CITY OF TACOMA

Tacoma Public Utilities – Tacoma Power

ADDENDUM NO. 2 **DATE:** February 5, 2019

REVISIONS TO:
Request for Bids Specification No. PG17-0493N
LaGrande Shop Building

NOTICE TO ALL BIDDERS:

This addendum is issued to clarify, revise, add to or delete from, the original specification documents for the above project. This addendum, as integrated with the original specification documents, shall form the specification documents. The noted revisions shall take precedence over previously issued specification documents and shall become part of this contract.

REVISIONS TO THE PROPOSAL PAGES:

Replace Page 5 with revised page: *Changed Item 7 and Item 8 Bid Unit to TON.*

REVISIONS TO THE SPECIAL PROVISIONS:

Replace Table of Contents, Page 3 with revised page: *Added Section 08300 – Coiling Rollup Doors.*

Replace Section 01010 – Section of Work, Page 7 with revised page: *Revised Site work and Electrical.*

Replace Section 01025 – Measurement and Payment, Pages 4, 5, 6, and 7 with revised pages 4, 5, 6 and 7 that changes Bid Items 7 and 8.

Added Section 08300 – Coiling Rollup Doors: *Added New Section (3 pages).*

REVISIONS TO THE DRAWINGS:

Replace Drawing No. AP2203 with revised page: *Changed City and Contractor responsibilities.*

SUBSTITUTION REQUESTS - APPROVED

Section 12710 – Flow Control	Griswolds Controls
Section 15710, 2.3 – Expansion Tanks	Zilmet ZETA-20ASME Tank
Section 15770 – Radiant Floor Heating	Mr. Pex

SUBSTITUTION REQUESTS - REJECTED

Section 15600 – Heating Water Electric	Precision
Section 15600, 2.1 – Electric Boiler	Thermo 2000 Volt Max 60

NOTE: Acknowledge receipt of this addendum by initialing the corresponding space as indicated on the signature page. Vendors who have already submitted their bid/proposal may contact the Purchasing Division at 253-502-8468 and request return of their bid/proposal for acknowledgment and re-submittal. Or, a letter acknowledging receipt of this addendum may be submitted in an envelope marked Request for Bids Specification No. PG18-0321N Addendum No. 2. The City reserves the right to reject any and all bids, including, in certain circumstances, for failure to appropriately acknowledge this addendum.

Patsy Best, Procurement and Payables Manager
Finance/Purchasing Division

Cc: Steve Fairchild, Project Lead, Generation
Terry Ryan, Assistant Generation Manager, Generation
Business Systems, Generation

_____
Name of Bidder

PROPOSAL

	QUANTITY	BID UNIT	UNIT COST	TOTAL COST
ITEM 1 Mobilization/Demobilization		LS	$_____	$_____
ITEM 2 Pre-engineered Building Foundation		LS	$_____	$_____
ITEM 3 Pre-engineered Building Structure		LS	$_____	$_____
ITEM 4 Building Septic Holding Tank		LS	$_____	$_____
ITEM 5 Building Mechanical System		LS	$_____	$_____
ITEM 6 Building Fire Monitoring and Alarm System		LS	$_____	$_____
ITEM 7 Material Removal (Organic)	20,000	~~**CY**~~ ***TON***	$_____	$_____
ITEM 8 Debris Removal (Concrete)	300	~~**CY**~~ ***TON***	$_____	$_____
ITEM 9 Bank Run Material	200	TON	$_____	$_____
ITEM 10 5/8 (-) Crushed Surfacing Top Course	300	TON	$_____	$_____
ITEM 11 1-½ Inch Drain Rock	100	TON	$_____	$_____
ITEM 12 Concrete Fill (2,500 psi)	3000	SF	$_____	$_____
ITEM 13 *****Force Account			$ 100,000	$ 100,000

TECHNICAL PROVISIONS

DIVISION 2 - EARTHWORK

SECTION 02110 - PROTECTION OF ENVIRONMENT

SECTION 02200 - EARTHWORK

SECTION 02999 – GEOTECHNICAL REPORT

DIVISION 3 - CONCRETE

SECTION 03000 - CAST IN PLACE CONCRETE

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

SECTION 07300 – BUILDING INSULATION

SECTION 07900 – JOINT SEALERS

DIVISION 8 – DOORS

SECTION 08100 - METAL DOORS AND FRAMES

SECTION 08300 - COILING ROLLUP DOORS

SECTION 08600 - DOOR HARDWARE

DIVISION 9 - FINISHES

SECTION 09100 – FIBER REINFORCED PLASTIC

SECTION 09900 - PAINTING

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13100 - PRE-ENGINEERED METAL BUILDING

DIVISION 15 – MECHANICAL

SECTION 15010 - GENERAL MECHANICAL PROVISIONS

SECTION 15015 - PROJECT CLOSEOUT AND SYSTEM START-UP

SECTION 15030 - ELECTRICAL PROVISIONS FOR MECHANICAL WORK

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

SECTION 15060 - PIPING

SECTION 15080 - PIPING SPECIALTIES

SECTION 15100 - VALVES

SECTION 15140 - PUMPS

SECTION 15200 - VIBRATION ISOLATION

SECTION 15210 - SEISMIC CONTROL

SECTION 15250 - MECHANICAL INSULATION

SECTION 15400 - DOMESTIC WATER SYSTEM

SECTION 15410 - PLUMBING FIXTURES

Contractor shall provide a surety bond for 100% of the contract award within ten (10) calendar days after award of contract. Up to 95-percent of the bid amount can be released upon satisfactory completion of the job and completion of the state requirements.

1.13 WORK BY CITY

The City will award separate work related to this overall project. See also section 01040, 1.6 – Division of Work.

Items noted **'NIC'** (not in contract) on the drawings will be furnished and installed by the City operating before or concurrently with the work of this contract, and are not included in this contract:

A. SITE WORK

1. ~~**Demolition of**~~ ***The City will demolish the*** existing forebay concrete ***in the way of the contractor's work***. This includes all concrete demolition for building construction and as required for installation of site utilities. City will stockpile concrete material adjacent to building site. Contractor required to dispose of material ***on Force Account***.
2. Installation and partial backfill of site utilities to within 6-ft of building footprint (exception described below). City will install required site water, ~~**sewer**~~, and power and backfill trench to within 6-inches of finished grade. Contractor required to cap trench with concrete backfill as shown on the contract drawings. Contractor responsible for foundation footing drains and downspout tight lines to existing catch basins (which go beyond 6-ft of the building footprint).

B. ELECTRICAL

1. ~~**City will provide all electrical components except electrical conduits embedded within the building foundation slab, wiring associated with contractor-installed fire alarm system, wiring for septic holding tank alarm system and any wiring required to startup and fully commission the air compressor, boiler and all HVAC equipment. Transformers, vaults and distribution panels are included in Work by City.**~~ ***City will purchase and install all electrical components, except the following, which shall be installed by the Contractor:***
    - ***Electrical pathways embedded within the foundation slab.***
    - ***Wiring associated with contractor installed fire alarm system.***
    - ***Conduit, alarm panel, and wiring for septic tank to the J-Box just inside the building (through slab).***

NOTE: The contractor shall commission the air compressor, boiler and all HVAC equipment upon final permit by City.

C. SHOP EQUIPMENT

1. The Vehicle Lift shown on the drawings is City-Furnished/Contractor Installed. All other machine shop equipment is City Furnished/City Installed.

END OF SECTION

Installation and wiring of control system shall be considered incidental to this bid item.

Connection of the septic holding tank to the bathroom plumbing shall be considered incidental to this bid item.

Excavation and foundation preparation for the holding tank shall be considered incidental to this bid item.

Foundation rock below the holding tank shall be paid for under Bid Item 10 - 5/8 (-) Crushed Surfacing Top Course

B. PAYMENT

The contract price per lump sum (LS) for Building Septic Holding Tank shall be full compensation for all costs associated with this bid item.

5. BUILDING MECHANICAL SYSTEM

A. MEASUREMENT

Building Mechanical Systems shall be measured per lump sum (LS) and shall include all labor, materials and equipment required for installation of Division 15 systems in accordance with the attached plans and specifications and as listed in this proposal. This shall include (but not limited to) mechanical air handling equipment, hydronic boiler, boiler appurtenances, complete air compressor package and piping, radiant floor heating system piping, ductwork, hangers, equipment, equipment connections, coordination between trades, equipment controls and interlocks, and all embedded mechanical piping associated for a complete and fully functioning radiant floor heating system.

Cost associated with the installation of the City-Furnished Vehicle Lift shall be considered incidental to this bid item.

B. PAYMENT

The contract price per lump sum (LS) for Building Mechanical Systems shall be full compensation for all costs associated with this bid item.

6. BUILDING FIRE MONITORING AND ALARM SYSTEM

A. MEASUREMENT

Building Fire Monitoring and Alarm System shall be measured per lump sum (LS) and shall include all labor, materials and equipment required to design, permit, install and commission the Building Fire Monitoring and Alarm System described in Division 16 and in accordance with the attached plans and specifications.

B. PAYMENT

The contract price per lump sum (LS) for Building Fire Monitoring and Alarm System shall be full compensation for all costs associated with this bid item.

7. MATERIAL REMOVAL (*SOIL AND* ORGANIC)

A. MEASUREMENT

Material Removal (***Soil and*** Organic) shall be measured per ~~**cubic yard (CY)**~~ ***ton (TON)*** for the removal and legal disposal of material located in the southwest corner of the forebay facility in accordance with the attached plans and specifications and as listed in this proposal.

Legal disposal is required and associated costs are considered incidental in this bid item. ***Soil being removed is assumed clean and without contamination.***

Costs associated with contractor providing weight tickets along with a detailed and organized spreadsheet outlining the details of the weight tickets and ticket material product totals shall be incidental to this bid item.

B. PAYMENT

The unit price per ~~**cubic yard (CY)**~~ ***ton (TON)*** for Material Removal (Organic) shall be full compensation for all costs associated with this bid item.

8. DEBRIS REMOVAL (CONCRETE)

A. MEASUREMENT

Debris Removal (Concrete) shall be measured per ~~**cubic yard (CY)**~~ ***ton (TON)*** for the removal and legal disposal of concrete debris created by the City's demolition activity in accordance with the attached plans and specifications and as listed in this proposal. ***Maximum size of debris to be removed 2-feet x 2-feet.***

Legal disposal is required and associated costs are considered incidental in this bid item.

Costs associated with contractor providing weight tickets along with a detailed and organized spreadsheet outlining the details of the weight tickets and ticket product totals shall be incidental to this bid item.

B. PAYMENT

The unit price per ~~**cubic yard (CY)**~~ ***ton (TON)*** for Debris Removal (Concrete) shall be full compensation for all costs associated with this bid item.

9. BANK RUN MATERIAL

A. MEASUREMENT

Bank Run Material shall be measured per ton (TON) and shall include all labor, materials, and equipment required to supply, transport, grade and compact materials in lifts as necessary to establish final grades in accordance with the attached plans and specifications, and as listed in the proposal.

Quantities for Bank Run Material delivered to the site shall be pre-approved by the Tacoma Power inspector and weight tickets collected by inspector.

Costs associated with contractor providing weight tickets along with a detailed and organized spreadsheet outlining the details of the weight tickets and ticket rock product totals shall be incidental to this bid item.

B. PAYMENT

The unit price per ton (TON) for Bank Run Material shall be full compensation for all costs associated with this bid item.

10. 5/8 (-) CRUSHED SURFACING TOP COURSE

A. MEASUREMENT

5/8 (-) Crushed Surfacing Top Course shall be measured per ton (TON) and shall include all labor, materials, and equipment required to supply, transport, grade and compact materials in lifts as necessary to establish final grades in accordance with the attached plans and specifications, and as listed in the proposal.

Quantities for 5/8 (-) Crushed Surfacing Top Course delivered to the site shall be pre-approved by the Tacoma Power inspector and weight tickets collected by inspector.

Costs associated with contractor providing weight tickets along with a detailed and organized spreadsheet outlining the details of the weight tickets and ticket rock product totals shall be incidental to this bid item.

B. PAYMENT

The unit price per ton (TON) for 5/8 (-) Crushed Surfacing Top Course shall be full compensation for all costs associated with this bid item.

11. 1-1/2 INCH DRAIN ROCK

A. MEASUREMENT

1-1/2 Inch Drain Rock shall be measured per ton (TON) and shall include all labor, materials, and equipment required to supply, transport and place materials as necessary around footing drains in accordance with the attached plans and specifications, and as listed in the proposal.

Quantities for 1-1/2 Inch Drain Rock delivered to the site shall be pre-approved by the Tacoma Power inspector and weight tickets collected by inspector.

Costs associated with contractor providing weight tickets along with a detailed and organized spreadsheet outlining the details of the weight tickets and ticket rock product totals shall be incidental to this bid item.

B. PAYMENT

The unit price per ton (TON) for 1-1/2 Inch Drain Rock shall be full compensation for all costs associated with this bid item.

12. CONCRETE FILL (2,500 PSI)

A. MEASUREMENT

Concrete Fill (2,500 psi) shall be measured per square foot (SF) of 6-inch thick slab installed to cap all utility trenches prepared by the City. Concrete Fill (2,500 psi) shall include all labor, materials, and equipment required to supply, transport and place concrete to final grades in accordance with the attached plans and specifications, and as listed in the proposal.

Quantities for Concrete Fill (2,500 psi) delivered to the site shall be pre-approved by the Tacoma Power inspector and weight tickets collected by inspector upon request.

B. PAYMENT

The unit price per square foot (SF) for Concrete Fill (2,500 psi) shall be full compensation for all costs associated with this bid item.

13. FORCE ACCOUNT, PER LUMP SUM

A. MEASUREMENT

Measurement will be made for Force Account in accordance with Section 1-09.6 of the latest edition of the Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation as modified by Force Account Work in the Special Provisions or on negotiated lump sum or unit price change orders added to the contract.

B. PAYMENT

Payment shall be made for change order items added to the contract which shall be treated as a deduct to the force account remaining available.

“Force Account,” as listed in the proposal

1.3 FORCE ACCOUNT WORK

This section supersedes Section 3.10, Paragraph C of the General Provisions.

In certain circumstances, the contractor may be required to perform additional work. Where the work to be performed is determined to be extra and not attributed to the contractor's negligence, carelessness, or failure to install permanent controls, it shall be paid in accordance with the unit contract price or by force account.

Such additional work not covered by contract items will be paid for on a force account basis in accordance with Section 1-09.6 of the Standard Specifications or as a negotiated change order with lump sum or unit price items. For the purpose of providing a common proposal for all bidders and for that purpose only, the City has estimated the potential cost of force account work, and has entered the amount in the bid proposal to become a part of the total bid by the contractor. However, there is no guarantee that there will be any force account work.

