Firing Systems
13. Pulverized Coal Burners
14. Overfeed Stokers
15. Underfeed Stokers
16. Ash Analysis for Carbon
17. Combustion Efficiency
18. Handling Unburned Solids

J. Steam Generation
1. The Steam Generation Process
2. Temperature and Pressure Relationship
3. Superheating Steam and Steam Quality
4. Volume and Pressure Relationship
5. Steam Tables for Saturated Steam
6. How to Use Steam Tables
7. Circulation of Boiler Water
8. Steam Circulation and Tube Temperature
9. Steam Drum Design
10. Operating a High-Pressure Boiler at Low Pressure
11. The Complete Steam Generation System
12. Conserving Energy
13. Blowdown
14. Makeup Water
<table>
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<th>Title of Course, Description and Objectives</th>
<th>Duration</th>
<th>Min</th>
<th>Max</th>
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<tr>
<td>SAFETY AND TECHNOLOGY: LOW VOLTAGE SAFETY w/ARC FLASH</td>
<td>2 Days</td>
<td>1</td>
<td>10</td>
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With the dangers inherent to working on and around energized panels and equipment, industrial businesses that have maintenance departments must insure that their qualified electrical people are aware of 1) the recent electrical safety mandates and 2) safe work practices in and around energized equipment. MSI’s EHWS class – designed to encourage electrical safe work practices and maintenance O&M effectiveness among qualified maintenance people and to emphasize federal and state mandates - focuses on the following topics during the 2-day program:

**COURSE OBJECTIVES:**

- **Introduction and Basis of the Training** – this section covers the bases of this safety training program (NFPA 70E, NEC, OSHA).
- **Basic electrical safety** to include OSHA 1910 “Qualified Worker” Sub Part S annual refresher.
- **Electrical Fundamentals** – this section establishes the electrical foundation that individuals who are not true electricians can build on to gain electrical work practice safety qualifications. A clear discussion of why faults occur, energy dynamic of faults in an industrial facility and why the worker must be aware of the greatly increased danger posed by industrial circuits follow. This plays well with the growing trend to cross-train workers, training that TPC has extensive experience providing its customers.
- **Electrical Hazards** - shock, arc flash and burn, shock and arc boundaries, discussion of the arc event are covered in this section.
- **PPE Fundamentals** - acceptable and unacceptable clothing and accessories for shock and arc risk boundary approach, arc flash-specific PPE details by HRC, care and maintenance of ARC-specific ATPV rated PPE, FR Welding vs. FR ATPV rated for Arc Flash are discussed. This section also discusses layering of clothing as a method to increase ATPV.
- **Electricians Tools** - safer arc and shock boundaries are defined and discussed, including insulated vs. comfort grip.
- **Metering Safety** - appropriate meters and test instruments for industrial plants with high power hazards are discussed.
- **Shock Reduction and AEGCP** – the use of GFCI devices and the Assured Equipment Grounding Program to reduce shock injuries and deaths are discussed. Included in this section is a discussion of how arc events can start and kill individuals when they, for various reasons, touch or contact live parts with tools and become engulfed in an arc.
- **Workspace Stepback Requirements** - OSHA and NEC-mandated workspace distances required for workers to have adequate space to safely work on panels in the plant are covered in this section.
- **Work Practices** - this brief overview of safer work practices that will help companies and their employees reduce shock, arc and other electrical-related injuries.

I. **Day One Discussion Topics**

A. Introduction

B. **Fundamentals of Industrial Electricity** - Understanding the risks

C. **Electrical Hazards** - Shock and Arc

D. **PPE Overview and Selection**

1. Electricians Tools for Arc and Shock Risk boundaries


3. **Shock Hazard Reduction.**

E. **Work environment special conditions**

F. **Work Practices and workplace safety**

G. **Reference Appendix and supplemental documents.**

H. **Written test (if required by the customer)**

II. **Day Two**

A. **Witness Testing** – each qualified person must demonstrate:

1. the care, selection and usage of proper PPE

2. panel labels and the information on them

3. arc flash hazards and approach boundaries and safe use of tools when working in and around energized panels & equipment
### MSI030 | Title of Course, Description and Objectives
---|---
| **SAFETY AND TECHNOLOGY: HIGH VOLTAGE SAFETY w/ ARC FLASH** | **Duration** | **Min** | **Max**
| | 2 Days | 1 | 10

With the dangers inherent to working on and around energized panels and equipment, industrial businesses that have maintenance departments must ensure that their qualified electrical people are aware of 1) the recent electrical safety mandates and 2) safe work practices in and around energized equipment. MSI's Electrical Hazards & Workplace Safety (EHWS) class – designed to encourage electrical safe work practices and maintenance O&M effectiveness among qualified maintenance people and to emphasize federal and state mandates - focuses on the following topics during the 2-day program:

