



34th Edition
James A. Thomson

2026 NATIONAL PLUMBING & HVAC ESTIMATOR

Manhour, labor, and material costs for residential, commercial, and industrial plumbing, heating, ventilating & air conditioning





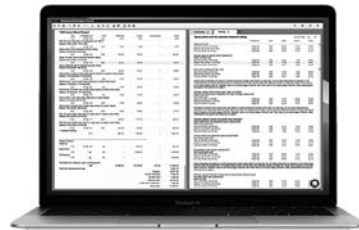
2026 NATIONAL PLUMBING & HVAC ESTIMATOR

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Edited by James A. Thomson
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Acknowledgments

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Contents

How to Use This Book	5	Fire Protection	
Plumbing Equipment		Fire Protection Sprinklers.....	172
Domestic Hot Water Heaters	19	Fire Protection Equipment.....	175
Water Softeners	22	Fire Protection Sprinkler Pipe and Fittings (Roll Grooved)	177
Kitchen Equipment	25	Fire Protection Branch Pipe & Fittings	181
Kitchen Equipment Connections	26	Fire Protection Sprinkler Pipe and Fittings (CPVC)	184
Plumbing Fixtures	27		
Plumbing Fixture Rough-In	31	HVAC Equipment	
Piping Systems		Commercial Boilers	186
Copper Pipe, Type K with Brazed Joints	33	Commercial Boiler Connections.....	191
Copper Pipe, Type K with Soft-Soldered Joints....	43	Commercial Boiler Components and Accessories	193
Copper Pipe, Type L with Brazed Joints.....	53	Centrifugal Pumps and Pump Connections	207
Copper Pipe, Type L with Soft-Soldered Joints	61	Heat Exchangers and Connections	208
Copper Pipe, Type M with Brazed Joints.....	70	Fan Coil Units and Connections	209
Copper Pipe, Type M with Soft-Soldered Joints....	78	Reheat Coils and Connections	210
Copper, Pressfit	86	Unit Heaters and Connections	211
Copper Pipe, Type K & L with Roll Grooved Joints	89	Chillers and Chiller Connections.....	212
Soft Copper Pipe.....	91	Condensing Units and Cooling Towers.....	213
Corrugated Stainless Steel Tubing	92	Cooling Towers and Cooling Tower Connections	214
PVC, Schedule 40, with Solvent-Weld Joints	93		
PVC, Schedule 80, with Solvent-Weld Joints	103	Steel Piping Systems	
Polyethylene-Aluminum Pipe with Crimped Joints.....	113	Carbon Steel, Schedule 40 with 150# Fittings & Butt-Welded Joints.....	215
Polyethylene-Aluminum Pipe with Compression Joints	118	Carbon Steel, Schedule 40 with 150# M.I. Fittings & Threaded Joints	224
Plumbing and Piping Specialties.....	121	Carbon Steel, Schedule 5 with Pressfit Fittings.....	235
Cast Iron, DWV, Service Weight, No-Hub with Coupled Joints	137	Carbon Steel, Schedule 80 with 300# Fittings & Butt-Welded Joints.....	238
Cast Iron, DWV, Service Weight, Hub & Spigot with Gasketed Joints	143	Carbon Steel, Schedule 80 with 300# M.I. Fittings & Threaded Joints	248
Copper, DWV, with Soft-Soldered Joints	148	Carbon Steel, Schedule 160 with 3,000-6,000# Fittings	256
ABS, DWV with Solvent-Weld Joints	152	Carbon Steel, Schedule 40 with Roll-Grooved Joints.....	267
PVC, DWV with Solvent-Weld Joints	156	Carbon Steel, Schedule 10 with Roll-Grooved Joints.....	274
PVC, DWV with Gasketed Bell and Spigot Joints.....	161	Carbon Steel, Schedule 40 with Cut-Grooved Joints	281
Polypropylene, Schedule 40, with Heat-Fusioned Joints.....	166		
Floor, Area, Roof and Planter Drains	170		
Cleanouts	171		

Residential HVAC Assemblies.....	287	Galvanized Steel Round Ductwork	395
Air Handling Unit Accessories.....	291	Fiberglass Ductwork.....	396
Heat Recovery Ventilators - Commercial.....	292	Fiberglass Pipe Insulation.....	398
Heat Recovery Ventilators - Residential	293	Calcium Silicate Pipe Insulation with	
Water Coil Piping.....	295	Aluminum Jacket.....	400
Air Handling Unit Coil Connections	298	Closed Cell Elastomeric Pipe Insulation.....	401
Gas-Fired Furnaces.....	300	Thermal Duct Insulation	402
Energy Recovery Systems, Enthalpy	302	Balancing of HVAC Systems.....	403
Unit Heaters	303	Temperature Controls.....	406
Infrared Heaters.....	305	Ductile Iron Pipe Systems	
Heat Pump Systems.....	306	Ductile Iron, Class 153, Cement-Lined with	
Water Pump Systems.....	314	Mechanical Joints.....	408
Geothermal/Domestic Water Wells.....	317	Ductile Iron, Class 153, Double Cement-Lined	
Biomass-Fired Boilers	320	with Mechanical Joints	410
Fans and Blowers.....	325	Ductile Iron, Class 110, Cement-Lined with	
Ventilators & Residential Exhaust Fans	327	Mechanical Joints.....	412
Apparatus Housing	332	Cast Iron, Class 150 with Mechanical Joints....	413
Air Devices, Registers & Grilles	334	Asbestos-Cement, Class 2400 or 3000 with	
Air Devices, Diffusers & Grilles	335	Mechanical Joints	414
Terminal Units (VAV).....	338	Fiberglass Tanks	415
Ducting Systems		Plastic Tanks	416
Ductwork Specialties.....	340	Trenching	418
Galvanized Steel Ductwork	345	Equipment Rental.....	420
Installed Ductwork Per Pound.....	347	Close-Out Items.....	421
Galvanized Steel Spiral Ductwork.....	349	HVAC & Plumbing Demolition	422
Galvanized Steel Round Spiral Fittings	350	Budget Estimating.....	435
Galvanized Steel Rectangular Ductwork.....	352	Forms and Letters	
Galvanized Steel Rectangular		Change Estimates.....	438
90 Degree Elbows.....	354	Subcontract Forms.....	447
Galvanized Steel Spiral Duct	357	Purchase Orders	451
Galvanized Steel Spiral Duct Fittings.....	359	Construction Schedules	453
Galvanized Steel Spiral Tees.....	361	Letter of Intent	456
Galvanized Steel Spiral Crosses.....	367	Submittal Data.....	458
Galvanized Steel Rectangular Ductwork.....	370	Billing Breakdown Worksheet	461
Galvanized Steel Rectangular Elbows.....	382	Index	463
Galvanized Steel Drops and Tees	392		

How to Use This Book

This 2026 National Plumbing & HVAC Estimator is a guide to estimating labor and material costs for plumbing, heating, ventilating and air conditioning systems in residential, commercial and industrial buildings.

This manual is also available by subscription on the Web as part of *National Estimator Cloud*. For only a few dollars a month, you get all ten of Craftsman's 2026 construction cost estimating guides. Each has about 400 pages of current labor and material costs for construction – all neatly organized and indexed. Use these costs to build estimates, bids and invoices for nearly any type of project.

National Estimator Cloud:

- Prints estimates, bids and invoices as Word, Excel or PDF documents.
- Supports progress billing. National Estimator remembers what work has been billed and what hasn't.
- Runs as a secure app on the Web so you can write estimates anywhere you have a Web connection.
- Exports invoices to QuickBooks, either desktop or online.
- Bids and invoices can show as much or as little detail as you want.
- Material costs are updated regularly as prices change.
- Costs only a few dollars a month. Cancel any time you want.

Costs in This Manual will apply within a few percent on a wide variety of projects. Using the information given on the pages that follow will explain how to use these costs and suggest procedures to follow when compiling estimates. Reading the remainder of this section will help you produce more reliable estimates for plumbing and HVAC work.



Manhour Estimates in This Book will be accurate for some jobs and inaccurate for others. No manhour estimate fits all jobs because every construction project is unique. Expect installation times to vary widely from job to job, from crew to crew, and even for the same crew from day to day.

There's no way to eliminate all errors when making manhour estimates. But you can minimize the risk of a major error by:

1. Understanding what's included in the manhour estimates in this book, and
2. Adjusting the manhour estimates in this book for unusual job conditions.

The Craft@Hrs Column. Manhour estimates in this book are listed in the column headed *Craft@Hrs*. For example, on page 19 you'll see an estimate for installing a 6 gallon hot water heater. In the *Craft@Hrs* column opposite 6 gallon you'll see:

P1@.500

To the left of the @ symbol you see an abbreviation for the recommended work crew.

Page 7 shows the wage rates and craft codes used in this book.

To the right of the @ symbol you see a number. The number is the estimated manhours (not crew hours) required to install each unit of material listed. In the case of a 6 gallon hot water heater, P1@.500 means that .500 manhours are required to install 1 hot water heater.



Costs in the Labor \$ Column are based on manhour estimates in the *Craft@Hrs* column. Multiply the manhour estimate by the assumed hourly labor cost to find the installation cost in the *Labor \$* column. For example, .500 manhours times \$44.45 (the average wage for crew P1) is \$22.225 (rounded to the nearest dime, \$22.23).