1.4 NON-PAYMENT FOR REJECTED OR SURPLUS PRODUCTS OR WORK

Payment will not be made for work rejected by the City. Products or work not meeting contract requirements shall be replaced by the contractor at no expense to the City, regardless of the impact to work, schedule or cost.

1.5 AS-BUILTS

The final payment of this contract will not be released until complete "AS-BUILT" plans are received and approved by the engineer.

END OF SECTION

SECTION 08300 - COILING ROLLUP DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Motor-Operated Insulated Service Doors

1.2 SUBMITTALS

A. Submit under provisions of Section 01300 - Submittals and Shop Drawings.

B. Shop drawings: Indicate all anchorage, trim details and connection to electrical.

C. Submit manufacturer's installation instructions under provisions of Section 01300 – Submittals and Shop Drawings.

D. Submit manufacturer's operation and maintenance data under provisions of Section 01300 – Submittals and Shop Drawings.

1.3 QUALITY ASSURANCE

A. Regulatory requirements: Comply with City of Tacoma codes, ordinances, and other applicable regulatory requirements.

B. Comply with Underwriters' Laboratories labeling requirements.

C. Exterior rolling insulated service doors shall be designed to withstand at least twenty (20) pounds per square foot wind load.

D. All rolling insulated service doors shall be designed to a standard maximum of 25 cycles per day and an overall maximum of 50,000 operating cycles for the life of the door.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURES FOR OVERHEAD COILING DOORS

A. The Cookson Company

B. Wayne-Dalton Corporation

C. Overhead Door

D. Cornell

E. R&S Manufacturing

NOTE: Cookson is referenced for specification and basis of design indicated in drawings. Models from listed or other approved manufacturers shall meet or exceed specification.

2.2 OVERHEAD MOTOR-OPERATED INSULATED SERVICE DOOR

A. SPECIFICATION STANDARD

Cookson Type FMWI

1. Face of wall mounted
2. Motor – gearhead vertical

B. CURTAIN

1. 3-inch high by 7/8-inch deep, with 22 gauge exterior slat and 22 gauge interior slat separated by 13/16-inch of rigid insulation.

a. The insulation shall not produce a flame spread greater than 25 and a smoke generation greater than 50.

C. FACTORY FINISH – CURTAIN

1. Hot-dipped galvanized G-90 coating consistent with ASTM A-653.
2. Bonderized coating for prime coat adhesion.
3. Corrosion inhibiting primer 0.2 mils per side.
4. Thermosetting polyester top coat with a mini8mum thickness of 0.6 mils each side.
5. Baked, powder coat finish, color determined on a project-by-project basis.

D. BOTTOM BAR

Two (2) 1/8-inch angles mechanically joined together with solid flexible astragal/safety edge system.

E. GUIDES

1. Steel angles bolted together to form channel for curtain to travel.
2. With continuous extruded vinyl snap-on weather-stripping along exterior leg of guide.
3. Continuous wall angle for bolt or weld attachment at minimum 36-inch centers.

F. BRACKETS

Minimum 1/4-inch thick steel and bolted to the wall angle.

G. HOOD

1. 24-gauge galvanized steel, formed to fit curvature of brackets with waterproof baffle to control air infiltration.
2. Factory finish as indicated for curtain.

H. OPERATION

1. The door shall be operated at a speed of 2/3-foot per second by an open drip-proof electric motor with gear reducer in oil bath.
2. The motor operator shall include a geared limit switch, and an electrically interlocked emergency chain operator.
3. The motor starter shall be housed in a NEMA 1 housing and include a magnetic reversing starter size 0, a 24-volt control transformer, and a complete terminal strip to facilitate field wiring.
4. The motor operator shall be activated by a three (3) button push-button station in a NEMA 1 enclosure. The motor operator shall be mounted to the door bracket. All motor operators shall be U.L. listed.
5. Model RG single-phase ½ hp or three-phase 480V ¾ hp sized as required by door manufactured by Overhead Door Corporation or engineer-approved equal.

I. ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Each opener shall be wired for an inside-mount, button-control opener that will open, stop, and close the door when pushed, and an outside mastered keyed cylinder, best 6-pin, core control that shall open, stop, and close the door.

B. Openers shall come complete with emergency disconnect and be programmable to stop whenever resistance is encountered.

C. Openers shall be capable of lifting the garage door without exerting any undo stresses on the guides, track, or torsion spring.

D. Openers shall be compatible for 115/120 volt, single-phase power supply or as directed by the engineer.

E. Submit to the engineer the complete data on the coiling roll-up doors and openers for approval prior to placing firm order on materials.

F. The City will provide required electrical circuits and receptacles as required by the contractor.

J. SAFETY EDGE

Installed on bottom bar of the door to automatically reverse the door if the device detects an obstruction in the downward travel of the door.

PART 3 EXECUTION

3.1 INSTALLATION

Install door unit assembly in accordance with manufacturer's instructions. Anchor assembly to wall construction and building framing without distortion or stress.

Securely brace door tracks suspended from structure. Secure tracks to structural members only.

Fit and align door assembly including hardware, level and plumb, to provide smooth operation.

Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

Ensure the operation and adjustments to door assembly for smooth operation.

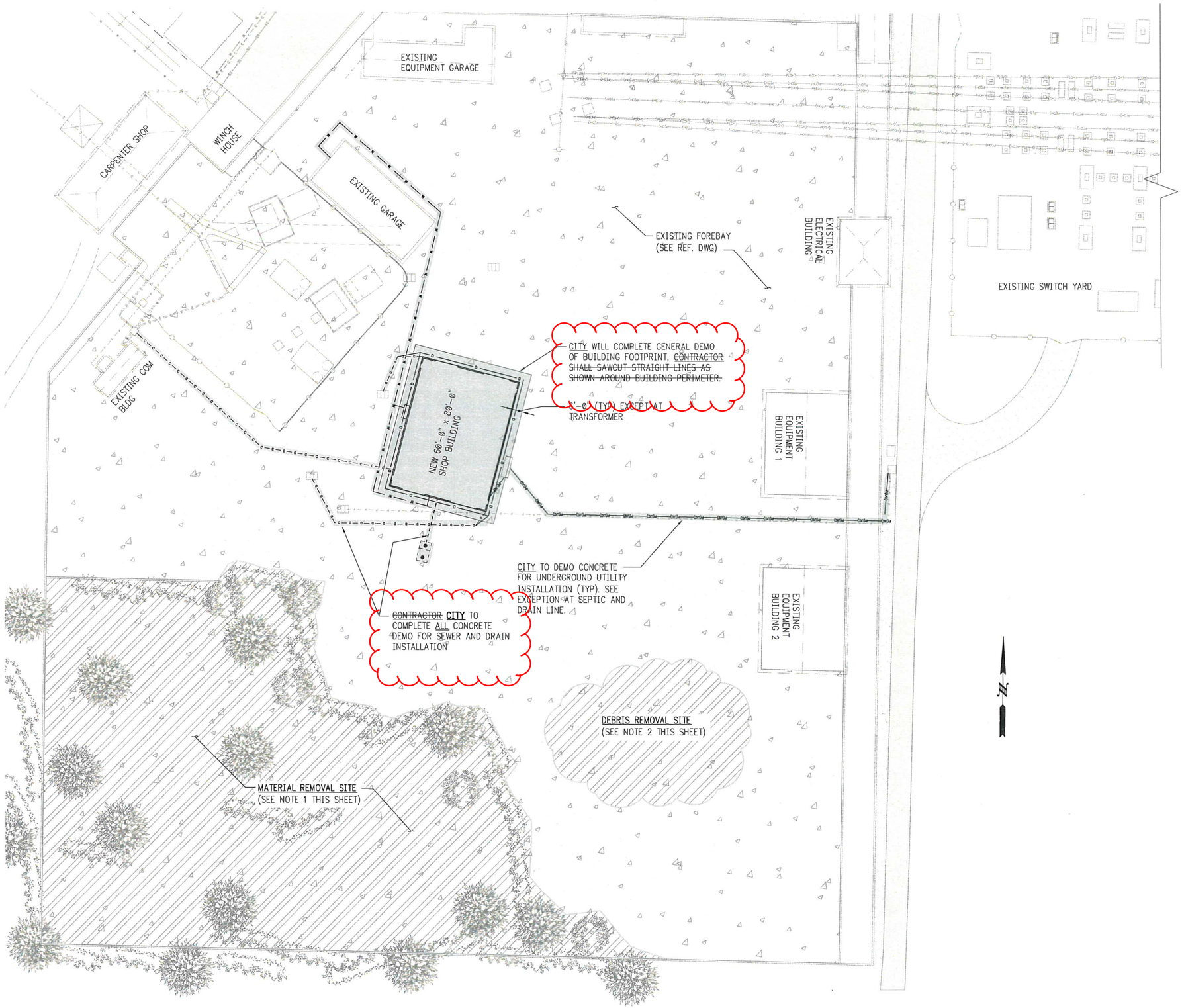
3.2 TOLERANCES

Maximum variation from plumb and level shall not exceed 1/16-inch.

Longitudinal or diagonal warp shall not exceed 1/8-inch (+/-) from 10-foot straight edge.

END OF SECTION

Addendum 2



DEBRIS REMOVAL NOTES:

1. CONTRACTOR SHALL REMOVE AND LEGALLY DISPOSE OF ALL MATERIAL LOCATED IN SOUTHWEST CORNER OF FOREBAY FACILITY. CONTRACTOR IS RESPONSIBLE FOR INSPECTING SURPLUS MATERIAL PRIOR TO BIDDING. MATERIAL TYPE UNKNOWN. FOR BIDDING PURPOSES THE VOLUME OF MATERIAL IS ESTIMATED TO BE 20,000 CUBIC YARDS.
2. CITY TO DEMOLISH CONCRETE SLAB AS REQUIRED, (U.N.O.) FOR CONSTRUCTION AND STOCKPILE CONCRETE DEBRIS IN LOCATION SHOWN. CONTRACTOR SHALL REMOVE AND LEGALLY DISPOSE OF ALL DEBRIS. VOLUME OF CONCRETE DEBRIS IS ESTIMATED TO BE 300 CUBIC YARDS. SEE PLAN FOR EXCEPTION, WHERE DEMO FOR DRAIN LINE AND SEWER LINE IS BY CONTRACTOR AND SAWCUT LINES AROUND BLDG. FOOTPRINT ARE BY CONTRACTOR

LEGEND:

- P(UG) — NEW POWER (UG) UNDERGROUND
- C — C — C — NEW COMM
- D — D — D — NEW DRAIN
- S — S — S — NEW SANITARY SEWER
- W — NEW WATER
- EXIST CATCH BASIN
- EXIST POWER
- P(OH) — EXIST POWER (OH) OVERHEAD
- EXIST CONCRETE SLAB (FOREBAY)
- EXIST ASPHALT
- EXIST FIRE HYDRANT
- NPT — EXIST FIRE HYDRANT SUPPLY
- AREA INDICATES EXTENT OF FOREBAY CONCRETE SLAB TO BE DEMOLISHED AS NECESSARY FOR BUILDING CONSTRUCTION AND UTILITY INSTALLATION. SEE PLAN AND DEBRIS REMOVAL NOTES FOR BREAKDOWN OF WORK BY CITY AND WORK BY CONTRACTOR.
- AREA INDICATES APPROX. LOCATION OF DEBRIS REMOVAL.

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

REV. NO. 0

NISQUALLY PROJECT
LAGRANDE SHOP BUILDING DEMOLITION AND DEBRIS REMOVAL

STEPHEN D. FAIRCHILD STATE OF WASHINGTON 31204 REGISTERED PROFESSIONAL ENGINEER

REVIEWED	DESIGNED	DRAWN
	SDF	PAP
APPROVED	1/ /19 DATE	STAMPED
	DRAWING NO. AP2203	

C-1.1

FILED IN: C:\Civil 3D Vault Projects\Nisqually Civil\LaGrande\Shop Building\C-1.1.dwg SAVED: pparis 1/4/2019 3:13 PM PLOTTED: Jones, Kim 2/5/2019 3:29 PM

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

TO: Tacoma Power/Generation
3628 South 35th Street
Tacoma WA 98409
Fax: 253-502-8136

ATTN: **Steve Fairchild** Date: 1-22-2019

PROJECT: **Specification PG17-0493F LaGrande Shop Building** Transmittal No. _____

(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: 15710

Specified Item: Flow Control

Proposed Substitution: Griswold Controls

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes and changes to drawings and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? ☐ Yes ■ No
If yes, provide detail: _____

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? ☐ Yes ■ No

C. What effect does substitution have on other trades?
Ø

D. Difference between proposed substitution and specified item?
Ø

E. Manufacturer's guarantees of proposed and specified items are? ■ Same ☐ Different*
*Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution? ■ Yes ☐ No

G. Will the proposed substitution have any effect on compliance with applicable codes? ☐ Yes ■ No
If yes, explain: _____

H. Name and address and current phone number the Project Lead for three (3) similar projects where the proposed product was used, along with the Project name and date of installation:
1. Seatac International Arrival Facility - Apollo Mech
2. North Middle School - Bratonia Mech
3. Parkwood Elementary - Bratonia Mech

I. Contract completion date is? _____ ■ Same ☐ Different*
Explain differences on attachment(s).

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TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Cam Vann
Name

Proctor Sales
Firm

20715 50th Ave
Address

Lynnwood, WA 98036
City, State, Zip

Phone No.