**COURSE OBJECTIVES:**
- Introduction and Basis of the Training – this section covers the bases of this safety training program (NFPA 70E, NEC, OSHA).
- Electrical Fundamentals – this section establishes the electrical foundation that individuals who are not true electricians can build on to gain electrical work practice safety qualifications. A clear discussion of why faults occur, energy dynamic of faults in an industrial facility and why the worker must be aware of the greatly increased danger posed by industrial circuits follow. This plays well with the growing trend to cross-train workers, training that TPC has extensive experience providing its customers.
- Electrical Hazards - shock, arc flash and burn, shock and arc boundaries, discussion of the arc event are covered in this section.
- PPE Fundamentals - acceptable and unacceptable clothing and accessories for shock and arc risk boundary approach, arc flash-specific PPE details by HRC, care and maintenance of ARC-specific ATPV rated PPE, FR Welding vs. FR ATPV rated for Arc Flash are discussed. This section also discusses layering of clothing as a method to increase ATPV.
- Electricians Tools - safer arc and shock boundaries are defined and discussed, including insulated vs. comfort grip.
- Metering Safety - appropriate meters and test instruments for industrial plants with high power hazards are discussed.
- Shock Reduction and AEGCP – the use of GFCI devices and the Assured Equipment Grounding Program to reduce shock injuries and deaths are discussed. Included in this section is a discussion of how arc events can start and kill individuals when they, for various reasons, touch or contact live parts with tools and become engulfed in an arc.
- Workspace Stepback Requirements - OSHA and NEC-mandated workspace distances required for workers to have adequate space to safely work on panels in the plant are covered in this section.
- Work Practices - this brief overview of safer work practices that will help companies and their employees reduce shock, arc and other electrical-related injuries.

I. Day One Discussion Topics
   - Introduction
   - Fundamentals of Industrial Electricity - Understanding the risks
   - Electrical Hazards - Shock and Arc
   - PPE Overview and Selection
     - Electricians Tools for Arc and Shock Risk boundaries
     - Metering safety for arc flash and shock prevention.
     - Shock Hazard Reduction.
   - Work environment special conditions
   - Work Practices and workplace safety
   - Reference Appendix and supplemental documents.
   - Written test (if required by the customer)

II. Day Two
   - Witness Testing – each qualified person must demonstrate:
     - the care, selection and usage of proper PPE
     - panel labels and the information on them
     - arc flash hazards and approach boundaries and safe use of tools when working in and around energized panels & equipment
Title of Course, Description and Objectives

**SAFETY AND TECHNOLOGY: HVAC CONTROLS AND DISTRIBUTION**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>MSI033</td>
<td>SAFETY AND TECHNOLOGY: HVAC CONTROLS AND DISTRIBUTION</td>
</tr>
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</table>

Duration: 3 Days

Min: 1

Max: 10

With the dangers inherent to working on and around HVAC Controls and Distribution systems and equipment, industrial businesses that have maintenance departments must insure that their qualified HVAC personnel are aware of 1) the recent HVAC safety mandates and 2) safe work practices in and around HVAC equipment. MSI’s HVAC Controls and Distribution class – designed to encourage safe work practices and maintenance O&M effectiveness among qualified maintenance people and to emphasize federal and state mandates - focuses on the following topics during the 3-Day program:

**COURSE OBJECTIVES:**

I. Control Systems (437)

A. Introduction to Control Systems
   1. The Need for Controls
   2. Automatic Control
   3. Control System Basics
   4. Control Methods
   5. Two-Position Control
   6. Floating Control
   7. Proportional Control
   8. Open and Closed-Loop Control
   9. Control System Operating Power
   10. Self-Powered Control System
   11. Pneumatic and Hydraulic Control Systems
   12. Electric and Electronic Control Systems

B. Sensors and Controlled Devices
   1. Sensors
   2. Temperature Sensors
   3. Humidity Sensors
   4. Pressure Sensors
   5. Controlled Devices
   6. Dampers
   7. Valves
   8. Variable-Speed Drives

C. Automatic Control Systems
   1. Two-Position Electric Control
   2. Floating Electric Control
   3. Proportional Electric Control
   4. Pneumatic Control Systems
   5. Pneumatic Controllers
   6. Pneumatic Actuators
   7. Pneumatic Relays and Switches
   8. Electronic Control Systems
   9. Proportional Band and Gain
   10. PID Control