Manhour Estimates include all productive labor normally associated with installing the materials described. These estimates assume normal conditions: experienced craftsmen working on reasonably well planned and managed new construction with fair to good productivity. Labor estimates also assume that materials are standard grade, appropriate tools are on hand, work done by other crafts is adequate, layout and installation are relatively uncomplicated, and working conditions don't slow progress.

All manhour estimates include tasks such as:

- Unloading and storing construction materials, tools and equipment on site.
- Working no more than two floors above or below ground level.

National Plumbing & HVAC Estimator

- Working no more than 10 feet above an uncluttered floor.
- Normal time lost due to work breaks.
- Moving tools and equipment from a storage area or truck not more than 200 feet from the work area.
- Returning tools and equipment to the storage area or truck at the end of the day.
- Planning and discussing the work to be performed.
- Normal handling, measuring, cutting and fitting.
- Regular cleanup of construction debris.
- Infrequent correction or repairs required because of faulty installation.

If the work you're estimating won't be done under these conditions, you need to apply a correction factor to adjust the manhour estimates in this book to fit your job.

Applying Correction Factors. Analyze your job carefully to determine whether a labor correction factor is needed. Failure to consider job conditions is probably the most common reason for inaccurate estimates.

Use one or more of the recommended correction factors in Table 1 to adjust for unusual job conditions. To make the adjustment, multiply the manhour estimate by the appropriate conversion factor. On some jobs, several correction factors may be needed. A correction factor less than 1.00 means that favorable working conditions will reduce the manhours required.



Supervision Expense to the installing contractor is not included in the labor cost. The cost of supervision and non-productive labor varies widely from job to job. Calculate the cost of supervision and non-productive labor and add this to the estimate.

Hourly Labor Costs also vary from job to job. This book assumes an average manhour labor cost of \$51.49 for plumbers and \$49.64 for sheet metal workers. If these hourly labor costs are not accurate for your jobs, adjust the labor costs up or down by an appropriate percentage. Instructions on the next page explain how to make these adjustments. If you're using National Estimator Cloud, it's easy to set your own wage rates.

Hourly labor costs in this book include the basic wage, fringe benefits, the employer's contribution to welfare, pension, vacation and apprentice funds, and all tax and insurance charges based on wages. Table 2 at the top of the next page shows how hourly labor

Condition	Correction Factor
Work in large open areas, no partitions	.85
Prefabrication under ideal conditions, bench work	.90
Large quantities of repetitive work	.90
Very capable tradesmen	.95
Work 300' from storage area	1.03
Work 400' from storage area	1.05
Work 500' from storage area	1.07
Work on 3rd through 5th floors	1.05
Work on 6th through 9th floors	1.10
Work on 10th through 13th floors	1.15
Work on 14th through 17th floors	1.20
Work on 18th through 21st floors	1.25
Work over 21 floors	1.35
Work in cramped shafts	1.30
Work in commercial kitchens	1.10
Work above a sloped floor	1.25
Work in attic space	1.50
Work in crawl space	1.20
Work in a congested equipment room	1.20
Work 15' above floor level	1.10
Work 20' above floor level	1.20
Work 25' above floor level	1.30
Work 30' above floor level	1.40
Work 35' to 40' above floor level	1.50

Table 1 Recommended Correction Factors

costs in this book were calculated. It's important that you understand what's included in the figures in each of the six columns in Table 2. Here's an explanation:

Column 1, the base wage per hour, is the craftsman's hourly wage. These figures are representative of what many contractors are paying plumbers, sheet metal workers and helpers in 2026.

Column 2, taxable fringe benefits, includes vacation pay, sick leave and other taxable benefits. These fringe benefits average about 6.37% of the base wage for many plumbing and HVAC contractors. This benefit is in addition to the base wage.



Column 3, insurance and employer-paid taxes in percent, shows the insurance and tax rate for the craft workers. The cost of insurance in this column includes workers' compensation and contractor's casualty and liability coverage. Insurance rates vary

Column Number	1	2	3	4	5	6
		Taxable fringe benefits (at 6.37% of base wage)	Insurance and employer taxes (%)	Insurance and employer taxes (\$)	Non-taxable fringe benefits (at 5.63% of base wage)	Total hourly cost used in this book
Craft	Base wage per hour					
Laborer	25.94	1.65	30.27%	8.35	1.46	37.40
Plumber	37.64	2.40	23.29%	9.33	2.12	51.49
Sheet Metal Worker	35.94	2.29	24.57%	9.39	2.02	49.64
Operating Engineer	37.21	2.37	23.79%	9.42	2.09	51.09
Sprinkler Fitter	36.99	2.36	23.88%	9.40	2.08	50.83
Electrician	36.52	2.33	19.14%	7.44	2.06	48.35
Cement Mason	32.20	2.05	22.18%	7.60	1.81	43.66

Craft Code	Crew Composition	Average Hourly Cost per Manhour
ER	4 building plumbers, 2 building laborers, 1 operating engineer	47.41
SN	4 building sheet metal workers, 2 building laborers, 1 operating engineer	46.35
P1	1 building plumber and 1 building laborer	44.45
ST	1 sprinkler fitter	50.83
SK	4 sprinkler fitters, 2 building laborers, 1 operating engineer	47.03
SL	1 sprinkler fitter and 1 laborer	44.12
S2	1 building sheet metal worker, 1 building laborer	43.52
BE	1 electrician	48.35
CF	1 cement mason	43.66
SW	1 sheet metal worker	49.64

Table 2 Labor Costs Used in This Book

widely from state to state and depend on a contractor's loss experience. Note that taxes and insurance increase the hourly labor cost by approximately 30%. There is no legal way to avoid these costs.

Column 4, insurance and employer taxes in dollars, shows the hourly cost of taxes and insurance. Insurance and taxes are paid on the costs in both columns 1 and 2.

Column 5, non-taxable fringe benefits, includes employer paid non-taxable benefits such as medical coverage and tax-deferred pension and profit sharing plans. These fringe benefits average 5.63% of the base wage for many plumbing and HVAC contractors. The employer pays no taxes or insurance on these benefits.

Column 6, the total hourly cost in dollars, is the sum of columns 1, 2, 4, and 5. The labor costs in Column 6 were used to compute costs in the Labor \$ column of this book.

Adjusting Costs in the Labor \$ Column. The hourly labor costs used in this book may apply within a few percent on many of your jobs. But wage rates may be much higher or lower in some areas. If the hourly costs shown in Column 6 of Table 2 are not accurate for your work, adjust labor costs to fit your jobs.

For example, suppose your hourly labor costs are as follows:

Plumber	\$29.00
Laborer	\$19.00
Total hourly crew cost	\$48.00

Your average cost per manhour would be \$24.00 (\$48.00 per crew hour divided by 2 because this is a crew of two).

A labor cost of \$24.00 is about 54% of the \$44.45 labor cost used for crew P1. Multiply costs in the Labor \$ column by .539 to find your estimated cost.

Adjusting the labor costs in this book will make your estimates much more accurate. Making adjustments to labor costs is both quick and easy if you use National Estimator Cloud.

Equipment Cost will vary according to need and application. It is typically \$33.20 per day for a 2-ton chain hoist.

Material Costs in this manual are intended to reflect what medium- to low-volume contractors will be paying in 2026 after applying normal discounts. These costs include charges for delivery to within 25 to 30 miles of the supplier.

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Overhead and Profit for the installing contractor are not included in the costs in this manual unless specifically identified in the text. Markup can vary widely with local economic conditions, competition and the installing contractor's operating expenses. Add the markup that's appropriate for your company, the job and the competitive environment.

How Accurate Are These Figures? As accurate as possible considering that the editors don't know your material suppliers, haven't seen the plans or specifications, don't know what building code applies or where the job is, had to project material costs at least six months into the future, and had no record of how much work the crew that will be assigned to the job can handle.

You wouldn't bid a job under those conditions. And I don't claim that all plumbing and HVAC work is done at these prices.

Estimating Is an Art, not a science. There is no one price that applies on all jobs. On many jobs the range between high and low bid will be 10% or more. There's room for legitimate disagreement on what the correct costs are, even when complete plans and specifications are available, the date and site are established, and labor and material costs are identical for all bidders.

No estimate fits all jobs. Good estimates are custom made for a particular project and a single contractor through judgment, analysis and experience. This book is not intended as a substitute for judgment, analysis and sound estimating practice. It's an aid in developing an informed opinion of cost, not an answer book.

Additional Costs to Consider

Here's a checklist of additional costs to consider before submitting any bid.

1. Sales taxes
2. Mobilization costs
3. Payment and performance bond costs
4. Permits and fees
5. Storage container rental costs
6. Utility costs
7. Tool costs
8. Callback costs during warranty period
9. Demobilization costs

Exclusions and Clarifications

Neither the job specifications nor the contract may identify exactly what work should be included in the plumbing and HVAC bid. Obviously, you have to identify what work is included in the job.

The most efficient way to define the scope of the work is to prepare a list of tasks not normally performed by your company and attach that list to each bid submitted. Here's a good list of work that should be excluded from your bid.