Signature

1/22-19
Date

FOR USE BY TACOMA POWER:

☒ Accepted ☐ Accepted as Noted

☐ Not Accepted ☐ Received Too Late

By: Stephen Fairchild
(Project Lead/Manager)

Signature:

Date: 1/25/19

REMARKS:

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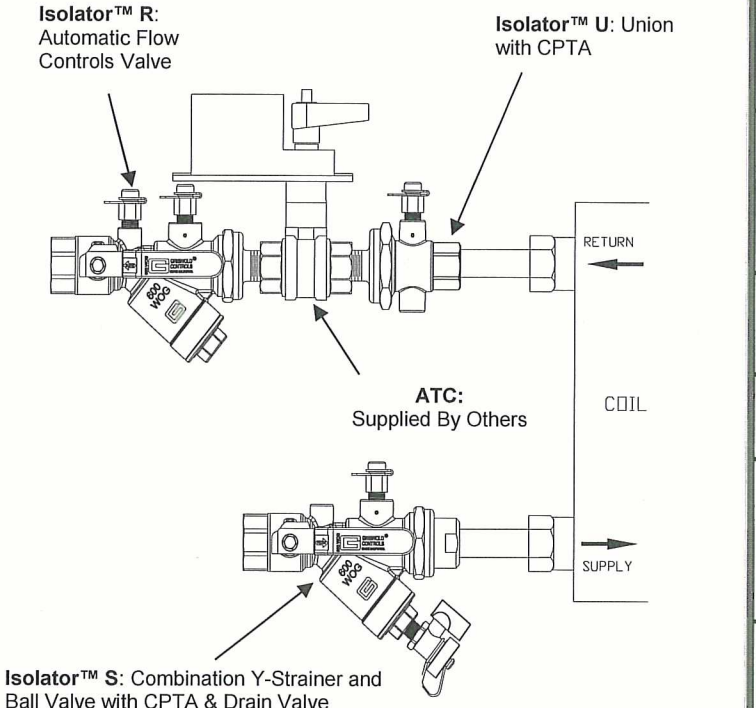

END CONNECTIONS:
❑ FNPT ❑ SWT
❑ FNPT (Line) & SWT (Coil)
❑ SWT (Line) & FNPT (Coil)

LINE SIZE:
❑ 1/2" ❑ 3/4"
❑ 1/2"L ❑ 3/4"L ❑ 1"
❑ 1" L ❑ 1-1/4" ❑ 1-1/2"
❑ 1-1/2"L ❑ 2"

BALL & STEM:
❑ Nickel-plated brass ball & brass stem
❑ Stainless Steel ball & stem

COMPONENT OPTIONS:
❑ Insulation Kit

HOSE OPTIONS (FNPT Option)
Type:
❑ F.R. SS Hose ❑ Insulated
Length
❑ 12" ❑ 18" ❑ 24" ❑ 36"

TEMPERATURE CONTROLS:
❑ Customer Supplied and Installed ATC
❑ Customer Supplied ATC-Installed By Griswold Controls

Specifications

Isolator™R: Forged brass (ASTM B283) automatic flow control valve Assembly includes integrated isolation ball valve and stainless steel flow control cartridge. Cartridge can be removed for inspection, or can be replaced without disturbing piping connections. Valve housing includes field repairable dual Teflon and EPDM o-ring seal stem, with Nickel plated ball. Valve includes one fixed end (FNPT or SWT) connection and one union (MNPT) connection. Union end includes union nut and EPDM o-ring. Valve body has two ports with (1) Pressure/Temperature Test Valves, and (1) combination Pressure/Temperature Test Valves and manual air vent (**CPTA**). Valve is fully assembled. PSI/Temperature Rating: 400 PSI / 250°F.

Isolator™S: Ball valve and integrated strainer. Valve housing is forged brass with field repairable dual Teflon and EPDM o-ring seal stem, with Nickel plated ball. Strainer is 20 mesh stainless steel and can be removed from housing without disturbing pipe connections for inspection or replacement. Valve includes one fixed (FNPT or SWT) connection and one union (FNPT or SWT) connection. Union end includes union nut and EPDM o-ring. Body has one port with combination Pressure/Temperature Test Valves and manual air vent (**CPTA**). Assembly includes drain valve with 3/4" hose connection with cap. Valve is fully assembled. PSI/Temperature Rating: 400 PSI / 250°F.

Union: Forged brass (ASTM B283) union. Union includes one fixed end (FNPT or SWT) connection and one union (MNPT) connection. Union end includes union nut and EPDM o-ring. Union body has one port with combination Pressure/Temperature Test Valves and manual air vent (**CPTA**). PSI/Temperature Rating: 400 PSI / 250°F.

Drain Valve: Rated 275 PSI / 250°F. Brass housing, Nickel plated ball. 3/4" NPSH hose connection.

Pressure/Temperature Test Valve: Rated 1000 PSI / 350°F.Brass Housing, Nordel Seal.

Combination Pressure/Test Valve & Manual Air Vent (CPTA): Pressure/Temperature Test Valve works in conjunction with valve body feature to function as Manual Air Vent. Requires both components to operate as manual air vent.

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GRISWOLD CONTROLS®

CPP-2IRIS PACKAGES

Model Number Selection:

Size	Model Number- FNPT	Model Number- SWT	Model Number- Combo (Line: FNPT; Coil: SWT)	Model Number- Combo (Line: SWT; Coil: FNPT)	Add ATC Size to Model Number
1/2"	AA.CPP2IRIR0E_	AA.CPP2IRIR0L_	AA.CPP2IRIR01_	AA.CPP2IRIR01Z_	1/2"=H
3/4"	AA.CPP2IRIR0F_	AA.CPP2IRIR0M_	AA.CPP2IRIR02_	AA.CPP2IRIR02Z_	1/2"=H, 3/4"=I
1/2" L	A.CPP2IRIR1E_	A.CPP2IRIR1L_	A.CPP2IRIR11_	A.CPP2IRIR11Z_	1/2"=H
3/4" L	A.CPP2IRIR1F_	A.CPP2IRIR1M_	A.CPP2IRIR12_	A.CPP2IRIR12Z_	1/2"=H, 3/4"=I
1"	A.CPP2IRIR1G_	A.CPP2IRIR1N_	A.CPP2IRIR13_	A.CPP2IRIR13Z_	1/2"=H, 3/4"=I, 1"=J
1" L	B.CPP2IRIR2G_	B.CPP2IRIR2N_	B.CPP2IRIR23_	B.CPP2IRIR23Z_	1/2"=H, 3/4"=I, 1"=J
1-1/4"	B.CPP2IRIR2P_	B.CPP2IRIR2K_	B.CPP2IRIR24_	B.CPP2IRIR24Z_	1/2"=H, 3/4"=I, 1"=J, 1-1/4"=S
1-1/2"	B.CPP2IRIR2Q_	B.CPP2IRIR2W_	B.CPP2IRIR25_	B.CPP2IRIR25Z_	1/2"=H, 3/4"=I, 1"=J, 1-1/4"=S, 1-1/2"=T
1-1/2" L	C.CPP2IRIR3Q_	C.CPP2IRIR3W_	C.CPP2IRIR35_	C.CPP2IRIR35Z_	1-1/4"=S , 1-1/2"=T
2"	C.CPP2IRIR3R_	C.CPP2IRIR3Y_	C.CPP2IRIR36_	C.CPP2IRIR36Z_	1-1/4"=S , 1-1/2"=T, 2"=U

NOTES:

1. Connections to ATC are MNPT.
2. Optional Insulation Kit- includes cap and tube for insulation around handle, and appropriate number of extensions for PT/CPTA included in package. Add a "1" to the end of the model number to designate 1-1/2" insulation option and a "2" to the end of the model number to designate 2" insulation option.
3. Standard CPPs include nickel-plated brass ball and brass stem. For optional stainless steel ball and stem change "CPP" to "CPS" in model number.

Isolator™R Flow Rates (+/- 5%)

SIZE	MODEL NO.	HEAD LOSS IN FEET[1]	PSID RANGE	GPM
1/2", 3/4"	IR02__	7.4	2-32[2]	0.25, 0.33, 2.00, 2.50, 3.00
	IR04__	13.4	4-57	0.50, 1.00, 1.50, 2.00, 2.50, 3.00
1/2"L, 3/4", 1"	IR11__	3.5	1-14	0.33, 0.50, 0.67, 1.00, 1.33, 1.67, 2.00, 2.33, 2.67, 3.33, 4.00, 4.67, 5.00
	IR12__	7.4	2-32	0.55, 0.75, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 5.00, 6.00, 7.00, 8.00
	IR14__	13.4	4-57	0.75, 1.00, 1.33, 2.00, 2.67, 3.33, 4.00, 4.67, 5.33, 6.67, 8.00, 9.33, 10.00
	IR18__	30.0	8-128	1.10, 1.50, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 10.0, 12.0, 14.0, 16.0
1"L,1-1/4", 1-1/2"	IR21__	3.5	1-14	5.33, 6.00, 6.67, 7.33, 8.00, 8.67, 9.33, 10.00, 10.67, 11.33, 12.00, 12.67, 13.33, 14.00, 14.67
	IR22__	7.4	2-32	8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0, 21.0, 22.0
	IR24__	13.4	4-57	10.67, 12.00, 13.33, 14.67, 16.00, 17.33, 18.67, 20.00, 21.33, 22.67, 24.00, 25.33, 26.67, 28.00, 29.33
	IR28__	30.0	8-128	16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0, 34.0, 36.0, 38.0, 40.0, 42.0, 44.0
1-1/2"L - 2"	IR31__	3.5	1-14	12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38
	IR32__	7.4	2-32	18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57
	IR34__	13.4	4-57	24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76
	IR38__	30.0	8-128	36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114

NOTES

[1] Head Loss in Feet is provided for pump head calculations. (1 PSI = 2.307 Feet of Water)

[2] Systems with entrained air and fluid velocities less than 4fps are susceptible to noise when using the 2-32 cartridge in the IR0 housing. If your system has entrained air and flowrates less than 2 gpm please use the 4-57 cartridge.

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GRISWOLD® CONTROLS

tucai®

Specification Sheet
Water range

TAQ EXTRA - FLEXIBLE BRAIDED HOSES

0.50" - 2.00" (DN13- DN50)

TAQ® EXTRA

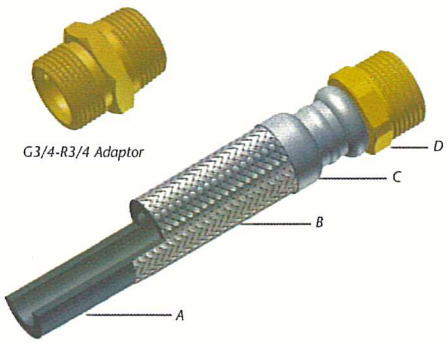
Size	Dn	Max. Working Pressure	Burst Pressure	Temperature Rating
0.50"	13	425 psi	1275 psi	194 °F (90 °C) [1]
0.75"	19	375 psi	1125 psi	194 °F (90 °C) [1]
1.00"	25	325 psi	975 psi	194 °F (90 °C) [1]
1.25"	30	240 psi	725 psi	194 °F (90 °C) [1]
1.50"	40	190 psi	570 psi	194 °F (90 °C) [1]
2.00"	50	145 psi	435 psi	194 °F (90 °C) [1]

[1] Temperature peaks : 230 °F (110 °C)

Standard Lengths 12", 18", 24", 36"

	Part	Materials
A	Liner	Epdm Rubber / (*) Reinforced Epdm Liner
B	Braiding	Aisi 304 Stainless Steel
C	Ferrules	Aisi 304 Stainless Steel / (*) Aluminium
D	Brass Fittings	Female Swivel Cone Seat X Mnpt, With Mpsm-Mnpt Adapter

(*) named TAQ SUPER (same product)



The information contained in this specification sheet is subject to change without notice.

TUCAI, S.A. Llobateras, 10-12 · Polígono Industrial Santiga · 08210 Barberà del Vallès · Barcelona (España)
Tel. +34 93 718 89 12 · Fax +34 93 718 82 55 · www.tucai.com · info@tucai.com

SS-TAQ EXTRA-2012-Rev.00/12

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

TO: Tacoma Power/Generation
3628 South 35th Street
Tacoma WA 98409
Fax: 253-502-8136

ATTN: **Steve Fairchild** Date: 1-23-19

PROJECT: **Specification PG17-0493F LaGrande Shop Building** Transmittal No. _____
(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: 15710, 2.3 Expansion Tanks
Specified Item: Amtrol
Proposed Substitution: Zilmet ZETA-20 ASME Tank

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes and changes to drawings and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? ☐ Yes X] No
If yes, provide detail: _____

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? ☐ Ye N/A o

C. What effect does substitution have on other trades? None

D. Difference between proposed substitution and specified item? Thermo2000 has more features as standard furnished

E. Manufacturer's guarantees of proposed and specified items are? [X Same ☐ Different*
*Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution? X| Yes ☐ No

G. Will the proposed substitution have any effect on compliance with applicable codes? ☐ Yes X] No
If yes, explain: _____

H. Name and address and current phone number the Project Lead for three (3) similar projects where the proposed product was used, along with the Project name and date of installation:
1. _____
2. _____
3. _____

I. Contract completion date is? _____ X| Same ☐ Different*
Explain differences on attachment(s).

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TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

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Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Kim Louthian

Name

Suntoya Corporation

Firm 22409 72nd Ave S

Address Kent, WA 98032

City, State, Zip 509-534-1516

Phone No.

Kim Louthian 1-23-19

Signature Date

FOR USE BY TACOMA POWER:

☒ Accepted ☐ Accepted as Noted

☐ Not Accepted ☐ Received Too Late

By: Stephen Fairchild

(Project Lead/Manager)

Signature:

Date: 1/25/19

REMARKS:

Provided to Builders Exchange of WA, Inc. For usage Conditions Agreement see www.bxwa.com - Always Verify Scal

Submittal Form

ZETA Series

Hydronic Expansion Tank with Fixed Diaphragm

Company Name: _____ Contact: _____

Bill to: _____ Date: _____

_____ Purchase Order No. _____

Ship to: _____ Notes _____

_____ _____

Description

Zilmet USA ZETA series are ASME fixed diaphragm type pre-charged expansion tanks. They are designed to absorb the expansion forces and control the pressure in heating/cooling systems. The system's expanded water (fully compatible with water/glycol mixtures) is contained in heavy-duty diaphragm that prevents tank corrosion and waterlogging problems. All ZETA expansion tanks can be installed vertically or horizontally.