D. Control of Refrigeration and Air-Conditioning Processes
   1. Primary Control
   2. Low-Pressure Control
   3. High-Pressure Control
   4. High-Temperature Cutout Control
   5. Low-Water-Temperature Cutout Control
   6. Anti-Recycle Timers
   7. Condenser Pressure Regulators
8. Oil-Pressure Controls
9. Oil-Level Float Controls
10. Motor Overload Protection
11. Capacity Controls
12. System Interlock
13. Control of Air-Conditioning Systems
14. Flow Control in Hydronic Systems
15. Space-Temperature Control
16. Seasonal Changeover; Pressure Regulation
17. Flow Switches
18. Control of a Complex Air-Handling System

E. Maintaining and Troubleshooting Controls
1. Establishing a PM Program
2. Maintaining Pressure Controls
3. Maintaining Thermostats
4. Maintaining Float Switches and Valves
5. Maintaining Oil-Pressure Controls
6. Maintaining Timers
7. Maintaining Condenser Controls
8. Maintaining Compressor Capacity Controls
9. Maintaining Valves and Accessories
10. Maintaining Instrument Air
11. Maintaining Pneumatic Controllers
12. Maintaining Pneumatically Controlled Devices
13. Maintaining Pressure Switches and Pneumatic Relays
14. Maintaining Electric/Electronic Power Sources
15. Maintaining Electric Controllers
16. Maintaining Electronic Controllers
17. Maintaining Electrically Controlled Actuators
18. Maintaining Electric and Electronic Switches
19. Troubleshooting a Control System
20. Following Up

II. Air Handling Systems (438)

A. Air Movement and Distribution
1. The Air-Handling System
2. Comfort Air Conditioning
3. Process Air Conditioning
4. Heat and Moisture Transport
5. How Air Moves
6. Types of Airflow
7. Pressure Relationships
8. Controlling Ventilation and Pressurization
9. Dual-Duct Systems
10. System Velocity

B. Fans and Fan Motors
1. Fan Construction
2. Centrifugal Fans
3. Axial-Flow Fans
4. Fan Performance Curves
5. System Characteristics
6. Preventive Maintenance for Fans
7. Impeller Maintenance
8. Belts and Drive-Train Maintenance
9. Bearing Maintenance and Replacement
10. Fan Motor Problems
11. Troubleshooting a Noisy Fan

C. Ductwork Types, Fabrication, and Repair
1. Types of Ducts
2. Duct Designations
3. Duct Systems
4. Duct Fittings and Connections
5. Insulation
6. Diffusers and Other Terminal Devices
7. Fabricating Sheet Metal Ducts
8. Duct Reinforcement
9. Duct Maintenance

D. Air Filtration
1. The Process of Air Filtration
2. Mechanical Air Filters
3. Establishing a Service Schedule
4. Servicing Impingement Filters
5. Replacing Dry Media Filters
6. Installing HEPA Filters
7. Selecting Replacement Air Filters
8. Electronic Air Cleaners
9. Maintaining Electronic Air Cleaners

E. Air System Balancing and Troubleshooting
1. A Systematic Procedure
2. Measuring Instruments
3. Auxiliary Instruments
4. Pretest Data Collection
5. Preparing the System
6. Measuring and Adjusting the Main Airflow
7. Measuring and Adjusting Branch Ducts
8. Adjusting Registers and Diffusers
9. Troubleshooting Air-Handling Systems

F. Indoor Air Quality and Sick Building Syndrome
1. Sick Building Syndrome (SBS) Characteristics
2. Investigating a Potential SBS Problem
3. Internal SBS Contributors
4. External SBS Contributors
5. HVAC Systems as Contaminant Sources
6. Particulates and IAQ
7. Pollutant Pathways
8. Odors and Contamination
9. Building-Related Illness (BRI)

III. System Troubleshooting (439)
A. Preparation for Troubleshooting
1. Mechanical Refrigeration Systems
2. Keys to Effective Troubleshooting
3. Safety in Troubleshooting
4. Tools and Equipment
5. Supplies (Consumables)
6. Human Relations Skills

B. Troubleshooting Procedures
1. Six Steps of Troubleshooting
   a. Step One—Stating the Problem
   b. Step Two—Collecting Data
      i. Routine Preliminary Checks
      ii. Detailed Checks
      iii. Not Enough Cooling Example
   c. Step Three—Analyzing the Data
   d. Step Four—Deciding on an Action
   e. Step Five—Making the Repairs
   f. Step Six—Checking the Results;
2. Avoiding a Recurrence of the Problem

C. Troubleshooting Electric Controls
1. A Troubleshooting Flowchart
2. Checking the Contactor
3. A1 Procedures
4. Armature, Transformer, and Bad Connections
5. A2 Procedures
6. Faulty Coils, Relays, and Switches
7. B Procedures
8. The Power Side