Your Bid Should Exclude

- Final cleaning of plumbing fixtures
- Backings for plumbing fixtures
- Toilet room accessories
- Electrical work, including motor starters
- Electrical wiring and conduit over 100 volts
- Temporary utilities
- Painting, priming and surface preparation
- Structural cutting, patching or repairing
- Fire protection and landscape sprinklers
- Equipment supports
- Surveying and layout of control lines
- Removal or stockpiling of excess soil
- Concrete work, including forming and rebar
- Setting of equipment furnished by others
- Equipment, unless shown, and personnel hoisting
- Wall and floor blockouts
- Pitch pockets
- The costs of performance or payment bonds
- Site utilities
- Asbestos removal or disposal
- Contaminated soil removal or disposal
- Major increases in copper material prices
- Fire dampers not shown on the plans

Your Bid Should Include

- Trash sweep-up only. Others haul it away
- Site utilities from building to property line only
- Piping to 5 feet outside the building only
- Plumbing & HVAC permits for your work only

Beware of Price Changes

There's no way to be sure what prices will be in three to six months. All labor, equipment, material and subcontract prices in a bid should be based on costs anticipated when the project is expected to be built, not when the estimate is compiled. That presents a problem. Except for the installation of underground utilities, most plumbing and HVAC work is done six months to a year after the bid is submitted. When possible, get price protection in writing from your suppliers and subcontractors. If your suppliers and subs won't guarantee prices, include an escalation allowance in your bid to cover anticipated price increases.

Material Pricing Conditions

All equipment and material prices quoted by your vendors will be conditional. They usually don't include sales tax and are subject to specific payment and shipping terms. Every estimator should understand the meaning of common shipping terms. They define who pays the freight and who has responsibility for processing freight-damage claims. Here's a summary of important conditions you should understand.

F.O.B. Factory (Free On Board at the Factory): Title passes to the buyer when the goods are delivered by the seller to the freight carrier. The buyer pays the freight and is responsible for freight-damage claims.

F.O.B. Factory F.F.A. (Free On Board at the Factory, Full Freight Allowed): The title passes to the buyer when the goods are delivered by the seller to the freight carrier. The seller pays the freight charges, but the buyer is responsible for freight-damage claims.

F.O.B. (city of destination) (Free On Board to your city): The title passes to the buyer when the goods are delivered by the seller to the freight terminal in the city, or nearest city, of destination. The seller pays the freight and is responsible for freight-damage claims to the terminal. The buyer pays the freight charge and is responsible for freight-damage claims from the terminal to the final destination.

F.O.B. Job Site (Free On Board at job site, or contractor's shop): The title passes to the buyer when the goods are delivered to the job site (or shop). The seller pays the freight and is responsible for freight-damage claims.

F.A.S. Port [of a specific city] (Free Alongside Ship at the nearest port): The title passes to the buyer when goods are delivered to the ship dock or port terminal. The seller pays the freight and is responsible for

freight-damage claims to the ship dock or port terminal only. The buyer pays the freight and is responsible for freight-damage claims from the ship dock or port terminal to the designated delivery point.

Obviously, it's to your advantage to instruct all vendors to quote costs F.O.B. the job site or your shop.

Reducing Costs

Most construction specifications allow the use of alternative equipment and materials. It's the estimator's responsibility to select the most cost-effective products. Research and compare your costs before making any decisions. Avoid selecting any material or equipment simply because that's what you've always done.

Don't recommend plastic products such as ABS, PVC, or polypropylene pipe or corrugated flexible ducts until you've checked local code requirements. Most building codes prohibit use of these materials inside public buildings such as schools, care centers and hospitals.

It's wise to select 100% factory-packaged equipment. Beware of equipment labeled "Some assembly required." Field labor costs for mounting loose coils, motors and similar equipment are very high.

Value Engineering

Let's suppose you've submitted a combined plumbing and HVAC bid for \$233,000. Your cutthroat competitor put in a bid at \$4,000 less, \$229,000. Obviously there's no way you're going to get the job. Right?

Not so fast! Maybe value engineering can help you win that contract — while fattening your profit margin.

Suppose the proposal you submitted had two parts. Part I is the bid for \$233,000, based entirely on job plans and specs, just the way they were written. But appended to your proposal is Part II, a list of suggestions for saving money without sacrificing any of the capacity or quality designed into the system. Here's an example of what might be in Part II:

1. Deduct for providing pipe hanger spacings per UPC in lieu of specified spacings: \$1,750.00
2. Deduct for reducing heating hot water pipe sizes by using 40 degrees F Delta T in lieu of specified 20 degrees F Delta T: \$4,600.00
3. Deduct for providing pressure/temperature taps at air handling units, pumps and chillers in lieu of specified thermometers and pressure gauges: \$875.00

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4. Deduct for eliminating water treatment in closed piping systems: \$1,800.00
5. Deduct for piping chilled and heating hot water pumps in parallel in lieu of providing 100% standby pumps: \$2,900.00

Total deductions: \$11,925.00

Adopting these suggestions would make you low bidder by nearly \$8,000. A saving like that will be tempting to most owners, especially if the owner understands that your suggestions result in a system that is every bit as good and maybe better than the system as originally designed.

You're not offering to undercut the competition. Far from it. You're using knowledge and experience to create better value for the owner. That's called value engineering and it's likely to win the respect of nearly all cost-conscious owners.

Notice that reducing costs is only part of what value engineering is all about. You don't cut costs at the expense of system quality, integrity, capacity or performance.

Don't waste your time, and your client's, by offering to substitute cheaper or lower-quality fixtures or equipment. Any cutthroat contractor with a price list can do that. Recommend the use of inferior materials and you'll be associated with the inferior goods you promote. Some owners consider even the suggestion to be insulting.

The recommendations you make (like most of those in the example) will require design changes. You can expect to be examined (or even challenged) on these points. Be ready to explain and defend each of your suggestions. Convince the client (or the design engineer) that your ideas are based on sound engineering principles and you're well on the way to winning the owner's confidence and the contract.

Now, let's go back to the list and see how we might justify the five value engineering recommendations.

1. **Pipe Hanger Spacing.** The pipe hanger spacings recommended in the Uniform Plumbing Code (UPC) are calculated by experienced, professional structural engineers. The safety factors used in these calculations are very conservative. They've been widely used for many years and have proved to be more than adequate. There's no need for more hangers than the UPC requires.

2. **Changing HHW Delta T.** In hydronic heating systems, heat measured in Btus is pumped to terminal units. The proposed change of the Delta T, from 20 degrees F to 40 degrees F, has no effect whatsoever on how many Btus the system delivers. You're not changing anything but the volume of water being pumped. At lower volume levels, the size of the pump, the pipe and the pipe insulation can all be reduced. Not one of these changes will affect the system's ability to transmit heat. Furthermore, operating costs will also drop, since less pump horsepower will be needed to run the smaller pump.

3. **Thermometers/Pressure Gauges.** Thermometers and pressure gauges installed on or near vibrating machinery have a very short life expectancy. Gauges quickly lose accuracy under harsh conditions. Readings will become less and less reliable. That's potentially dangerous. You can avoid this problem by using insertion-type pressure/temperature taps instead. Store these sensitive gauges in a desk drawer or a tool crib when not in use. Safely stored, they're protected from damage. They'll give accurate readings longer and won't need to be replaced as often. And they're simple to use. Just insert a gauge in one of the conveniently located taps. Make the reading, then remove the gauge and put it away.

4. **Water Treatment.** ITT Bell & Gossett has done studies on corrosion in closed hydronic systems that have a make-up water rate of no more than 5% per year. These studies show that corrosion virtually stops when entrained air is either removed or depleted. No water treatment is needed in this closed system.

5. **100% Standby Pumps.** Two pumps piped and operated in parallel are more economical. Even if one pump fails, the other pump can maintain delivery at 75 to 80% of the designed flow rate. That's usually adequate for emergency operation.

These cost-saving ideas are small, but could tip the balance in your favor. I hope they demonstrate the potential that value engineering has when bidding jobs. Any time you're compiling an estimate, keep an eye out for ways to save money or reduce the owner's cost. Jot a note to yourself about each potential saving you identify. Before submitting the bid, make a list of your alternate suggestions. Maybe best of all, markup on your value engineering suggestions can be higher than your normal markup. If value engineering can cut costs by \$10,000, maybe as much as \$4,000 of that should end up in your pocket!

Value Engineering: Surplus Materials

Value engineering doesn't begin and end with job plans and specs. Value engineering means getting the most value at the least cost, no matter whether it's value to the owner or value to the contractor. Smart mechanical contractors learn to build extra value into their jobs by controlling shrinkage of materials. Nearly every significant plumbing and HVAC job ends with at least some surplus material on hand. Material left over when the job is done tends to be discarded as waste or hauled off the job in the back of a truck that doesn't have your company name on the door. And why not? It's surplus — not needed. The owner didn't need it. So now it's up for grabs.

Not quite. Let's consider who actually owns that surplus material. When your company has been paid, every piece of material your crew installed belongs to the building owner. But what about those fittings, hangers and valves delivered to the job site but never actually used? Almost certainly, those materials were included in your bid. So aren't they the property of the owner? Not in my opinion. The owner contracted for a mechanical system and (presumably) has one. Unless it's a cost-plus job or a labor-only job, the owner didn't buy materials delivered to the job site. The owner bought a mechanical system and has one — completely separate and apart from any surplus materials. In my mind, the property owner has no more claim to left-over materials than the same owner would have claim to labor hours not expended or equipment not used on the same job.