Construction

Shell: Carbon Steel
Bladder: Heavy Duty Butyl
System Connection: Carbon Steel

Performance Limitations

Maximum Design Temperature: 240°F
Maximum Design Pressure: 125 PSIG*
ZETA 15 thru ZETA 60: 150 PSIG*
ZETA 80 thru ZETA 280: 125 PSIG*
*200 & 250 PSIG available

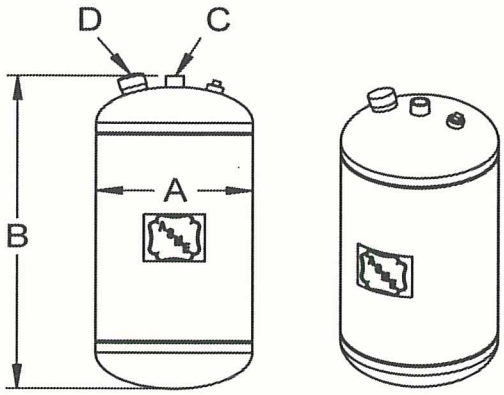
Model Number	Part Number	Tank Volume(Gal)	Acceptance Volume (Gal.)	Tagging Information	Quantity
ZETA-15	19010015	7.8	6.3		
ZETA-20	19010020	10.9	8.8		
ZETA-40	19010040	25	20.2		
ZETA-60	19010060	35	28		
ZETA-80	19010080	45	36		
ZETA-100	19010100	60	48.5		
ZETA-120	19010120	70	56.5		
ZETA-144	19010144	80	65		
ZETA-180	19010180	90	73		
ZETA-200	19010200	115	93		
ZETA-240	19010240	140	113.5		
ZETA-260	19010260	158	128		
ZETA-280	19010280	211	171		

Typical Specification

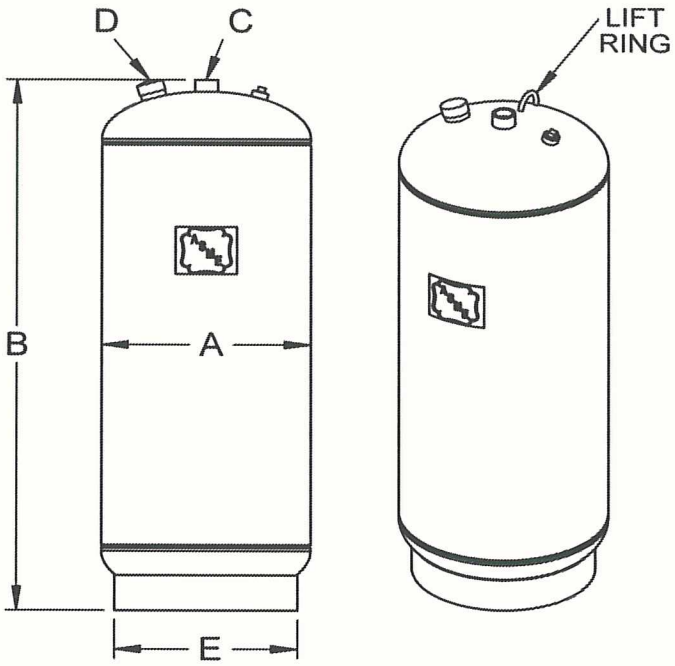
Furnish and install, as shown on plans, a _____ gallon _____" diameter X _____" (high) pre-charged steel expansion tank with a fixed heavy-duty butyl diaphragm. The tank shall be equipped with a NPT system connection, and a 0.302"-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed in accordance with most recent addendum of Section VIII Division 1 of the ASME Boiler and Pressure Vessel Code.

Each tank shall be Zilmet USA model number ZETA-_____ or approved equal.

400 Frenchtown Rd. • East Greenwich, RI 02818 • 401-884-4943 • fax:401-287-4951• www.ZilmetUSA.com



ZETA-15 & ZETA-40



ZETA-40 thru ZETA-280

Model Number	Dimensions in Inches					Approx. Ship Weight (lbs)
	A	B	System Connection C	Charging Valve D	E	
ZETA-15	12	19	3/4	0.302" -32NC	-	42
ZETA-20		25				52
ZETA-40	16	34	1		14	84
ZETA-60		45				97
ZETA-80	20	39			18	148
ZETA-100		50				175
ZETA-120	24	47	1 1/2		22	259
ZETA-144		50				268
ZETA-180		53				283
ZETA-200		67				325
ZETA-240		79				362
ZETA-260	30	64			24	591
ZETA-280		82				752

Notes

- Tanks are factory pre-charged at 12 psi and field adjustable.
- California code-sight glass is available upon request.
- Available with mounting clips.

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TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

TO: Tacoma Power/Generation
3628 South 35th Street
Tacoma WA 98409
Fax: 253-502-8136

ATTN: **Steve Fairchild** Date: 1-22-2019

PROJECT: **Specification PG17-0493F LaGrande Shop Building** Transmittal No. _____

(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: 15770

Specified Item: Radiant Floor Heating System

Proposed Substitution: Mr. Pex

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes and changes to drawings and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? ☐ Yes ■ No
If yes, provide detail: _____

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? ☐ Yes ■ No

C. What effect does substitution have on other trades?
Ø

D. Difference between proposed substitution and specified item?
Ø

E. Manufacturer's guarantees of proposed and specified items are? ■ Same ☐ Different*
*Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution? ■ Yes ☐ No

G. Will the proposed substitution have any effect on compliance with applicable codes? ☐ Yes ■ No
If yes, explain: _____

H. Name and address and current phone number the Project Lead for three (3) similar projects where the proposed product was used, along with the Project name and date of installation:
1. _____
2. _____
3. _____

I. Contract completion date is? _____ ■ Same ☐ Different*
Explain differences on attachment(s).

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TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Cam Vann
Name

Proctor Sales
Firm

20715 50th Ave
Address

Lynnwood, WA 98036
City, State, Zip

Phone No.

Signature

1-22-19
Date

FOR USE BY TACOMA POWER:

☑ Accepted ☐ Accepted as Noted

☐ Not Accepted ☐ Received Too Late

By: Stephen Fairchild
(Project Lead/Manager)

Signature:

Date: 1/25/19

REMARKS:

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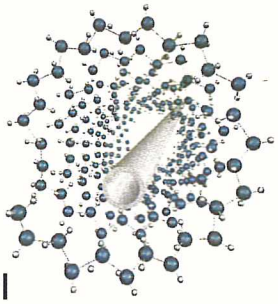
Product Data Sheet

MrPEX SYSTEMS

MrPEX® PEX-a Barrier Tubing



MrPEX® Barrier PEX tubing is Cross-Linked Polyethylene (PEX-a) manufactured and listed to ASTM F 876/877 (CSA B137.5).

Third party testing and certification by NSF (NSF-rfh).

Temperature and pressure rated by the Hydrostatic Stress Board of PPI (Plastics Pipe Institute) at:
- 160 psi at 73.4°F
- 100 psi at 180°F
- 80 psi at 200°F

Listed by ICC-PMG 1053.

EVOH oxygen barrier meet DIN 4726. Noise reduction barrier on all sizes up to ¾".

Compatible with fitting standards ASTM F877, F2080, F1960, F1807

TUBING

Part#	Description	Type	Unit
1210060	3/8 - Mr PEX Tubing with Oxygen Barrier	600 ft.	Coil
1210100	3/8 - Mr PEX Tubing with Oxygen Barrier	1000 ft.	Coil
1220030	1/2 - Mr PEX Tubing with Oxygen Barrier	300 ft.	Coil
1220050	1/2 - Mr PEX Tubing with Oxygen Barrier	500 ft.	Coil
1220100	1/2 - Mr PEX Tubing with Oxygen Barrier	1000 ft.	Coil
1220120	1/2 - Mr PEX Tubing with Oxygen Barrier	1200 ft.	Coil
1220160	1/2 - Mr PEX Tubing with Oxygen Barrier	1600 ft.	Coil
1230030	5/8 - Mr PEX Tubing with Oxygen Barrier	300 ft.	Coil
1230050	5/8 - Mr PEX Tubing with Oxygen Barrier	500 ft.	Coil
1230110	5/8 - Mr PEX Tubing with Oxygen Barrier	1100 ft.	Coil
1240030	3/4 - Mr PEX Tubing with Oxygen Barrier	300 ft.	Coil
1240040	3/4 - Mr PEX Tubing with Oxygen Barrier	400 ft.	Coil
1240050	3/4 - Mr PEX Tubing with Oxygen Barrier	500 ft.	Coil
1250030	1 - Mr PEX Tubing with Oxygen Barrier	300 ft	Coil
1260015	1 1/4 - Mr PEX Tubing with Oxygen Barrier	150 ft	Coil
1270015	1 1/2 - Mr PEX Tubing with Oxygen Barrier	150 ft	Coil

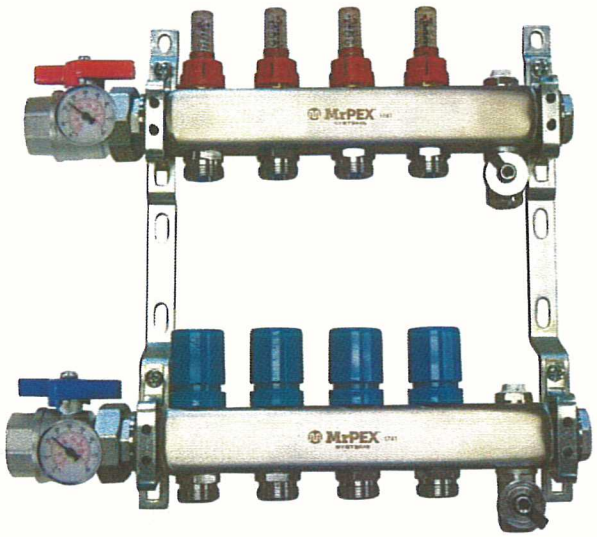
MrPEX Systems
5300 Alpine Dr. NW., suite 200
Ramsey, MN 55303

Toll Free: 1-800-716-3406
www.mrpexsystems.com

Product Data Sheet

MrPEX SYSTEMS

MrPEX® 1 ¼" Stainless Steel Manifold



MrPEX 1 ¼" Stainless Steel Manifold is made from high quality stainless steel, and is offered in 2 through 12 loop configurations. The manifold comes mounted on brackets and it is equipped with full port ball valves with thermometers, manual air vents and fill/drain valves. The Cv is 1.39 per branch.

The SUPPLY (upper) manifold is fitted with balancing flowmeters with readable range of 0 to 2 GPM that allow flow adjustment of each individual loop. The flow meters have a brass body and the sight glass is made from temperature and impact resistant plastic, all components are antifreeze resistant up to a 50% mix.

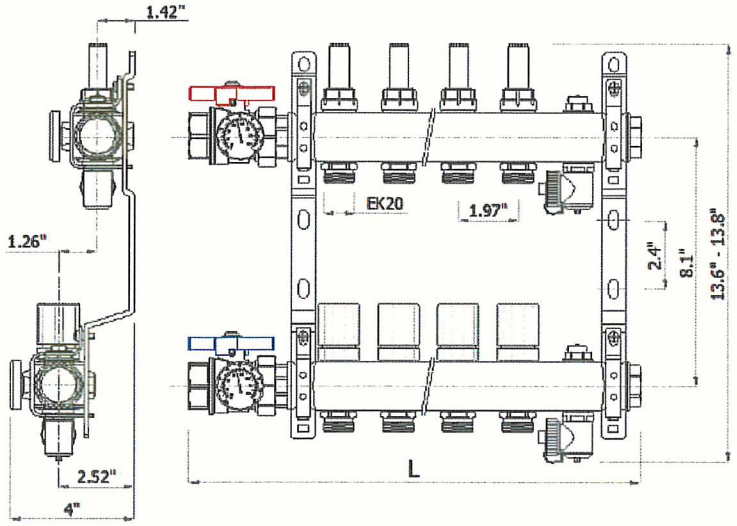
The RETURN (lower) manifold, has manual on/off valves that controls the flow for each individual circuit. The manual knob can be removed to accommodate the MrPEX actuators (part# 5120700 & 5120701).

Supply and return mains can be connected from either left or right sides. The manifold comes ready for a left-hand connection. Connection from the right can be done by removing the manifold body from the brackets and flipping them over.

Part #	Description	Type
3250200	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	2 Branch
3250300	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	3 Branch
3250400	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	4 Branch
3250500	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	5 Branch
3250600	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	6 Branch
3250700	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	7 Branch
3250800	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	8 Branch
3250900	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	9 Branch
3251000	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	10 Branch
3251100	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	11 Branch
3251200	1 1/4 Stainless Steel Manifold Assembly w/Flowmeter and ball valve	12 Branch

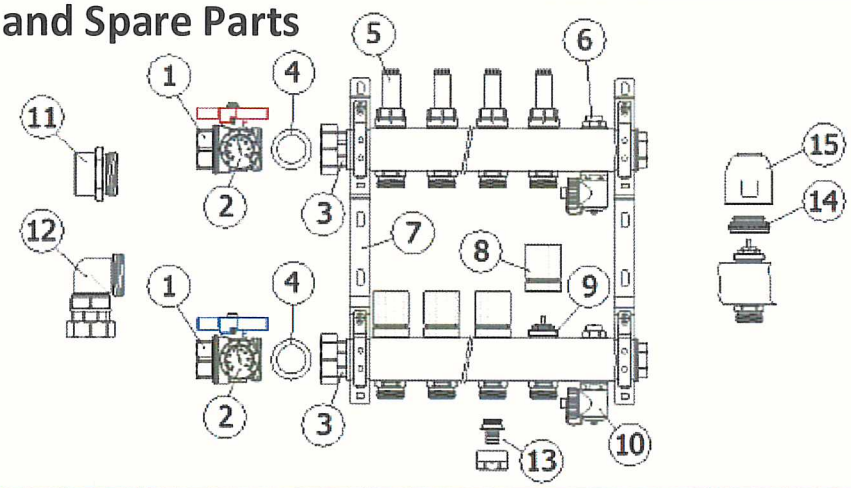
MrPEX Product description

Manifold dimensions



Part #	Type	Length L
3250200	2 Branch	10.6"
3250300	3 Branch	12.6"
3250400	4 Branch	14.6"
3250500	5 Branch	16.5"
3250600	6 Branch	18.5"
3250700	7 Branch	20.4"
3250800	8 Branch	22.4"
3250900	9 Branch	24.4"
3251000	10 Branch	26.3"
3251100	11 Branch	28.3"
3251200	12 Branch	30.3"

Accessories and Spare Parts



Position	Part #	Description	Type	Unit
1	3250018	Manifold Ball Valves, supply & return, straight, w/ thermometer, spare part	1" NPT X G 1-1/4" Flat Gasket	Set of 2
2	3250001	Thermometer, spare part	32 °F to 175 °F	Each
3	3250002	1" BSP Manifold Connection X G 1-1/4" Union Flat Gasket, spare part		Set of 2
4	3761175	Flat Gasket 1-1/4", spare part	Rubber EPDM 60 SH	Set of 10
5	3741172	Flowmeter for manifold series 325xxxx and 332xxxx, spare part	0 to 2 GPM	Each
6	3740011	Manual Air Vent, spare part		Each
7	3741171	1-1/4" Manifold Bracket for manifold series 325xxxx, spare part		Set of 2
8	3741173	Plastic Valve Cap, spare part	Threaded M30x1.5 - Blue	Each
9	3741174	On/Off Valve for manifold series, 325xxxx and 332xxxx, spare part	Threaded M30x1.5	Each
10	3740002	Fill/Drain Valve for manifold series 325xxxx and 332xxxx, spare part	3/4" GHT	Each
11	3250010	G 1-1/4" Flat Gasket X 1" Female NPT Straight Adaptor Kit		Set of 2
12	3250007	G 1 1/4 Flat Gasket X G 1 1/4 Flat Gasket Union Elbow Kit		Set of 2
13	***	Compression pre-assembled fitting for "MrPEX PE-Xa Tubing"	For sizes 3/8" - 1/2" - 5/8"	Set of 2
14	5700010	Plastic Adapter for actuator (Part # 5120700 & 5120701)	Threaded M30x1.5 - Type VA10	Each
15	5120700	MrPEX actuator 24V AC 4-wire w/ End Switch	Quick connection	Each
15	5120701	MrPEX actuator 24V AC 2-wire	Quick connection	Each