D. Troubleshooting Pneumatic Controls
1. Equipment and Tools
2. The Problem—Unstable Control
3. Checking the Control Air Supply; Output Pressure Test
4. Checking for Air Leaks; Checking Other Controllers
5. Actuator Problems
6. Thermostat Adjustments
7. When All Else Fails

E. Troubleshooting the Refrigerant Circuit
1. Preliminary Checks
2. Analyzing the Complaint
3. Checking Refrigerant Pressures
4. Checking Refrigerant Charge
5. Checking for Refrigerant Leaks
6. Compressor Cycling
7. Checking High-Side Components
8. Low-Side Problems
9. Distribution System Problems
MSI032 | Title of Course, Description and Objectives | Duration | Min | Max
--- | --- | --- | --- | ---

**SAFETY AND TECHNOLOGY: PLUMBING AND PIPEFITTING FOR PLANTS & BLDGS.** 3 Days | 1 | 10

With the dangers inherent to working on and around Plumbing and Pipefitting systems and equipment, industrial businesses that have maintenance departments must insure that their qualified Plumbing and Pipefitting personnel are aware of 1) the recent Plumbing and Pipefitting safety mandates and 2) safe work practices in and around Plumbing and Pipefitting equipment. MSI’s Plumbing and Pipefitting for Plants & Bldgs. class – designed to encourage safe work practices and maintenance O&M effectiveness among qualified maintenance people and to emphasize federal and state mandates - focuses on the following topics during the 3-day program:

COURSE OBJECTIVES:

I. Pipefitting Tools (107-3)
   - A. Pipe Wrenches
   - B. Using a Pipe Wrench
   - C. Pipe Vises
   - D. Cutting Pipe
   - E. Reaming Pipe
   - F. Threading Pipe
   - G. Tapping Pipe
   - H. Cutting Tubing and Plastic Pipe

II. Plumbing Tools (107-4)
   - A. Plumbing Codes
   - B. Plumbing System
   - C. Joining Copper Pipe
   - D. Tube Bending
   - E. Cutting Cast-Iron Pipe
   - F. Joining Cast-Iron Pipe
   - G. Assembling Plastic Pipe
   - H. Force-Cup Plungers; Augers
   - I. Line-Clearing Tools
   - J. Sewer Tapes
   - K. Special Wrenches
   - L. Measuring Pipe

III. Maintenance Pipefitting (345)
   - A. Piping Dimensions and Terminology
     1. Piping Standards
     2. Basic Pipe Dimensions
     3. Piping System Symbols
     4. Pipe Fittings
     5. Flanges
     6. Flange Facings and Finishes
     7. Using Dimensional Tables
     8. Calculating Lengths from Existing Pipes
     9. Straight Offsets
     10. Rolling Offsets
   - B. Threaded Piping Systems
     1. Threads
     2. Thread Terminology
3. Measuring Pipe Threads
4. Threaded Pipe Fittings
5. Measuring Pipe for Installation
6. Cutting Pipe
7. Threader and Dies
8. Threading Pipe
9. Finishing the Pipe
10. Inspecting Old Threads
11. Applying Sealants
12. Assembly of Components
13. Testing the System
14. Troubleshooting/Emergency Repairs
15. Replacement
C. Welded Piping Systems
   1. Welds Based on Type of Connection
   2. Fittings for Welded Pipe Systems
   3. Welding Rings
   4. System Alignment
   5. Squareness
   6. Aligning Fittings
   7. Hole Positioning
   8. Measurements
   9. Preparing the Work
  10. Squaring the Flange
  11. Weld Cracks
  12. Inspection
  13. Repairs
D. Plastic Piping Systems
   1. Thermoplastic Pipe Materials
   2. Advantages of Thermoplastic Materials
   3. Disadvantages of Thermoplastic Materials
   4. Standards for Thermoplastic Pipe
   5. Thermosetting Pipe Materials
   6. Fluids Carried by Thermosetting Pipe
   7. Advantages of Thermosetting Materials
   8. Disadvantages of Thermosetting Materials
   9. Standards for Thermosetting Pipe
  10. Installing Thermoplastic Pipe
  11. Installing Thermosetting Pipe
  12. Troubleshooting Plastic Piping Systems
E. Pipefitting Accessories
   1. Hangers and Supports
   2. Special Mountings
   3. Steam Traps
   4. Types of Traps
   5. Steam Trap Installation
   6. Trap Cleaning
   7. Filters, Strainers, and Separators
   8. Installation
   9. Cleaning
  10. Expansion Joints and Fittings
  11. Expansion Joint Applications
12. Expansion Joint Selection and Installation
13. Maintenance