Unless there's some provision in your contract to the contrary, surplus material belongs to the installing contractor. But your right to that material and the chance of actually getting it back to your shop are two very different propositions. I see recovery of surplus material as a training issue. As a matter of company policy, make it clear to your crews that surplus material belongs to your company. The supervisor on every job should be accountable for recovery of excess material. Every significant job will have at least some surplus. Accounting for that surplus should be part of your routine close-out procedure. Fortunately, it's not difficult. I'll explain.

Control of surplus materials begins with a good checklist, or form. I recommend the Materials, Equipment and Tool form, "MET" for short. A blank MET form appears following this section. Your MET should show both what's delivered to the job site (material, equipment and tools) and surplus "drops" returned to your shop at project close-out. A MET

ensures that the estimator, the shop inventory manager and your field supervisor are on the same page. Your MET establishes accountability. Nothing falls through the cracks. Job input equals job output plus returns. Everything delivered to the job and not expended should be returned to your shop.

Here's how it works:

1. Based on the estimate that won you the job, the items needed are purchased for the job and staged for delivery to the job site.
2. As materials, equipment and tools are delivered to the job site, your supervisor completes the first three columns of the MET form: Description, Quantity and Date.
3. As work is completed, the same supervisor completes the four columns under Returned to Inventory: Quantity Returned, Date, Status Code and Value. The status code will be either "RS" (Returned and Salvaged) or "RN" (Returned New).
4. Back at your shop, both RS and RN materials should be restored to inventory.
5. If your company has an inventory manager, have that manager assign the return value to each item returned. If you're using QuickBooks Pro, the "Adjust Inventory" feature can handle this task quite easily. Add two new categories under "Inventory Stock on Hand by Vendor." The first new category is Returned Salvage. The second is Returned New. Be sure the value of RS materials includes the cost of any reconditioning done to restore salvaged materials (such as pumps and boilers) to serviceable condition.
6. Comparing MET deployed to the job site with MET returned to inventory yields MET actually used on the job. That's a very important number to every plumbing and HVAC estimator. Be sure actual usage gets entered on the Project Summary form.
7. When the take-off on your next estimate is complete, compare that materials list with a summary of RS and RN materials on hand from prior jobs.
8. Evaluate which returned materials can be redeployed on the new job.
9. It's a management decision to either (1) charge the new job for the cost of RS and RN materials already on hand, or (2) consider materials on hand as "free" and a competitive advantage in winning the new bid. Either way, RN and RS materials are an asset to your company.

National Plumbing & HVAC Estimator

Plumbing and HVAC materials are expensive. Every mechanical contractor has an interest in MET tracking. Everyone in your company should be aware of the need for good materials management. Used correctly, the MET form in this book can help engineer more value into your jobs.

Maximizing the Value of Old Estimates

There should be two profits in every job. The first is money in the bank — a return on time and expenses. The second is what you learn from the job — primarily by comparing the estimate you made with what turns out to be your actual cost. On some jobs, the value of lessons learned may outweigh net revenue.

Every plumbing and HVAC contractor has marginal jobs. That's normal. What *shouldn't* be normal is repeating mistakes. The best way to avoid trouble in your future is to keep track of your past. Keeping old estimates available for reference can help prevent errors on new estimates.

As your file of completed estimates grows, organization becomes more important. You need an easy way to find similar projects with the same components and comparable scope of work. If your estimating file is in QuickBooks Pro, searching by keyword may be enough. Otherwise, I recommend creating a short summary for each completed job, and an index that references all summaries available for comparison. You'll find a blank Project Summary form at the end of this section. To make reference easier, create an index by type of job and equipment used. You may choose to use an alphabetical index based on client name or project ID.

How to complete the Project Summary form is obvious. The many ways to use this form may not be so obvious, so here are a few pointers.

1. Use your index of Project Summary forms to find completed jobs most similar to the job you're bidding. Believe it or not, Project Summary forms with the widest margin of error will be most useful. Ask yourself: Who worked on those projects? Who was the field superintendent? Who were the vendors? Did the errors result from poor estimating or the poor performance of vendors, supervisors or crews? The most common estimating errors occur when (a) inspecting the job site, (b) examining the plans or (c) reading the specifications. What did you miss and why? Look for pitfalls to avoid in the job now being estimated. Identify the biggest two or three mistakes made when bidding that job. Make a notation about each on the Project Summary form.
2. Now look at your bid for the current job. Which mistakes made on a prior job might you expect on this job? Concentrate on the big three oversights to avoid: Inspecting the job site; examining the plans; and reading the specifications.
3. Unless there's a major error in take-off, your estimate of material costs should be within about 5 percent of the actual costs of materials. However, it's common for labor cost estimates to vary 20 percent or more from actual labor costs. This is precisely where data from old jobs comes in handy. If your Project Summary files show that some project types are consistent money-losers, either shift your company's focus to another class of work, factor more contingency into your bids, or find some way to wring inefficiencies out of the labor component. Poor staging, delivery and retrieval procedures drag down labor productivity on any job.
4. Use your file of Project Summary forms to spot any common thread that runs through either money-making jobs or money-losing jobs. For example, if the names of certain subcontractors or vendors are prominent on low-margin jobs, maybe there's a relationship between your profit margin and choice of subs and suppliers. Even the best and most reliable vendors can become complacent if not challenged occasionally.
5. Project Summary forms should note changes and extras identified after the contract was signed — both for which your company was paid and changes done without additional compensation. Projects with changes and extras that exceed about 4 percent of the contract price deserve special scrutiny. Jobs with changes beyond about 4 percent aren't good for business, at least in my opinion. Nearly all changes have a negative impact on your job schedule and require a disproportionate investment of management resources. Too many changes can antagonize the owner and design staff, even if they were responsible for the altered plans. You may know of a mechanical contractor with a reputation for capitalizing on change orders. But I've rarely seen a job plagued with changes that turned into a money-maker for anyone — except the attorneys. Your file of Project Summary forms will show job types that carry change order risk. Before finalizing and submitting any bid, consider whether the job will get mired in disputes over changes and extras. If similar jobs have ended on the courthouse steps, factor that risk into your estimate.

Utility of a Project Summary forms file is limited only by your ingenuity. The important point is to keep and organize the source of your second profit available on every job. What you learn can be more valuable than what you earn.

The Estimating Procedure

Every plumbing and HVAC estimator works under deadline pressure. You'll seldom have the luxury of spending as much time as you would like on an estimate. Estimators who aren't organized waste valuable time and tend to make careless errors. Try to be well-organized and consistent in your approach to estimating. For most projects, I recommend that you follow the procedures listed below and in the order listed:

1. Get a second set of project drawings and specifications for use by your suppliers and subcontractors. Remember that your subs and suppliers need access to the plans and specs and time to prepare their quotes.
2. Study the plans and specs carefully. Highlight important items. Make a list of specific tasks that require labor unit correction factors. The estimate is never complete until you're totally familiar with the project and the applicable construction codes.
3. Get the general contractor or owner to identify the proposed construction schedule and subcontractor lay-down (storage) area. Work schedule and site conditions always affect your costs.
4. Contact all potential suppliers and subcontractors as early as possible. Set a time when each can come to your office to make their take-offs from the spare set of contract documents.

When this important preliminary work is done, or in progress, it's time to begin your detailed take-off.

Guidelines for Good Estimating

You can compile estimates on a legal pad, a printed estimating form or on a computer. Regardless of the method, these guidelines will apply:

List Each Cost Separately on your take-off sheet. Don't combine system estimates, even if the materials are the same type. A combined system estimate may have to be completely redone if materials for one system are changed at a later date. Use the Estimate Detail Sheet on page 16 if you don't already have a good material take-off form.

Use Engineer's Identification Numbers when listing equipment. The word pump without any other description is ambiguous when there are several pumps included in the project.

Don't Forget Labor Adjustment factors if your labor costs are significantly higher or lower than the costs used in this book. See instructions on page 7 for adjusting labor costs.

Use Colored Pencils or highlighters to mark the items you've taken off and listed. Use a different color for each piping or ducting system.

Log Telephone Quotes and other important phone conversations on a telephone quote form. See the sample on page 18.

Project Estimated Costs for labor, material and equipment to the time when the work is expected to be done, not when the job is being estimated.

The only good estimate is a complete estimate. You've probably heard this saying, "He who makes the most mistakes is likely to be low bidder, and live to regret it."

Preparing the Proposal

It's both common courtesy and good business practice to deliver an unpriced copy of your bid or proposal letter to the general contractor three or four days before the bid deadline date. This gives the contractor time to study your proposal and obtain alternate pricing for items you may have excluded. To avoid misunderstandings, make sure your proposals include, as a minimum, the following elements:

1. The complete name and address of the proposed project.
2. Specification title and issue date.
3. A complete listing of drawings and their issue or revision date.
4. A complete list of addenda and their dates of issue.
5. A list of specification section numbers covered by your proposal.
6. A list of exclusions, clarifications and assumptions.

Your final bid can be phoned in or sent by fax, but it should reach the general contractor or owner no more than five or ten minutes before the bid deadline. Prices submitted too early may have to be revised because of last-minute price changes by subcontractors or suppliers.