MrPEX Systems
5300 Alpine Dr. NW. suite 210
Ramsey, MN 55303

Toll Free: 1-800-716-3406
www.mrpexsystems.com

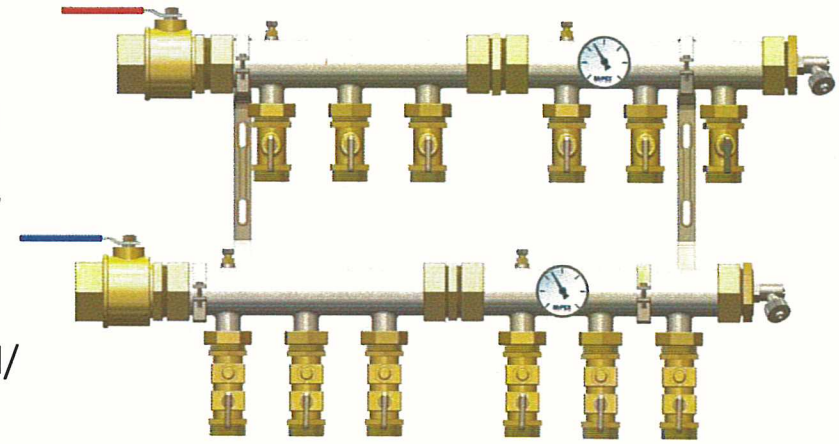
Product Data Sheet

MrPEX® SYSTEMS

MrPEX 1 ½" Stainless Steel Manifold

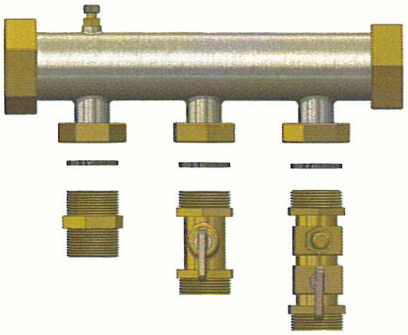
Introducing the next generation commercial stainless steel manifold!

GENERAL



MrPEX 1 ½" Large Stainless Steel manifolds are made from high quality stainless steel and offered in 3 – 10 loop sections. The manifold body comes with G 1 ¼" flat gasket unions for connection to inlet ball valve G 1 ¼" x 1 ½" Female NPT and end caps with fill/ drain valve. The branches comes with G 1" flat gasket unions to accommodate the on/off and balancing branch valves G 1" x EK 25 for easy connection with MrPEX EK 25 fitting assemblies (PEX to EK25 or PEX-AL-PEX to EK25) to connect tubing to the manifold. The branch Cv value is 6 gpm and the manifold body accommodates flows up to 25 gpm. Manifold body also is equipped with a manual air vent for purging.

CONNECTION OPTIONS



The manifold branches are equipped with 1" flat gasket swivel nuts that offer a large number of different connection options. The picture shows a selection of the different options for connection currently available. More options will be available in the future.

MrPEX Systems
5300 Alpine Dr. NW., suite 200
Ramsey, MN 55303

Toll Free: 1-800-716-3406
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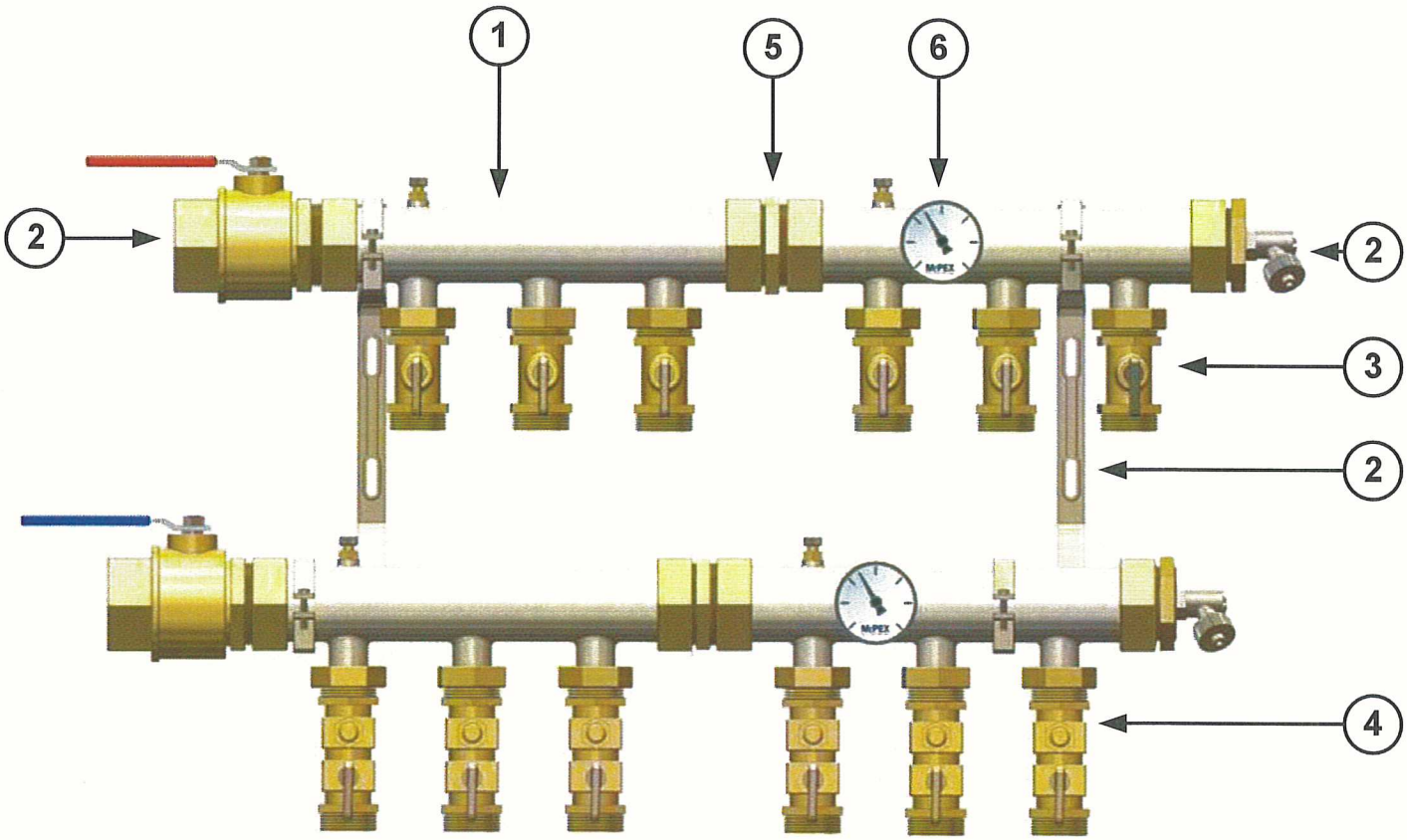
MrPEX 1 ½" Stainless Steel Manifold



No.	Part#	Description	Type	Unit
1	3240300	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	3 Branches	Each
1	3240400	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	4 Branches	Each
1	3240500	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	5 Branches	Each
1	3240600	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	6 Branches	Each
1	3240700	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	7 Branches	Each
1	3240800	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	8 Branches	Each
1	3240900	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	9 Branches	Each
1	3241000	1 1/2" Stainless Steel Manifold, Supply & Return Body, G1" Branch Union	10 Branches	Each
2	3240001	Base Kit for 1 1/2" Stainless Manifold, Ball-Valves, Bracket and End Caps	1 1/2" FIP Connection	Each
3	3240002	On / Off Valve for 1 1/2" Stainless Steel Manifolds	G1" x EK25	Box of 10
4	3240003	On / Off Valve, w/ balancing for 1 1/2" Stainless Steel Manifolds	G1" x EK25	Box of 10
5	3240004	Manifold Union for 1 1/2" Stainless Steel Manifold	G 1 1/4" x G 1 1/4"	Set of 2
6	5240748	Strap on pipe thermometer 70 - 200 F	For pipes 1/2 - 4	Box of 2

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

TO: Tacoma Power/Generation
3628 South 35th Street
Tacoma WA 98409
Fax: 253-502-8136

ATTN: **Steve Fairchild** Date: 1-22-2019

PROJECT: **Specification PG17-0493F LaGrande Shop Building** Transmittal No. _____

(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: 15600

Specified Item: Heating Water, Electric

Proposed Substitution: Precision

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes and changes to drawings and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? ☐ Yes ■ No
If yes, provide detail: _____

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? ☐ Yes ■ No

C. What effect does substitution have on other trades?
Ø

D. Difference between proposed substitution and specified item?
Ø

E. Manufacturer's guarantees of proposed and specified items are? ■ Same ☐ Different*
*Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution? ■ Yes ☐ No

G. Will the proposed substitution have any effect on compliance with applicable codes? ☐ Yes ■ No
If yes, explain: _____

H. Name and address and current phone number the Project Lead for three (3) similar projects where the proposed product was used, along with the Project name and date of installation:

1. Centralia High School - Holaday Parks
2. Cougar Ridge - Eagle Harbor
3. Cedar Building - Enviromech

I. Contract completion date is? _____ ■ Same ☐ Different*
Explain differences on attachment(s).

Provided to Builders Exchange of WA, Inc. For usage Conditions Agreement see www.bxwa.com - Always Verify Scal

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Cam Vann
Name

Proctor Sales
Firm

20215 50th Ave
Address

Lynnwood, Wa 98036
City, State, Zip

Phone No.

Signature

1-22-19
Date

FOR USE BY TACOMA POWER:

☐ Accepted ☐ Accepted as Noted

☒ Not Accepted ☐ Received Too Late

By: Stephen Fairchild
(Project Lead/Manager)

Signature:

Date: 1/23/19

REMARKS:

① Warranty does not meet spec.

② Specific product or equal are not called out in spec, However, product must clearly meet specs intended performance.

Provided to Builders Exchange of WA, Inc. For usage Conditions Agreement see www.bxwa.com - Always Verify Scal

PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS

STRINGENT STANDARDS

- ASME Section IV "H" Code
- UL Subject 834
- NEC/NFPA Article 424-G
- ASME Safety Code CSD-1 (>117 KW)

DESIGN ADVANTAGES

Compact Benefits

Ideal for new boiler applications or to RETROFIT existing installations, because it fits through many existing doorways with ease.

- Available in ratings from 15 KW to 720 KW
- Requires less square footage floor space, and does not require horizontal clearance for element removal.
- Heavy duty/ 16 gauge cabinet and flanged steel base provides greater structural strength.
- All electrical components are UL listed or recognized.
- Optional features and trim available to meet any custom design criteria.
- Individual flanged U-tube design heating element shortens down time for element replacement.

Compact Engineering Features

- Meets CSD-1 requirements (units greater than 117KW)
- Small foot print saves in building construction cost.
- Close temperature control because control sensor is located in the outlet pipe.
- Individual immersion heating elements are 2 1/2" square flanged for ease of replacement. The elements are made of a highly corrosion resistant Incoloy sheath, and nickel-chromium resistance wire packed in magnesium oxide powder in a U-tube design.
- No horizontal removal clearance required.
- Vertical design of boiler allows for easier installation in existing or new piping systems.

STANDARD FEATURES AND ACCESSORIES

- ASME National Board Registered Pressure Vessel (150 PSI / 250°F)
- Heavy Duty Steel Boiler Vessel Housing
- Four Inch Fiberglass Insulation
- Three Inch NPT Inlet and Outlet
- ASME Safety Relief Valve
- Pressure Gauge w/ Cock
- Drain Valve
- Incoloy-Sheathed Elements
- Construction per NEC & UL, with UL Label
- Electronic Digital Temperature Readout (except 1 and 2 step models)
- Integral Electric Control Panel with Key-Locked Door
- Internal Branch Circuit Fusing
- Magnetic Contactors rated 500,000 Cycles
- Main Supply Circuit Lugs
- 120 Volt Fused Control Transformer
- On/Off Switch w/ Pilot Light
- Manual Limit Toggle Switches (one per step)
- Status Pilot Light for each Stage/Step
- Probe-type Low Water Cut-Off
  Note: Manual Reset, Test & Pilot Light Provided Units > 117KW
- Two Adjustable High Limit Cutouts:
  (1) Auto Reset (1) Manual Reset
  Note: Manual Reset provided only on units > 2 stages
- Automatic Temperature Control via:
  On-Off Temperature Switches (1 & 2 step units)
  Electronic Multi Stage Control (3 & 4 step units)
  Proportional Progressive Sequence Step Control (units > 4 steps)

PRECISION BOILERS

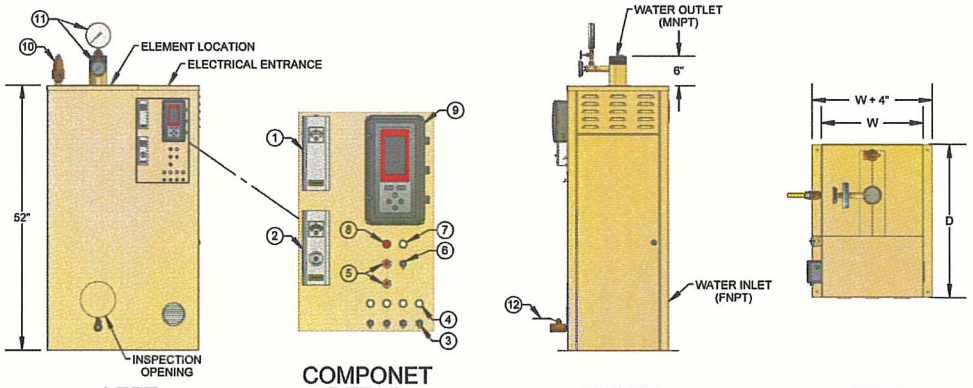
PCW COMPAC ELECTRIC HOT WATER BOILERS

OPTIONAL EQUIPMENT AND ACCESSORIES

- Non-Fused Disconnect or Non-Auto Breaker
- Fused Disconnect or Automatic Breaker
- Shunt Trip Circuit Interrupter
- Ground Fault Detection System
- Ammeter (1 or 3 phase)
- Voltmeter (1 or 3 phase)
- Watt-hour Meter
- Time Clock (24 hour or 7 day)
- Alarm Buzzer with Silencing Switch
- Safety Door Interlock
- Low Temperature Switch/Alarm
- Remote Reset of Setpoint (to Accomodate BAS Analog Reset Signal)
- Stainless Steel Construction (210°F max) for Deionized water
- Local/Remote Switch to Accomodate BAS Analog Control Signal
- PLC's and Other Interface Provisions (Consult Factory)
- Outdoor Reset Control
- Flow Switch (Installed)
- High/Low Pressure Switches/Alarms
- Auxiliary Low Water Cut-off (Float or Probe type) (Auxillary Probe type standard on units > 117 KW)
- Manual Reset Low Water Cut-off
- Temperature Gauge (3" / Installed)
- 4" Connection Size (PCW3 or PCW4)
- Proportional Step Control (for 3 or 4 Stage Models)
- Linear Sequence Step Control

Contact Factory for Many Other Options to Meet Your Specific Requirements.

DIMENSIONAL DATA



NOTE: MINIMUM CLEARANCE OF 36" IN FRONT OF CONTROL CABINET AND 30" FOR ELEMENT REMOVAL.

COMPONENTS

1. Temperature Limit, Auto Reset
2. Temperature Limit, Manual Reset
3. Manual Limit Switches
4. Pilot Lights, Amber (Steps "ON")
5. PB Switches (Low Water Cutoff "Test"/ "Reset")
6. Toggle Switch (Control Power)
7. Pilot Light, Amber (Control Power "ON")
8. Pilot Light, Red (Low Water)
9. Temperature Setpoint / Control / Readout
10. Safety Relief Valve
11. Temperature and Pressure Gauges
12. Drain Valve

PHYSICAL DATA

	PCW 1	PCW 2	PCW 3	PCW 4	PCW 5
Max KW @ 208V*/480V*	120/160	180/240	360/480	NA/600	NA/720
• Dimensions:	52"H x 20"W x 30"D	52"H x 24"W x 34"D	52"H x 28"W x 38"D	52"H x 32"W x 46"D	52"H x 38"W x 48"Dx
• Approx Ship Weight:	600 lbs	800 lbs	1100 lbs	1800 lbs	2300 lbs
• Tank Size (dia/gal):	12"/22	16"/36	20"/56	24"/80	30"/126
• Connection Size:	3" NPT	3" NPT	3" NPT***	3" NPT***	4" NPT
• Max Flow (gpm):	230	230	230***	230***	300
• Drain Size (NPT):	3/4"	1"	1" / 1 1/4"	1 1/4"	1 1/4"

* 3-phase (Note: PCW1 is also available in single phase)
** Height may increase on Model PCW5 depending on bottom head construction
*** 4" FLG connection (300 gpm max) is optional
Actual dimensions depend on options (EG. number of steps, disconnects,etc...)

PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS

CONVERSIONS/EQUATIONS

$KW = \frac{GPH \times \Delta T\ (°F)}{410} = \frac{LPH \times \Delta T\ (°C)}{862}$

$KW = GPM \times \Delta T\ (°F) \times .146$

10KW = 1.02 BHP = 34 Lbs Steam/H = 34,120 BTU/H

$GPH = \frac{KW \times 410}{\Delta T\ (°F)}$ Amps (3 phase) = $\frac{KW \times 1000}{Volts \times 1.732}$

$GPH = \frac{BTU/H}{8.33 \times \Delta T\ (°F)}$ Amps (1 phase) = $\frac{KW \times 1000}{Volts}$

BTU/H = KW x 3412 BTU/H = ΔT x 500 x GPM

1 gal water at 62°F = 8.34 Lbs 1 cu ft = 7.48 gallons

1 cu ft water at 62°F = 62.4 Lbs 1 ft water = 0.435 psi

Enthalpy of water = Temp (°F) -32 BTU/LB

SATURATED STEAM: PRESSURE vs. TEMPERATURE

0 psig = 0 KPa = 212°F	150 psig = 1034 KPa = 366°F
8 psig =55 KPa = 235°F	175 psig = 1207 KPa = 377°F
15 psig =103 KPa = 250°F	200 psig = 1379 KPa = 388°F
30 psig =207 KPa = 274°F	225 psig = 1551 KPa = 397°F
50 psig =345 KPa = 298°F	250 psig = 1724 KPa = 406°F
80 psig =552 KPa = 324°F	300 psig = 2068 KPa = 422°F
100 psig =690 KPa = 338°F	350 psig = 2413 KPa = 436°F
125 psig =862 KPa = 353°F	400 psig = 2758 KPa = 448°F

HOW TO SELECT A MODEL NUMBER

PCW 2 - 180 C - 480

- PCW: Precision Compac Water
- 2: Vessel Size
- 180: KW Input
- C: Element Designation
- 480: Voltage

208 & 240 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps	Model Number*	Rating		Elements		Number of:		Amps
	MBH	KW	Qty	KW	Circuits	Steps @ KW	(208/3)		MBH	KW	Qty	KW	Circuits	Steps @ KW	(208/3)
PCW1-015	51	15	1	15	1	1@15	42	PCW1-135	461	135	9	15	9	1@45,3@30	376
PCW1-020	68	20	2	10	2	1@20	56	PCW2-150	512	150	10	15	10	5@30	417
PCW1-030	102	30	2	15	2	1@30	84	PCW2-165	563	165	11	15	11	1@45,4@30	459
PCW1-040	136	40	4	10	4	2@20	111	PCW2-180	614	180	12	15	12	6@30	501
PCW1-045	154	45	3	15	3	1@15,1@30	125	PCW3-210	717	210	14	15	14	7@30	584
PCW1-060	205	60	4	15	4	2@30	167	PCW3-225	768	225	15	15	15	1@45,6@30	626
PCW1-075	256	75	5	15	5	1@15,2@30	209	PCW3-240	819	240	16	15	16	8@30	668
PCW1-080	273	80	8	10	8	4@20	222	PCW3-270#	921	270	18	15	18	9@30	751
PCW1-090	307	90	6	15	6	3@30	251	PCW3-300#	1024	300	20	15	20	10@30	834
PCW1-105	358	105	7	15	7	1@15,3@30	292	PCW3-330#	1126	330	22	15	22	11@30	918
PCW1-120	409	120	8	15	8	4@30	334	PCW3-360#	1228	360	24	15	24	12@30	1001

*For lower KW ratings, please refer to the Precision "COMPAC" Boiler.

* For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)

\# Oversize control cabinets are supplied for these models at 208 & 240 volts.

\## These models also available @ 380/415 volts derated by 25%

† These models have 108 wsi elements.

PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS

480 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps (480/3)	Model Number*	Rating		Elements		Number of:		Amps (480/3)
	MBH*	KW	Qty	KW	Circuits	Steps @ KW			MBH*	KW	Qty	KW	Circuits	Steps @ KW	
PCW1-015	51	15	1	15	1	1@15	18	PCW2-240	819	240	12	20	6	6@40	289
PCW1-018	61	18	1	18	1	1@18	22	PCW3-240	819	240	16	15	8	8@30	289
PCW1-020	68	20	1	20	1	1@20	24	PCW3-252	860	252	14	18	7	7@36	304
PCW1-030	102	30	2	15	1	1@30	36	PCW3-270#	921	270	15	18	8	1@18,7@36	325
PCW1-036	123	36	2	18	1	1@36	44	PCW3-280	955	280	14	20	7	7@40	337
PCW1-040	136	40	2	20	1	1@40	48	PCW3-288	983	288	16	18	8	8@36	347
PCW1-045	154	45	3	15	2	1@15,1@30	54	PCW3-300#	1024	300	15	20	8	1@20,7@40	361
PCW1-054	184	54	3	18	2	1@18,1@36	65	PCW3-320	1092	320	16	20	8	8@40	385
PCW1-060	205	60	4	15	2	2@30	72	PCW3-330#	1126	330	22	15	11	5@30,3@60	397
PCW1-072	246	72	4	18	2	2@36	87	PCW3-360#	1228	360	20	18	10	6@36,2@72	434
PCW1-075	256	75	5	15	3	1@45,1@30	90	PCW3-400##	1365	400	20	20	10	6@40,2@80	482
PCW1-080	273	80	4	20	2	2@40	96	PCW3-440##	1501	440	22	20	11	5@40,3@80	530
PCW1-090	307	90	5	18	3	1@18,2@36	109	PCW3-480##	1638	480	24	20	12	4@40,4@80	578
PCW1-100	341	100	5	20	3	1@20,2@40	121	PCW4-520##	1774	520	26	20	13	3@40,5@80	626
PCW1-105	358	105	7	15	4	1@45,2@30	126	PCW4-560##	1911	560	28	20	14	2@40,6@80	674
PCW1-108	368	108	6	18	3	3@36	130	PCW4-600##	2047	600	30	20	15	1@40,7@80	723
PCW1-120	409	120	6	20	3	3@40	145	PCW5-640##	2184	640	32	20	16	8@80	771
PCW1-126	430	126	7	18	4	1@18,3@36	152	PCW5-680##	2320	680	34	20	17	1@40,8@80	819
PCW2-135	461	135	9	15	5	1@45,3@30	163	PCW5-720##	2457	720	36	20	18	9@80	867
PCW1-140	478	140	7	20	4	1@20,3@40	169								
PCW1-144	491	144	8	18	4	4@36	173	PCW1-165 †	563	165	5	33	5	5@33	199
PCW2-150	512	150	10	15	5	5@30	181	PCW1-198 †	676	198	6	33	6	6@33	238
PCW1-160	546	160	8	20	4	4@40	193	PCW1-232 †	788	231	7	33	7	7@33	278
PCW2-165	563	165	11	15	6	1@45,4@30	199	PCW1-264 †	901	264	8	33	8	8@33	318
PCW2-180	614	180	10	18	5	5@36	217	PCW2-297 †	1013	297	9	33	9	9@33	358
PCW2-200	682	200	10	20	5	5@40	241	PCW2-330 †	1126	330	10	33	10	10@33	397
PCW3-210	717	210	14	15	7	7@30	253	PCW2-363 †	1239	363	11	33	11	11@33	437
PCW2-216	737	216	12	18	6	6@36	260	PCW2-396 †	1351	396	12	33	12	12@33	477
PCW3-225	768	225	15	15	8	1@45,6@30	271								

*From & At 212°F. **These models may require 2 power panels (add 12" to "W" dim). † Models above 1040KW are also available in 40KW increments.

* For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)
\# Oversize control cabinets are supplied for these models at 208 & 240 volts.
These models also available @ 380/415 volts derated by 25%
† These models have 108 wsi elements.

380 & 415 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps (380/3)	Model Number*	Rating		Elements		Number of:		Amps (380/3)
	MBH*	KW	Qty	KW	Circuits	Steps @ KW			MBH*	KW	Qty	KW	Circuits	Steps @ KW	
PCW1-015	51	15	1	15	1	1@15	23	PCW2-165	563	165	11	15	6	1@45,4@30	251
PCW1-030	102	30	2	15	1	1@30	46	PCW2-180	614	180	12	15	6	6@30	274
PCW1-045	154	45	3	15	2	1@15,1@30	68	PCW3-210	717	210	14	15	7	7@30	320
PCW1-060	205	60	4	15	2	2@30	92	PCW3-225	768	225	15	15	8	1@45,6@30	342
PCW1-075	256	75	5	15	3	1@45,1@30	114	PCW3-240	819	240	16	15	8	8@30	365
PCW1-090	307	90	6	15	3	3@30	137	PCW3-270#	921	270	18	15	9	1@60,7@30	411
PCW1-105	358	105	7	15	4	1@45,2@30	160	PCW3-300#	1024	300	20	15	10	2@60,6@30	456
PCW1-120	409	120	8	15	4	4@30	183	PCW3-330#	1126	330	22	15	11	3@60,5@30	502
PCW2-135	461	135	9	15	5	1@45,3@30	205	PCW3-360#	1228	360	24	15	12	4@60,4@30	548
PCW2-150	512	150	10	15	5	5@30	228								

*From & At 100°C. **These models may require 2 power panels (add 12" to "W" dim). † Models above 840KW are also available in 30KW increments.

* For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)
\# Oversize control cabinets are supplied for these models at 208 & 240 volts.
These models also available @ 380/415 volts derated by 25%
† These models have 108 wsi elements.

PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS

SPECIFICATIONS

1. GENERAL

Furnish and install as shown on the plans___ electric hot water boilers, fabricated per these specifications, including all accessories and construction features as described herein. Boilers shall be completely factory assembled and pre-tested prior to shipment. Boilers shall be UL labeled and shall include an ASME Section IV pressure vessel which has been fabricated under inspection by an authorized inspector holding a National Board commission and subsequently stamped and National Board registered. Units greater than 117 KW shall also comply with CSD-1.

2. RATINGS

Boilers shall each be PRECISION Compac Model No. PCW-1,2,3,4 or 5 rated_____ KW, designed and fabricated for a balanced 3-phase, 3-wire, delta load at _____ volts, 3-phase, ____ hertz. The boilers shall be designed for _____ GPM with a discharge temperature of _____°F with entering water at _____°F.

3. PRESSURE VESSEL

The pressure vessel and all trim shall be as set forth in the ASME Code, including ASME "HV" stamped safety relief valve sized as required. The vessel shall be provided with a threaded 3" (4"flanged) inlet and a threaded 3" (4" flanged) outlet, plus safety valve and drain nozzle as required. The pressure vessel shall be housed in a 16-gauge steel enclosure allowing 4 inches of insulation space around the vessel and filled with 4 inches of 3/4 pound-density fiberglass insulation. The electric panel and vessel shall be mounted on a common, structural steel base with overall dimensions of the unit not to exceed ___"D x ___"W x ___"H.

4. INTERNAL POWER DISTRIBUTION

The power distribution shall be through cable connection to mechanical lugs. Power shall be fed through current limiting fuses to magnetic contactors, and then to the heating element circuits. Contactors shall be 3-pole magnetic contactors tested by UL for 500,000 cycles at full load, The coil voltage shall be 120-volts. Internal wiring shall be in accordance with UL & NEC.

5. HEATING ELEMENTS

Elements shall be individually mounted in steel flanges. The flange size shall not exceed 2 1/2 inches square, with a maximum of three single-bend U-shaped element blades per flange. Element sheath material shall be Incoloy.

6. CONTROLS

The control circuit shall be 120-volt single-phase, one side grounded. Control voltage shall be provided by an integral control circuit transformer, fused on both legs of the primary, with a control circuit fuse on the ungrounded leg of the secondary. The controls shall include an ON/OFF switch, a manual limit switch and, indicator lights for each stage of heating, a low water cut-off, and one auto reset and one manual reset high limit temperature switches.