MET Worksheet

Material, Equipment and Tool Delivery and Surplus Return Record

Project ID _____

Job Location _____

Supervisor _____

Start Date _____

[illegible]

PROJECT SUMMARY

Project ID _____ Job Location _____

Short description _____

Supervisor _____

Index ID _____ Start Date _____

Estimator _____ Client _____

Major vendors _____ Subcontractors _____

Sources of cost deviation _____

Related Projects by ID Number _____

Thumbnail Summary	Labor	Material	Equipment	Subcontract	Deployed RN/RS	Total
Actual cost						
Estimate						
Over/(Under)						
Full Summary						
Bid amount						
Estimated cost						
Projected profit						
Cost overrun						
Bid profit						
Change orders						
Cost of changes						
Total profit						
Total profit with RN/RS						
Redeployment						

Data carried forward from Take-Off Quantity Survey Sheet(s)

Company/Department _____

Project _____

Address _____

Job description _____

CSI Division/Account _____

Estimate # _____

Estimate due _____

Estimator _____

Checked by _____

Date _____

Date _____

Notes: _____

Item Description	Quantity	Unit	Crew @ MH/Unit	Manhours Ext.	Materials		Labor		Equipment		Subcontract		Total \$
					Unit \$	Ext. \$	Unit \$	Ext. \$	Unit \$	Ext. \$	Unit \$	Ext. \$	
Totals This Sheet			Manhours		Material \$	Labor \$	Equipment \$	Subcontract \$	Total \$				

Carry totals forward to Estimate Summary Sheet

Estimate # _____ of _____
Estimate Detail Sheet _____ of _____

Quotation Sheet

Job: _____

Supplier: _____

Salesperson: _____ **Phone No:** _____

Per Plans/Specs: _____ Freight: _____ Terms: _____

[illegible]

By: _____

Details of Conversation: _____

Online Preview

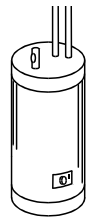
By: _____

Domestic Hot Water Heaters

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Electric domestic hot water heater (residential). Set in place only (floor models). Make additional allowances for pipe and electrical connections. (See below)

6 gallon						
1.5 KW/110V	P1@.500	Ea	495.00	22.20	—	517.20
10 gallon						
1.5 KW/110V	P1@.500	Ea	554.00	22.20	—	576.20
15 gallon						
1.5 KW/110V	P1@.750	Ea	582.00	33.30	—	615.30
20 gallon						
1.5 KW/110V	P1@.750	Ea	547.00	33.30	—	580.30
30 gallon						
1.5 KW/110V	P1@1.00	Ea	561.00	44.50	—	605.50
40 gallon						
1.5 KW/110V	P1@1.20	Ea	587.00	53.30	—	640.30
50 gallon						
3 KW/110V	P1@1.30	Ea	634.00	57.80	—	691.80
12 gallon						
3 KW/220V	P1@.500	Ea	488.00	22.20	—	510.20
20 gallon						
3 KW/220V	P1@.750	Ea	534.00	33.30	—	567.30
30 gallon						
3 KW/220V	P1@1.00	Ea	609.00	44.50	—	653.50
40 gallon						
3 KW/220V	P1@1.20	Ea	663.00	53.30	—	716.30
50 gallon						
3 KW/220V	P1@1.30	Ea	710.00	57.80	—	767.80

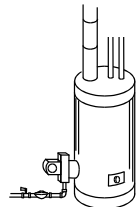


Electric domestic hot water heater (commercial), 208/240 volt. Set in place only. Make additional allowances for pipe and electrical connections. (See below)

96 gallon, 12 kw	P1@1.50	Ea	2,750.00	66.70	—	2,816.70
96 gallon, 18 kw	P1@1.50	Ea	3,730.00	66.70	—	3,796.70
96 gallon, 36 kw	P1@1.50	Ea	3,860.00	66.70	—	3,926.70
120 gallon, 18 kw	P1@2.00	Ea	3,960.00	88.90	—	4,048.90
120 gallon, 36 kw	P1@2.00	Ea	4,080.00	88.90	—	4,168.90
120 gallon, 54 kw	P1@2.00	Ea	4,830.00	88.90	—	4,918.90
120 gallon, 63 kw	P1@2.00	Ea	5,210.00	88.90	—	5,298.90

Gas-fired domestic hot water heater (residential). Set in place only, Make additional allowances for pipe and combustion venting connections. (See below)

30 gallon	P1@1.00	Ea	565.00	44.50	—	609.50
40 gallon	P1@1.00	Ea	913.00	44.50	—	957.50
50 gallon	P1@1.50	Ea	1,040.00	66.70	—	1,106.70



Domestic Hot Water Heaters

Description Craft@Hrs Unit Material \$ Labor \$ Equipment \$ Total \$

Gas-fired domestic hot water heater (commercial), standard efficiency. Set in place only, Make additional allowances for pipe and combustion venting connections. (See below)

50 gal./ 95 gph	P1@2.00	Ea	2,740.00	88.90	—	2,828.90
67 gal./106 gph	P1@2.00	Ea	3,250.00	88.90	—	3,338.90
76 gal./175 gph	P1@2.00	Ea	4,340.00	88.90	—	4,428.90
91 gal./291 gph	P1@2.00	Ea	5,240.00	88.90	—	5,328.90

Gas-fired domestic hot water heater (commercial), energy miser. Set in place only, Make additional allowances for pipe and combustion venting connections. (See below)

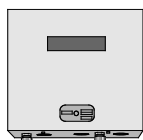
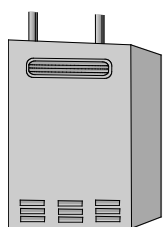
50 gal./ 95 gph	P1@2.00	Ea	6,760.00	88.90	—	6,848.90
67 gal./106 gph	P1@2.00	Ea	7,060.00	88.90	—	7,148.90
76 gal./175 gph	P1@2.00	Ea	8,750.00	88.90	—	8,838.90
91 gal./291 gph	P1@2.00	Ea	10,400.00	88.90	—	10,488.90

Tankless natural gas water heaters. Ambient pressure. DOE and UL rated. For residential, multi-dwelling and light commercial potable water applications. Add the cost of piping, tempering valve, circulating pump, controls, and electrical connection, post-installation inspection by both the fire marshal and the mechanical inspector to validate federal, state and local energy tax credits or energy tax credit offsets. For larger arrays (laundries, institutional facilities, food processing plants), develop an estimate based on the required capacity and multiply these costs by the number of heaters required. Rated in Btus and gallons per minute capacity. (1 Mbh = 1,000 Btus)

19.5-140 Mbh, .75-5.8 Gpm	P1@16.0	Ea	1,950.00	711.00	—	2,661.00
11-199 Mbh, .5-7 Gpm	P1@20.0	Ea	2,310.00	889.00	—	3,199.00
25-235 Mbh, .75-9.6 Gpm	P1@20.0	Ea	3,000.00	889.00	—	3,889.00

Tankless electric point-of-use water heaters. Ambient pressure, DOE and UL rated. For residential, multi-dwelling and light commercial potable water applications. Cost does not include piping, tempering valve, circulating pump, controls, storage tank, electrical connection. Add the cost of post-installation inspection by the mechanical inspector to validate federal, state and local energy tax credits or energy tax credit offsets. In rated gallons per minute capacity.

5.5 Kw/40 Amp, .75-2 Gpm	P1@4.00	Ea	492.00	178.00	—	670.00
9.5 Kw/50 Amp, .75-2.5 Gpm	P1@4.25	Ea	582.00	189.00	—	771.00
19 Kw/100 Amp, 1-3.5 Gpm	P1@4.50	Ea	969.00	200.00	—	1,169.00
28 Kw/120 Amp, 1.5-5 Gpm	P1@4.75	Ea	1,770.00	211.00	—	1,981.00



Domestic Hot Water Heater Connections

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Domestic hot water heater connection assembly. Includes supply, return, recirculation and relief piping and fittings (copper), relief and isolation valves. Make additional allowances for gas and venting connections where applicable.

¾" residential	P1@1.75	Ea	342.00	77.80	—	419.80
¾" commercial	P1@2.25	Ea	459.00	100.00	—	559.00
1" commercial	P1@2.75	Ea	804.00	122.00	—	926.00
1¼" commercial	P1@3.50	Ea	985.00	156.00	—	1,141.00
1½" commercial	P1@3.75	Ea	1,020.00	167.00	—	1,187.00
2" commercial	P1@4.50	Ea	1,090.00	200.00	—	1,290.00
2½" commercial	P1@5.75	Ea	2,270.00	256.00	—	2,526.00
3" commercial	P1@6.50	Ea	3,480.00	289.00	—	3,769.00

Domestic water heater combustion vent connection. Make additional allowances for piping distances greater than 25'.

2" B-vent	P1@.090	LF	7.18	4.00	—	11.18
3" B-vent	P1@.100	LF	8.88	4.45	—	13.33
4" B-vent	P1@.110	LF	11.80	4.89	—	16.69
6" B-vent	P1@.130	LF	14.40	5.78	—	20.18
Tankless heater vent kit	P1@2.50	Ea	681.00	111.00	—	792.00
Power vent kit	P1@2.00	Ea	1,670.00	88.90	—	1,758.90

Water Softeners and Controllers

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Water softener, time clock controller. Including brine tank, brine well and pick-up tube. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start up and testing.