7. MANUFACTURER

Boilers shall be PRECISION Model PCW-1,2,3,4 or 5 or approved equivalent. Alternate bids shall indicate any deviations from these specifications, and shall state price additions or deductions for substitution of said alternates.

PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS

LIMITED WARRANTY

PRECISION warrants all electrical components (except pilot lights and fuses), pressure vessel and heating elements, if found defective in workmanship or material while under normal use and service within the first year of operation or until 18 months after shipment from PRECISION'S factory, whichever occurs first, after authorized return by purchaser to PRECISION (at purchaser's expense) and after examination discloses to PRECISION'S reasonable satisfaction to be defective. The repair or replacement of defective parts will be made by PRECISION without charge. PRECISION will not be held responsible for any field charges in connection with the removal or replacement of allegedly defective parts, nor for incidental or consequential damages. This guarantee does not include damage resulting from unsuitable water.

CONTACT US FOR THESE QUALITY PRODUCTS

- Electric Storage Heaters 125 to 5500 Gallons
- Electrode High Voltage Boilers
- Thermal Storage Systems Space Heating & Domestic or Process Water; Electric, Gas or Steam Fired
- Boiler Feedwater Systems
- Pressure Vessels Water Storage Tanks Flash Tanks Blowdown Tanks
- Unfired Hot Water and Steam Generators
- Deaerators and Surge Tanks
- Steam Superheaters-Electric
- Circulation Heaters-Electric
- Gas or Oil-Fired Vertical Firetube Boilers and Water Heaters
- Gas or Oil-Fired WaterTube Boilers (Flextube Type)
- Chemical Bypass Feeders and Automatic Chemical Feed Systems

NOTE: In pursuing our policy of continuous development of products, PRECISION reserves the right to vary any detail in this bulletin without notice.

Represented in your area by:

Precision Boilers
5727 Superior Drive
Morristown, TN 37814

PRECISION BOILERS

PHONE: **(423) 587-9390**
FAX: **(423) 581-7749**
E-mail: **sales@precisionboilers.com**
WEB: **www.precisionboilers.com**

PCW - 9.27.11 REV. 1

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

TO: Tacoma Power/Generation
3628 South 35th Street
Tacoma WA 98409
Fax: 253-502-8136

ATTN: **Steve Fairchild** Date: 1-23-19

PROJECT: **Specification PG17-0493F LaGrande Shop Building** Transmittal No. _____
(Specification/Name/Contract No., if applicable)

We hereby submit for consideration, the following product instead of the specified item for the above project:

Specification Section: 15600, 2.1 Electric Boiler
Specified Item: Lochinvar
Proposed Substitution: Thermo2000 Volt Max 60

NOTES: Attach complete technical data, including laboratory tests and samples as applicable.

Provide a detailed comparison of the significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect, where applicable) for the proposed substitution in comparison with the original requirements.

List completely, installation changes and changes to drawings and specifications required by the proposal.

FILL IN BLANKS BELOW:

A. Does substitution require change in drawing dimensions? ☐ Yes [X] No
If yes, provide detail: _____

B. Will undersigned pay for resulting building design changes including engineering/detailing costs? ☐ Ye N/A o

C. What effect does substitution have on other trades? None

D. Difference between proposed substitution and specified item? Thermo2000 has more features as standard furnished

E. Manufacturer's guarantees of proposed and specified items are? [X Same ☐ Different*
*Explain differences on attachment(s).

F. Are maintenance/service parts locally (within 50 miles) available for proposed substitution? X Yes ☐ No

G. Will the proposed substitution have any effect on compliance with applicable codes? ☐ Yes X] No
If yes, explain: _____

H. Name and address and current phone number the Project Lead for three (3) similar projects where the proposed product was used, along with the Project name and date of installation:
1. _____
2. _____
3. _____

I. Contract completion date is? _____ X Same ☐ Different*
Explain differences on attachment(s).

Provided to Builders Exchange of WA, Inc. For usage Conditions Agreement see www.bxwa.com - Always Verify Scal

TACOMA POWER / GENERATION
SUBSTITUTION REQUEST FORM

This request shall be submitted to engineer listed below per Specification Submittals and Shop Drawings Section (Construction) or Substitutions Section (Supply). Substitution requests not received by the engineer will not be considered.

Undersigned attests function and quality equivalent or superior to specified item and waives their rights to additional payment and time which may subsequently be necessitated by failure of the substitution to perform adequately, and for the required work to make corrections thereof.

SUBMITTED BY:

Kim Louthian

Name

Suntoya Corporation

Firm 22409 72nd Ave S

Address Kent, WA 98032

City, State, Zip 509-534-1516

Phone No.

Kim Louthian — 1-23-19

Signature — Date

FOR USE BY TACOMA POWER:

☐ Accepted ☐ Accepted as Noted

☒ Not Accepted ☐ Received Too Late

By: Stephen Fenchuld

(Project Lead/Manager)

Signature:

Date: 1/25/19

REMARKS:

Warrantee ~~or~~ does not meet or exceed called in spec.

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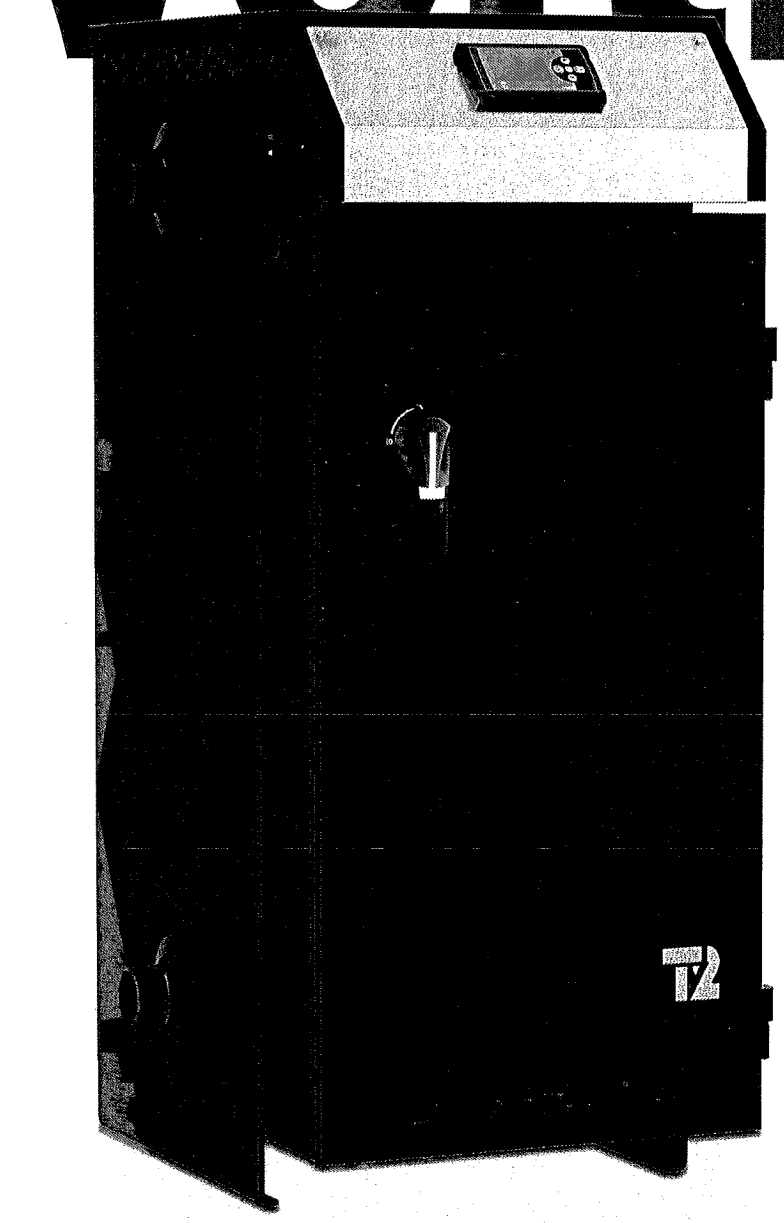
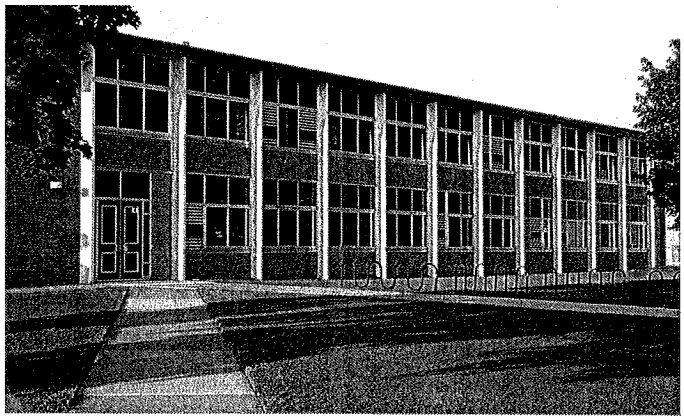
ELECTRIC BOILER
22.5 KW TO 180 KW

voltmax



COMMERCIAL



CONCENTRATED ENERGY

The **VOLTMAX** line of electric boilers was developed to efficiently supply hydronic heating systems in commercial, institutional and industrial applications. Available in 2 configurations, this boiler is offered under different voltages to respond to any single-phase or three-phase electrical supply. Its easy-to-use electronic controller provides precise temperature and power control to minimize energy costs and to optimize the boiler's performance. **VOLTMAX's** compact design is great for small spaces and requires minimal clearance around the unit.

THERMO 2000

Peak-performance heating systems

voltmax

ELECTRIC BOILER
22.5 KW TO 180 KW

COMMERCIAL

1 boiler. 2 ways to control its power.

VOLTMAX STG SERIES

The controller modulates the power of the unit by stages based on demand, while accurately controlling the temperature with a PID regulator. It also makes the rotation of the stages to ensure parts wear equally.

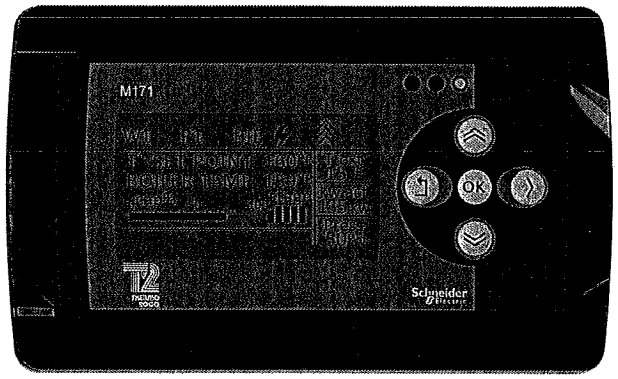
VOLTMAX SCR SERIES

The controller can modulate the power of the unit from 0 to 100 %, based on heating demand through the use of a solid state SCR relay. The benefit of this operating mode is increased temperature control and reduced wear on the power relays. In addition, it very precisely limits the maximum electrical power required for the boiler in order to prevent wasteful and costly peaks in consumption.

Both series are available in a range of voltages and pressures.

Energy at your fingertips

The VOLTMAX electronic controller makes it easy to control the boiler's operating settings related to the application in order to obtain optimal performance. Its large backlit screen provides the boiler's operating status at a glance. The controller keys provide quick management menu navigation to access the system's various functions.



The display screen includes the following information:

- Heat demand
- Set point temperature
- Outlet temperature
- Outdoor temperature when the sensor is connected
- Boiler power in real time
- Stage status
- Operating pressure
- Operating mode: electric, auxiliary or dual-energy
- "Boost" mode in operation
- Boiler OFF when the outdoor temperature is high «WWST»
- Visual and audible alarm with alarm code
- Operating status indicator lights: green, yellow or red
- Choice of temperature units (°C/°F) and languages (English/French)

voltmax

ELECTRIC BOILER
22.5 KW TO 180 KW

COMMERCIAL

VOLTMAX 208 VAC / 60 Hz / 1 phase[1]

Model	Power kW	Power BTU/h	Amps	Elements 240 V	STG Series Relay Stages	SCR Series Relay Stages	SCR Series SCR Stages
VOLTMAX 23	22.5	76 770	108.4	6 x 5 kW	3 x 7.5 kW	2 x 7.5 kW	1 x 7.5 kW
VOLTMAX 27	27	92 124	130.1	6 x 6 kW	3 x 9 kW	2 x 9 kW	1 x 9 kW
VOLTMAX 30	30	102 360	144.5	8 x 5 kW	4 x 7.5 kW	3 x 7.5 kW	1 x 7.5 kW
VOLTMAX 36	36	122 832	173.4	8 x 6 kW	4 x 9 kW	3 x 9 kW	1 x 9 kW
VOLTMAX 41	41	139 892	198.7	5 x 5 kW + 5 x 6 kW	5 x 8.25 kW	4 x 8.25 kW	1 x 8.25 kW
VOLTMAX 45	45	153 540	216.8	10 x 6 kW	5 x 9 kW	4 x 9 kW	1 x 9 kW
VOLTMAX 50	49.5	168 894	238.4	6 x 5 kW + 6 x 6 kW	6 x 8.25 kW	5 x 8.25 kW	1 x 8.25 kW
VOLTMAX 54	54	184 248	260.1	12 x 6 kW	6 x 9 kW	5 x 9 kW	1 x 9 kW

[1] 208 V 1-phase electrical supply (L1-L2) with two 90 °C conductors and a ground.

VOLTMAX 240 VAC / 60 Hz / 1 phase[1]

Model	Power kW	Power BTU/h	Amps	Elements 240 V	STG Series Relay Stages	SCR Series Relay Stages	SCR Series SCR Stages
VOLTMAX 30	30	102 360	125	6 x 5 kW	3 x 10 kW	2 x 10 kW	1 x 10 kW
VOLTMAX 36	36	122 832	150	6 x 6 kW	3 x 12 kW	2 x 12 kW	1 x 12 kW
VOLTMAX 40	40	136 480	166.7	8 x 5 kW	4 x 10 kW	3 x 10 kW	1 x 10 kW
VOLTMAX 48	48	163 776	200	8 x 6 kW	4 x 12 kW	3 x 12 kW	1 x 12 kW
VOLTMAX 55	55	187 660	229.2	5 x 5 kW + 5 x 6 kW	5 x 11 kW	4 x 11 kW	1 x 11 kW
VOLTMAX 60	60	204 720	250	10 x 6 kW	5 x 12 kW	4 x 12 kW	1 x 12 kW
VOLTMAX 66	66	225 192	275	6 x 5 kW + 6 x 6 kW	6 x 11 kW	5 x 11 kW	1 x 11 kW
VOLTMAX 72	72	245 664	300	12 x 6 kW	6 x 12 kW	5 x 12 kW	1 x 12 kW

[1] 240 V 1-phase electrical supply (L1-L2) with two 90 °C conductors and a ground.