20,000 grain water softener, TCC	P1@4.50	Ea	634.00	200.00	—	834.00
30,000 grain water softener, TCC	P1@4.50	Ea	676.00	200.00	—	876.00
45,000 grain water softener, TCC	P1@4.50	Ea	752.00	200.00	—	952.00
50,000 grain water softener, TCC	P1@4.75	Ea	848.00	211.00	—	1,059.00
60,000 grain water softener, TCC	P1@4.75	Ea	1,000.00	211.00	—	1,211.00
75,000 grain water softener, TCC	P1@5.00	Ea	1,080.00	222.00	—	1,302.00
90,000 grain water softener, TCC	P1@5.50	Ea	1,460.00	244.00	—	1,704.00
120,000 grain water softener, TCC	P1@5.75	Ea	1,570.00	256.00	—	1,826.00

Water softener, mechanically-metered controller. Including brine tank, brine well and pick up tube. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start up and testing.

20,000 grain water softener, MMC	P1@4.50	Ea	824.00	200.00	—	1,024.00
30,000 grain water softener, MMC	P1@4.50	Ea	860.00	200.00	—	1,060.00
45,000 grain water softener, MMC	P1@4.50	Ea	936.00	200.00	—	1,136.00
50,000 grain water softener, MMC	P1@4.75	Ea	1,030.00	211.00	—	1,241.00
60,000 grain water softener, MMC	P1@4.75	Ea	1,200.00	211.00	—	1,411.00
75,000 grain water softener, MMC	P1@5.00	Ea	1,290.00	222.00	—	1,512.00
90,000 grain water softener, MMC	P1@5.50	Ea	1,650.00	244.00	—	1,894.00
120,000 grain water softener, MMC	P1@5.75	Ea	1,760.00	256.00	—	2,016.00

Water Softeners and Controllers

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Water softener, electronically-metered controller. Including brine tank, brine well and pick up tube. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start up and testing.

20,000 grain water softener, EMC	P1@4.50	Ea	874.00	200.00	—	1,074.00
30,000 grain water softener, EMC	P1@4.50	Ea	900.00	200.00	—	1,100.00
45,000 grain water softener, EMC	P1@4.50	Ea	987.00	200.00	—	1,187.00
50,000 grain water softener, EMC	P1@4.75	Ea	1,080.00	211.00	—	1,291.00
60,000 grain water softener, EMC	P1@4.75	Ea	1,270.00	211.00	—	1,481.00
75,000 grain water softener, EMC	P1@5.00	Ea	1,330.00	222.00	—	1,552.00
90,000 grain water softener, EMC	P1@5.50	Ea	1,700.00	244.00	—	1,944.00
120,000 grain water softener, EMC	P1@5.75	Ea	1,810.00	256.00	—	2,066.00

Water softener accessories

By-pass valve Manifold	P1@.400	Ea	85.50	17.80	—	103.30
adapter kit	P1@.200	Ea	23.10	8.89	—	31.99
Turbulator	P1@.400	Ea	42.20	17.80	—	60.00

Iron filter, electronically-metered controller. Manganese green sand filter. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start-up and testing.

42,000 iron filter (1.5 cf media), 5 gpm	P1@4.00	Ea	826.00	178.00	—	1,004.00
65,000 iron filter (2.0 cf media), 6 gpm	P1@4.50	Ea	978.00	200.00	—	1,178.00
84,000 iron filter (2.5 cf media), 8 gpm	P1@4.75	Ea	1,040.00	211.00	—	1,251.00
Replacement green sand media	P1@1.20	CF	49.80	53.30	—	103.10

Iron filter accessories

By-pass valve	P1@.400	Ea	85.80	17.80	—	103.60
Air vent	P1@.200	Ea	68.10	8.89	—	76.99
Air controller	P1@.400	Ea	76.90	17.80	—	94.70

Water Softener Accessories

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Combination iron filter/water softener. Zeolite resins soften water and remove iron and manganese. Controller automatically controls PH level. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start-up and testing.

40,000 iron filter, 1.3 cf media	P1@4.00	Ea	1,600.00	178.00	—	1,778.00
60,000 iron filter, 1.7 cf media	P1@4.50	Ea	1,730.00	200.00	—	1,930.00
80,000 iron filter, 2.5 cf media	P1@4.75	Ea	2,510.00	211.00	—	2,721.00

Hot water softener, time clock controller. Brass valve construction. Designed for 150 F. maximum operating temperature. Includes brine tank, brine well and pick-up tube. Labor includes setting in place, connecting the unit to an existing domestic water distribution system, start-up and testing.

20,000 grain hot water softener	P1@4.50	Ea	2,000.00	200.00	—	2,200.00
30,000 grain hot water softener	P1@4.50	Ea	2,130.00	200.00	—	2,330.00
40,000 grain hot water softener	P1@4.50	Ea	2,230.00	200.00	—	2,430.00
60,000 grain hot water softener	P1@4.75	Ea	2,630.00	211.00	—	2,841.00

Pressure tank, fiberglass wound. Labor includes setting in place, connecting the tank to a domestic water distribution system and testing.

Fiberglass pressure tank, 20 gallon	P1@2.00	Ea	325.00	88.90	—	413.90
Fiberglass pressure tank, 30 gallon	P1@2.00	Ea	366.00	88.90	—	454.90
Fiberglass pressure tank, 80 gallon	P1@2.75	Ea	593.00	122.00	—	715.00
Fiberglass pressure tank, 120 gallon	P1@3.50	Ea	782.00	156.00	—	938.00
Brass tank tee assembly, ¾"	P1@3.50	Ea	50.40	156.00	—	206.40
Brass tank tee assembly, 1"	P1@3.50	Ea	93.90	156.00	—	249.90
Brass tank tee assembly, 1¼"	P1@3.50	Ea	164.00	156.00	—	320.00

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Ultra-violet water disinfection unit. Stainless steel reactor, audible and visible alarm, lamp end-of-life indicator and 7-day override. Gpm rating at 30,000 mj/m2 output. Labor includes setting in place, connecting to the water system and testing.

UV system, 1 gpm, ¼" in/out	P1@3.00	Ea	276.00	133.00	—	409.00
UV system, 6 gpm, ½" in/out	P1@3.00	Ea	537.00	133.00	—	670.00
UV system, 8 gpm, ¾" in/out	P1@4.00	Ea	621.00	178.00	—	799.00
UV system, 12 gpm, ¾" in/out	P1@4.00	Ea	796.00	178.00	—	974.00
UV replacement lamp, 20W, 1 gpm	P1@.750	Ea	61.80	33.30	—	95.10
UV replacement lamp, 32W, 6 gpm	P1@.750	Ea	70.10	33.30	—	103.40
UV replacement lamp, 39W, 8-12 gpm	P1@.750	Ea	89.70	33.30	—	123.00
UV replacement ballast, 420 Mv/110V	P1@1.00	Ea	270.00	44.50	—	314.50

Kitchen equipment booster heater

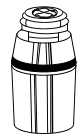
1,000 watt	P1@4.00	Ea	876.00	178.00	—	1,054.00
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Dishwasher

Built-in	P1@5.00	Ea	949.00	222.00	—	1,171.00
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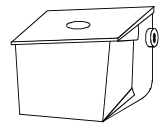
Garbage disposal

½ HP	P1@2.00	Ea	197.00	88.90	—	285.90
¾ HP	P1@2.00	Ea	329.00	88.90	—	417.90



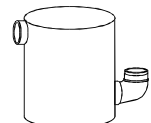
Grease and oil interceptor

4 GPM	P1@4.00	Ea	395.00	178.00	—	573.00
10 GPM	P1@5.00	Ea	643.00	222.00	—	865.00
15 GPM	P1@7.00	Ea	959.00	311.00	—	1,270.00
20 GPM	P1@8.00	Ea	1,160.00	356.00	—	1,516.00



Hair and lint interceptor

1½"	P1@.650	Ea	225.00	28.90	—	253.90
2"	P1@.750	Ea	320.00	33.30	—	353.30



All bronze ¾" to 1½" in-line NPT pump

1/12 HP	P1@1.50	Ea	843.00	66.70	—	909.70
1/6 HP	P1@1.50	Ea	1,260.00	66.70	—	1,326.70
1/4 HP	P1@1.50	Ea	1,470.00	66.70	—	1,536.70

Kitchen Equipment Connections

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Kitchen appliance gas trim

1/2"	P1@1.15	Ea	48.60	51.10	—	99.70
3/4"	P1@1.30	Ea	88.80	57.80	—	146.60
1"	P1@1.60	Ea	103.00	71.10	—	174.10
1 1/4"	P1@2.10	Ea	170.00	93.30	—	263.30
1 1/2"	P1@2.50	Ea	215.00	111.00	—	326.00
2"	P1@3.00	Ea	287.00	133.00	—	420.00

Hot and cold water supply

1/2"	P1@1.10	Ea	58.90	48.90	—	107.80
3/4"	P1@1.55	Ea	83.60	68.90	—	152.50
1"	P1@1.90	Ea	114.00	84.50	—	198.50
1 1/4"	P1@2.50	Ea	160.00	111.00	—	271.00
1 1/2"	P1@3.00	Ea	200.00	133.00	—	333.00

Continuous waste

2-part	P1@.250	Ea	71.60	11.10	—	82.70
3-part	P1@.350	Ea	122.00	15.60	—	137.60
4-part	P1@.450	Ea	156.00	20.00	—	176.00

Indirect waste

1/2"	P1@1.05	Ea	18.70	46.70	—	65.40
3/4"	P1@1.50	Ea	31.70	66.70	—	98.40
1"	P1@1.90	Ea	50.90	84.50	—	135.40
1 1/4"	P1@2.15	Ea	75.10	95.60	—	170.70
1 1/2"	P1@2.60	Ea	98.90	116.00	—	214.90
2"	P1@3.00	Ea	151.00	133.00	—	284.00

Kitchen fixture waste tailpiece

1 1/2"	P1@.100	Ea	17.90	4.45	—	22.35
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Kitchen fixture trap with solder bushing

1 1/2"	P1@.250	Ea	60.40	11.10	—	71.50
2"	P1@.300	Ea	83.70	13.30	—	97.00

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Water closet, floor-mounted, flush tank, white vitreous china, lined tank. Complete with trim. Make additional allowances for rough-in. Based on American Standard Cadet series. ADA means American Disabilities Act compliant. (Wheelchair accessible)

Round bowl	P1@2.10	Ea	312.00	93.30	—	405.30
Elongated bowl	P1@2.10	Ea	377.00	93.30	—	470.30
ADA, 18" high	P1@2.10	Ea	513.00	93.30	—	606.30



Water closet, floor-mounted, flush valve, white vitreous china.

Complete with trim. Make additional allowances for rough-in. Based on American Standard. ADA means American Disabilities Act compliant. (Wheelchair accessible)

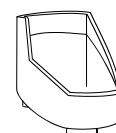
Elongated bowl	P1@2.60	Ea	488.00	116.00	—	604.00
Elongated bowl, ADA 18" high	P1@2.60	Ea	581.00	116.00	—	697.00
Elongated bowl with a bedpan cleanser	P1@4.10	Ea	843.00	182.00	—	1,025.00
Elongated bowl, ADA 18" high with a bedpan cleanser	P1@4.10	Ea	913.00	182.00	—	1,095.00

Water closet, wall-hung, flush valve, white vitreous china. Complete with fixture carrier and all trim. Make additional allowances for rough-in. Based on American Standard AFWall series.

Elongated bowl	P1@3.55	Ea	773.00	158.00	—	931.00
Elongated bowl with electronic flush valve	P1@3.80	Ea	1,380.00	169.00	—	1,549.00
Elongated bowl with bedpan cleanser	P1@5.05	Ea	1,120.00	224.00	—	1,344.00
Electronic flush valve, add	P1@.600	Ea	611.00	26.70	—	637.70

Urinal, wall-hung, flush valve, white vitreous china. Complete with trim. Make additional allowances for rough-in.

Siphon-jet type	P1@3.15	Ea	773.00	140.00	—	913.00
Wash-out type	P1@3.10	Ea	631.00	138.00	—	769.00
Wash-down type	P1@3.00	Ea	446.00	133.00	—	579.00
Urinal carrier, add	P1@.600	Ea	135.00	26.70	—	161.70
Electronic flush valve, add	P1@.600	Ea	494.00	26.70	—	520.70



Urinal, stall-type, flush valve, white vitreous china. Complete with trim. Make additional allowances for rough-in.

Stall urinal	P1@5.00	Ea	1,470.00	222.00	—	1,692.00
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Plumbing Fixtures

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Lavatory, wall-hung, white vitreous china. Complete with trim and fixture carrier. Make additional allowances for rough-in. ADA means American Disabilities Act compliant. (Wheelchair accessible)



Wall-hung lav	P1@2.70	Ea	598.00	120.00	—	718.00
Wall-hung, ADA	P1@2.70	Ea	871.00	120.00	—	991.00
Fixture carrier	P1@.500	Ea	134.00	22.20	—	156.20

Countertop lavatory, white. Complete with trim. Make additional allowances for rough-in.



Vitreous china	P1@2.00	Ea	435.00	88.90	—	523.90
Enameled steel	P1@2.00	Ea	360.00	88.90	—	448.90
Acrylic	P1@2.00	Ea	262.00	88.90	—	350.90

Bathtub, white, 60" x 32". Complete with trim, including shower head. Make additional allowances for rough-in.

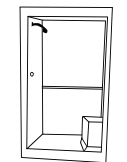


Enameled steel	P1@2.50	Ea	611.00	111.00	—	722.00
Cast iron	P1@3.50	Ea	1,200.00	156.00	—	1,356.00
Fiberglass	P1@2.50	Ea	622.00	111.00	—	733.00
Acrylic	P1@2.50	Ea	665.00	111.00	—	776.00

Tub and shower combination, fiberglass, white. Complete with trim. Make additional allowances for rough-in.

One-piece	P1@4.50	Ea	1,400.00	200.00	—	1,600.00
Two-piece (reno)	P1@5.50	Ea	1,790.00	244.00	—	2,034.00
Four-piece (reno)	P1@6.25	Ea	1,900.00	278.00	—	2,178.00

Shower stall, white, 36" x 36". Complete with trim. Make additional allowances for rough-in.



Fiberglass one-piece	P1@3.50	Ea	886.00	156.00	—	1,042.00
Fiberglass three-piece	P1@4.25	Ea	1,140.00	189.00	—	1,329.00
Acrylic one-piece	P1@3.50	Ea	1,330.00	156.00	—	1,486.00
Acrylic three-piece	P1@4.25	Ea	1,750.00	189.00	—	1,939.00

Shower basin, 36" x 36". Complete with trim (faucet, shower head and strainer). Make additional allowances for rough-in.

Fiberglass	P1@2.50	Ea	570.00	111.00	—	681.00
Acrylic	P1@2.50	Ea	613.00	111.00	—	724.00
Molded stone	P1@2.65	Ea	593.00	118.00	—	711.00

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Kitchen sink, double compartment. Complete with trim. Make additional allowances for rough-in.

Stainless steel	P1@2.15	Ea	448.00	95.60	—	543.60
Cast iron	P1@2.50	Ea	1,400.00	111.00	—	1,511.00
Acrylic	P1@2.15	Ea	530.00	95.60	—	625.60



Kitchen sink, single compartment. Complete with trim. Make additional allowances for rough-in.

Stainless steel	P1@2.00	Ea	378.00	88.90	—	466.90
Cast iron	P1@2.10	Ea	873.00	93.30	—	966.30
Acrylic	P1@2.00	Ea	394.00	88.90	—	482.90

Bar sink. Complete with trim. Make additional allowances for rough-in.

Stainless steel	P1@2.00	Ea	321.00	88.90	—	409.90
Acrylic	P1@2.00	Ea	216.00	88.90	—	304.90



Exam room sink. Complete with trim. Make additional allowances for rough-in.

Stainless steel	P1@2.10	Ea	491.00	93.30	—	584.30
Acrylic	P1@2.10	Ea	419.00	93.30	—	512.30

Laboratory sink. Complete with trim. Make additional allowances for rough-in.

Stainless steel	P1@2.25	Ea	562.00	100.00	—	662.00
Acrylic	P1@2.25	Ea	491.00	100.00	—	591.00

Laundry sink, double compartment. Complete with trim. Make additional allowances for rough-in.

Cast iron	P1@3.50	Ea	626.00	156.00	—	782.00
Acrylic	P1@2.25	Ea	275.00	100.00	—	375.00

Laundry sink, single compartment. Complete with trim. Make additional allowances for rough-in.

Cast iron	P1@2.75	Ea	1,080.00	122.00	—	1,202.00
Acrylic	P1@2.00	Ea	190.00	88.90	—	278.90



Mop sink, floor-mounted, 36" x 24". Complete with trim. Make additional allowances for rough-in.

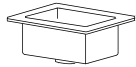
Molded stone	P1@2.65	Ea	800.00	118.00	—	918.00
Terrazzo	P1@2.65	Ea	953.00	118.00	—	1,071.00
Acrylic	P1@2.35	Ea	617.00	104.00	—	721.00

Plumbing Fixtures



Slop sink, enameled cast iron with P-trap, standard. Complete with trim. Make additional allowances for rough-in.

Slop sink with P-trap, std.	P1@3.50	Ea	1,520.00	156.00	—	1,676.00
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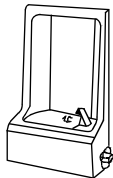
Floor sink, recessed, enameled steel, white. Add 40% to material prices for acid-resisting finish. Complete with strainer. Make additional allowances for rough-in.

9" x 9"	P1@1.00	Ea	112.00	44.50	—	156.50
12" x 12"	P1@1.00	Ea	131.00	44.50	—	175.50
15" x 15"	P1@1.15	Ea	143.00	51.10	—	194.10
18" x 18"	P1@1.25	Ea	164.00	55.60	—	219.60
24" x 24"	P1@1.50	Ea	215.00	66.70	—	281.70



Drinking fountain, refrigerated, stainless steel. Complete with trim. Make additional allowances for rough-in. ADA means American Disabilities Act compliant. (Wheelchair accessible)

Free-standing	P1@2.00	Ea	1,800.00	88.90	—	1,888.90
Semi-recessed	P1@2.50	Ea	2,410.00	111.00	—	2,521.00
Fully-recessed	P1@2.50	Ea	4,160.00	111.00	—	4,271.00
Wall-hung	P1@2.00	Ea	1,690.00	88.90	—	1,778.90
Wall-hung, ADA	P1@2.50	Ea	4,160.00	111.00	—	4,271.00



Drinking fountain, non-refrigerated. Complete with trim. Make additional allowances for rough-in. ADA means American Disabilities Act compliant. (Wheelchair accessible) S.S. means stainless steel.