VOLTMAX 208 VAC / 60 Hz / 3 phases[1]

Model	Power kW	Power BTU/h	Amps	Elements 240 V	STG Series Relay Stages	SCR Series Relay Stages	SCR Series SCR Stages
VOLTMAX 23	22.5	76 770	62.6	6 x 5 kW	2 x 11.25 kW	1 x 11.25 kW	1 x 11.25 kW
VOLTMAX 27	27	92 124	75.1	6 x 6 kW	2 x 13.5 kW	1 x 13.5 kW	1 x 13.5 kW
VOLTMAX 34	34	116 008	93.9	9 x 5 kW	3 x 11.25 kW	2 x 11.25 kW	1 x 11.25 kW
VOLTMAX 41	40.5	138 186	112.6	9 x 6 kW	3 x 13.5 kW	2 x 13.5 kW	1 x 13.5 kW
VOLTMAX 45	45	153 540	125.1	12 x 5 kW	4 x 11.25 kW	3 x 11.25 kW	1 x 11.25 kW
VOLTMAX 54	54	184 248	150.2	12 x 6 kW	4 x 13.5 kW	3 x 13.5 kW	1 x 13.5 kW
VOLTMAX 56	56	191 072	156.4	15 x 5 kW	5 x 11.25 kW	4 x 11.25 kW	1 x 11.25 kW
VOLTMAX 68	67.5	230 310	187.7	15 x 6 kW	5 x 13.5 kW	4 x 13.5 kW	1 x 13.5 kW

[1] 208 V 3-phase electrical supply (L1-L2-L3) with three 90 °C conductors and a ground.

VOLTMAX 240 VAC / 60 Hz / 3 phases[1]

Model	Power kW	Power BTU/h	Amps	Elements 240 V	STG Series Relay Stages	SCR Series Relay Stages	SCR Series SCR Stages
VOLTMAX 30	30	102 360	72	6 x 5 kW	2 x 15 kW	1 x 15 kW	1 x 15 kW
VOLTMAX 36	36	122 832	86.6	6 x 6 kW	2 x 18 kW	1 x 18 kW	1 x 18 kW
VOLTMAX 45	45	153 540	108.3	9 x 5 kW	3 x 15 kW	2 x 15 kW	1 x 15 kW
VOLTMAX 54	54	184 248	129.9	9 x 6 kW	3 x 18 kW	2 x 18 kW	1 x 18 kW
VOLTMAX 60	60	204 720	144.3	12 x 5 kW	4 x 15 kW	3 x 15 kW	1 x 15 kW
VOLTMAX 72	72	245 664	173.2	12 x 6 kW	4 x 18 kW	3 x 18 kW	1 x 18 kW
VOLTMAX 75	75	255 900	180.4	15 x 5 kW	5 x 15 kW	4 x 15 kW	1 x 15 kW

[1] 240 V 3-phase electrical supply (L1-L2-L3) with three 90 °C conductors and a ground.

VOLTMAX 480 VAC[1] and 600 VAC[2] / 60 Hz / 3 phases

Model	Power kW	Power BTU/h	Amps 480 VAC	Amps 600 VAC	Elements 480 V[1] or 600 V[2]	STG Series Relay Stages	SCR Series Relay Stages	SCR Series SCR Stages
VOLTMAX 30	30	102 360	36.1	28.9	6 x 5 kW	2 x 15 kW	1 x 15 kW	1 x 15 kW
VOLTMAX 36	36	122 832	43.3	34.6	6 x 6 kW	2 x 18 kW	1 x 18 kW	1 x 18 kW
VOLTMAX 45	45	153 540	54.1	43.3	9 x 5 kW	3 x 15 kW	2 x 15 kW	1 x 15 kW
VOLTMAX 54	54	184 248	65	52	9 x 6 kW	3 x 18 kW	2 x 18 kW	1 x 18 kW
VOLTMAX 60	60	204 720	72.2	57.7	12 x 5 kW	4 x 15 kW	3 x 15 kW	1 x 18 kW
VOLTMAX 72	72	245 664	86.6	69.3	12 x 6 kW	4 x 18 kW	3 x 18 kW	1 x 18 kW
VOLTMAX 75	75	255 900	90.2	72.2	15 x 5 kW	5 x 15 kW	4 x 15 kW	1 x 15 kW
VOLTMAX 90	90	307 080	108.3	86.6	15 x 6 kW	5 x 18 kW	4 x 18 kW	1 x 18 kW
VOLTMAX 99	99	337 788	119.1	95.3	9 x 5 kW + 9 x 6 kW	3 x 33 kW	2 x 33 kW	1 x 33 kW
VOLTMAX 108	108	368 496	129.9	103.9	18 x 6 kW	3 x 36 kW	2 x 36 kW	1 x 36 kW
VOLTMAX 120	120	409 440	144.3	115.5	24 x 5 kW	4 x 30 kW	3 x 30 kW	1 x 30 kW
VOLTMAX 132	132	450 384	158.8	127	12 x 5 kW + 12 x 6 kW	4 x 33 kW	3 x 33 kW	1 x 33 kW
VOLTMAX 144	144	491 328	173.2	138.6	24 x 6 kW	4 x 36 kW	3 x 36 kW	1 x 36 kW
VOLTMAX 150	150	511 800	180.4	144.3	30 x 5 kW	5 x 30 kW	4 x 30 kW	1 x 30 kW
VOLTMAX 165	165	562 980	198.5	158.8	15 x 5 kW + 15 x 6 kW	5 x 33 kW	4 x 33 kW	1 x 33 kW
VOLTMAX 180	180	614 160	216.5	173.2	30 x 6 kW	5 x 36 kW	4 x 36 kW	1 x 36 kW

[1] 480 V 3-phase electrical supply (L1-L2-L3) with three 90 °C conductors and a ground.
[2] 600 V 3-phase electrical supply (L1-L2-L3) with three 90 °C conductors and a ground.

10-YEAR WARRANTY
ON THE RESERVOIR

2-YEAR WARRANTY
ON ELECTRICAL AND MECHANICAL PARTS

OUR PRODUCTS ARE CERTIFIED

THERMO 2000

THERMO 2000 Inc.
500 9th Avenue
Richmond, QC J0B 2H0 Canada

1 888 854-1111 Toll-free
819 826-5613 Telephone
819 826-6370 Fax

thermo2000.com

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VOLTMAX 22.5 KW À 180 KW

1- DIGITAL CONTROLLER

2- HEATING WATER CONNECTIONS

3- EASILY-REPLACEABLE IMMERSION-TYPE "INCOLOY" HEATING ELEMENTS

4- LOW VOLTAGE FUSE PROTECTION (CONTROL CIRCUIT)

5- HIGH VOLTAGE FUSE PROTECTION (POWER CIRCUIT) STANDARD ON 120A AND HIGHER MODELS

6- POWER CONTACTOR

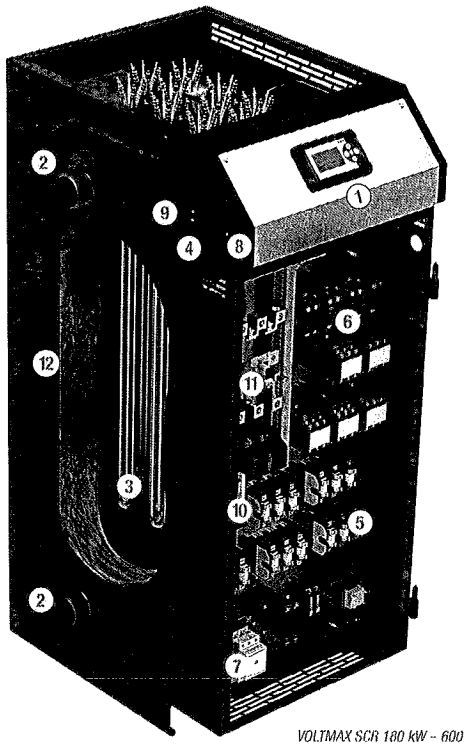
7- SOLID STATE SCR RELAY (SCR SERIES ONLY)

8- CONTROL CIRCUIT ON/OFF SWITCH

9- LOW WATER CUTOFF WITH AUTOMATIC RESET, TEST BUTTON AND INDICATOR LIGHTS (STANDARD FOR 120 KW OR HIGHER MODELS)

10- CURRENT TRANSDUCER (SCR SERIES ONLY)

11- MAIN DISCONNECT SWITCH (THREE-PHASES)



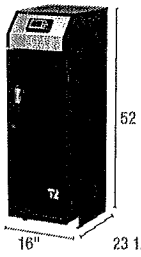
VOLTMAX SCR 180 kW - 600 V with main disconect switch option

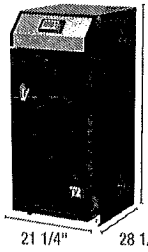
STANDARD FEATURES

- A first adjustable high-limit with automatic reset
- A second fixed high-limit with manual reset
- ¾" NPT drain valve
- ASME safety valve
- 3" insulation

OPTIONAL EQUIPMENT

- High voltage fuse protection (models less than 120A))
- Main disconect switch with or without built-in fuses (three-phases models only)
- Low water cutoff with automatic reset, test button and indicator lights (models less than 120 kW)
- Maximum operating pressure (see table below)

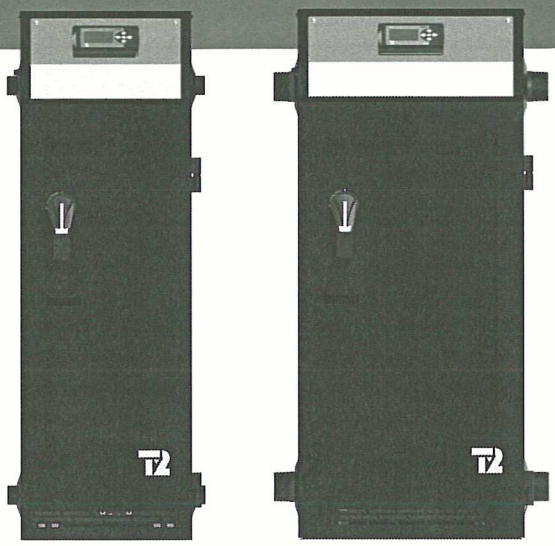




VOLTMAX	90 kW or less	More than 90 kW
MODEL	22.5 to 90 kW	99 to 180 kW
WEIGHT	310 lb	550 lb
VOLUME	11 US gallons	30 US gallons
CONNECTIONS	1 1/2" NPT male	2 1/2" NPT male
STANDARD MAXIMUM WORKING PRESSURE	30 PSI	60 PSI
OPTIONAL MAXIMUM WORKING PRESSURE	70 PSI*	125 PSI

*90 kW or lower models are available at 125 PSI, but the unit will be the same size as one greater than 90 kW.

4 CONNECTIONS
INLET AND OUTLET
(MULTIPOSITION)



VOLTMAX IS AVAILABLE IN DIFFERENT POWERS AND VOLTAGES

SINGLE PHASE 60 Hz

208 VAC	22.5 kW to 54 kW
240 VAC	30 kW to 72 kW

THREE-PHASE 60 Hz

208 VAC	22.5 kW to 67.5 kW
240 VAC	30 kW to 75 kW
480 VAC	30 kW to 180 kW
600 VAC	30 kW to 180 kW

For 100% efficiency

- Compact vertical boiler to optimize space
- Unit available in 2 different sizes to ensure minimal acquisition cost
- Easy access to component parts
- Operates only when needed
- Set point temperature adjustable from 50°F to 200° (10°C to 93°C)
- Silent, clean and requires little maintenance
- Robust industrial-grade construction
- Water temperature and boiler power modulation based on the outdoor temperature (sensor included)

- Ethernet and BACnet network communication ports enable remote communication
- Ability to view operating status and to modify the settings remotely through a webpage
- Information about operating anomalies and history
- Can be configured to send alarms by email

VOLTMAX SCR SERIES only

- Contacts to activate an external alarm
- Presence of dry contacts to start-up pumps with or without domestic hot water priority
- Amperage measurement (three-phases models only) to detect anomalies and to estimate electrical consumption
- Return temperature and boiler flow readings
- Can be easily connected with an auxiliary boiler as a power backup or for a dual-energy configuration
- Temperature-lowering function via an external contact when building is unoccupied

Increased temperature Control

The VOLTMAX boiler provides maximum comfort through accurate, efficient temperature control of these different modes:

- "Fixed"set point temperature
- Water temperature modulation with external temperature sensor
- Remote control the water temperature using an external BACnet IP or MSTP controller
- Variable water temperature based on a building occupancy schedule

VOLTMAX SCR only

- 0-10Vdc external temperature control

For all these modes, you can use the controller to set a second "fixed" set point temperature, adjusted to a greater value to use an indirect water heater with or without domestic hot water priority.

Increased power Control

To maximize savings without compromising comfort, the VOLTMAX boiler provides efficient power control according to these different modes:

- The controller acts without constraint or limitation
- The maximum power is determined manually
- Maximum power modulation based on the outdoor temperature sensor
- Remote power control (through an external BACnet IP or MSTP controller)
- Variable maximum power based on an hourly schedule

VOLTMAX SCR SERIES only

- 0-10Vdc external power control
- Auxiliary energy source used as a backup or master source

Nisqually River Project
TACOMA POWER

SHOP PRE-BID

MEETING TYPE: *Vendor Meeting*

DATE: *January 30, 2019 - 10:00 AM*

Name	Company	Phone Number	Email
Joe Brown	Five Rivers Const	360 423-1991	j.brown@fiveriversconstruction.com
Deony Williamson	Robinins Inc	360-532-5220	bids@roginins.com
Nathan Larson	LBC Construction	206 747 7748	nathan@larsonbergerc.com
Donna Ebi	TPU	253 312-4703	donna.ebi@ci.tacoma.wa.us
Steve Fairchild	TPU	253-502-8747	sfairchild@cityoftacoma.org
Marc Jackson	Tapani Inc	360 567 8017	QUOTES@TAPANI.com
Caleb Boettcher	Boettcher and Sons Inc	253-318-2201	Boetsons@gmail.com
Dave Cobb	Nisqually		
Mark Bolender	NW Steel Design LLC	360 269-5699	mnb@localaccess.com
Kevin Morrison	Customs Electric	253-922-5874	Kmmm@customec.com
Paul	Dirt works specialist	2065109826	PRoss99119@comcast.net
Garth Magaw	RCP	360-485-6605	ridgecreekplumbingllc@gmail.com