Recessed, china	P1@2.50	Ea	1,430.00	111.00	—	1,541.00
Wall-hung, china	P1@2.00	Ea	813.00	88.90	—	901.90
Recessed, S.S.	P1@2.50	Ea	1,600.00	111.00	—	1,711.00
Wall-hung, S.S.	P1@2.00	Ea	850.00	88.90	—	938.90
ADA, S.S.	P1@2.50	Ea	1,450.00	111.00	—	1,561.00

Plumbing Fixtures Rough-in

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Commercial plumbing fixture rough-in. Includes type L copper supply pipe and DWV copper (to 2½") or cast iron (MJ) DWV (over 2½") drain and vent piping. Make additional allowances for plumbing fixtures and trim. Use these costs for preliminary estimates.

Water closet, wall-hung, flush valve, with carrier	P1@2.25	Ea	1,080.00	100.00	—	1,180.00
Water closet, wall-hung, flush valve, no carrier	P1@1.95	Ea	993.00	86.70	—	1,079.70
Water closet, floor-mounted, flush valve	P1@2.75	Ea	877.00	122.00	—	999.00
Water closet, floor-mounted, tank type	P1@2.25	Ea	672.00	100.00	—	772.00
Bidet	P1@2.00	Ea	468.00	88.90	—	556.90
Urinal, wall-hung, flush valve, with carrier	P1@3.10	Ea	1,180.00	138.00	—	1,318.00
Urinal, wall-hung, flush valve, without carrier	P1@2.35	Ea	672.00	104.00	—	776.00
Lavatory, wall-hung, with carrier	P1@2.40	Ea	974.00	107.00	—	1,081.00
Lavatory	P1@1.90	Ea	468.00	84.50	—	552.50
Sink	P1@1.90	Ea	504.00	84.50	—	588.50
Bath tub	P1@2.35	Ea	720.00	104.00	—	824.00
Shower	P1@2.60	Ea	844.00	116.00	—	960.00
Mop sink	P1@2.40	Ea	599.00	107.00	—	706.00
Slop sink	P1@2.60	Ea	428.00	116.00	—	544.00
Laundry tub	P1@1.95	Ea	509.00	86.70	—	595.70
Wash fountain	P1@2.10	Ea	548.00	93.30	—	641.30
Lab sink, glass drainage	P1@3.80	Ea	2,160.00	169.00	—	2,329.00
Lab sink, acid resistant plastic drainage	P1@2.65	Ea	344.00	118.00	—	462.00
Drinking fountain	P1@2.20	Ea	373.00	97.80	—	470.80
Emergency eyewash and shower	P1@1.75	Ea	141.00	77.80	—	218.80
Washing machine	P1@2.25	Ea	547.00	100.00	—	647.00

Plumbing Fixtures Rough-in

Description	Craft@Hrs	Unit	Material \$	Labor \$	Equipment \$	Total \$
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Commercial plumbing fixture group rough-in. Includes Type L copper supply pipe and DWV copper (to 2½") or cast iron (MJ) DWV (over 2½") drain and vent piping. Make additional allowances for plumbing fixtures and trim. Use these costs for preliminary estimates.

3-piece washroom group	P1@5.50	Ea	1,290.00	244.00	—	1,534.00
3-piece washroom group back to back	P1@9.75	Ea	2,390.00	433.00	—	2,823.00
Kitchen sink, back to back	P1@2.15	Ea	695.00	95.60	—	790.60
Battery of water closets, floor-mounted, tank type, per water closet	P1@1.75	Ea	541.00	77.80	—	618.80
Battery of water closets, floor-mounted, flush valve, per water closet	P1@2.20	Ea	707.00	97.80	—	804.80
Battery of water closets, wall-hung, flush valve, with carrier, per water closet	P1@1.80	Ea	930.00	80.00	—	1,010.00
Battery of water closets, wall-hung, flush valve, without carrier, per water closet	P1@1.50	Ea	272.00	66.70	—	338.70
Battery of urinals, wall-hung, flush valve with carrier, per urinal	P1@2.45	Ea	1,120.00	109.00	—	1,229.00
Battery of urinals, wall-hung, flush valve without carrier, per urinal	P1@1.90	Ea	576.00	84.50	—	660.50
Battery of lavatory basins, wall-hung, with carrier, per lavatory	P1@2.00	Ea	870.00	88.90	—	958.90
Battery of lavatory basins, without carrier, per lavatory	P1@1.50	Ea	393.00	66.70	—	459.70

Residential plumbing fixture rough-in. Includes polyethylene (PE) supply pipe and ABS DWV drain and vent piping. Make additional allowances for plumbing fixtures and trim. Use these costs for preliminary estimates.

Water closet, floor-mounted, tank type	P1@2.00	Ea	143.00	88.90	—	231.90
Bidet	P1@1.85	Ea	107.00	82.20	—	189.20
Lavatory	P1@1.75	Ea	107.00	77.80	—	184.80
Counter sink	P1@1.75	Ea	118.00	77.80	—	195.80
Bathtub	P1@2.10	Ea	107.00	93.30	—	200.30
Shower	P1@2.45	Ea	157.00	109.00	—	266.00
Laundry tub	P1@1.75	Ea	97.90	77.80	—	175.70
Washing machine	P1@2.00	Ea	121.00	88.90	—	209.90

Index

A

- A/C systems287
- ABS, DWV
- test cap154
- ABS, DWV pipe152
- 1/4 bend152
- 1/8 bend152
- adapters154
- bushings154
- cleanouts154
- closet bend153
- closet flanges153
- combinations153
- couplings155
- hanger assemblies155
- P-traps153
- reducers155
- riser clamps155
- solvent-weld joints154-155
- tees153
- wyes153-154
- Access doors, steel123
- Accessories
- iron filter23
- water softener23
- Acid DWV systems166
- Actuator, damper405
- Adapters
- copper, DWV, soldered150
- copper, pressfit88
- CPVC sprinkler pipe185
- F.I.P., ABS154
- PE-AL pipe115
- PEX-AL pipe115
- polypropylene pipe168
- PVC sewer, bell & spigot165
- PVC, DWV158
- PVC, Schedule 4096
- PVC, Schedule 80106
- Schedule 10 steel, roll-grooved276
- Schedule 40 steel, cut-grooved282
- Schedule 40 steel, roll-grooved269
- Schedule 5 steel, pressfit237
- Type K copper, brazed37
- Type K copper, soldered47-48
- Type L copper, brazed56
- Type L copper, soldered64
- Type M copper, brazed73
- Type M copper, soldered81
- Additional costs8
- Adjusting costs7
- Air admittance valve329
- Air balance software339
- Air balancing
- air handling units403
- centrifugal fans404
- diffusers403
- fan coil units404
- fume hoods404
- grilles404
- terminal boxes403
- Air compressor407
- rental420
- Air conditioning
- budget estimates435
- residential287
- Air conditioning condensate systems
- PVC, Schedule 4093
- PVC, Schedule 80103
- Type K copper, brazed33
- Type K copper, soldered43
- Type L copper, brazed53
- Type L copper, soldered61
- Type M copper, brazed70
- Type M copper, soldered78
- Air conditioning units289
- Air cooled condenser
- demolition426
- removal426
- Air cooled condensing unit213
- Air grilles, return334
- Air handling equipment
- air conditioner289
- exhaust fans327
- housings332
- ventilators327
- Air handling units290
- accessories291
- air balancing403
- coil connection298-299
- removal424
- Air mixing box
- removal423
- Air separators, Rolaitrol type202
- Air vents123
- Alarm valves173
- Apartments, HVAC estimates437
- Area drains170
- installation costs435
- Arresters, water hammer135
- As-built drawings421
- Assemblies
- air conditioning287
- forced air heating288
- Auditoriums, HVAC estimates437
- ## B
- Backfill costs, trenching418
- Backflow preventers
- double check122
- reduced pressure121
- Backhoes, rental420
- Balancing valves
- PEX-AL pipe116, 120
- Ball valves
- copper, pressfit88
- PEX-AL pipe116, 120
- pipe and plumbing specialty128-129
- PVC, Schedule 4099
- PVC, Schedule 80109
- PVC, Solid body, EDPM99, 109
- PVC, Solid body, threaded99, 109
- PVC, Tru-union, threaded99, 109
- PVC, Union type, Solvent weld100, 109
- Schedule 40 steel, threaded231
- Schedule 80 steel, threaded253
- Type K copper, brazed40
- Type K copper, soldered50
- Type L copper, brazed59
- Type L copper, soldered67
- Type M copper, brazed76
- Type M copper, soldered84
- Banks, HVAC estimates437
- Bar sinks29
- estimating435
- Barber shops, HVAC estimates437
- Base wage6
- Baseboard fins205
- bath
- fan330
- Bathroom
- fans327-328
- fixtures28
- Bathroom fans328-329
- Bathroom heaters329
- Bathroom sink
- disconnect433
- Bathtubs28
- disconnect433
- estimating435
- Beauty shops, HVAC estimates437
- Bell & spigot pipe, PVC161
- Benders, hydraulic, rental420
- Bends
- ABS, DWV pipe152
- cast iron, no-hub138-140
- class 110 DI, cement lined412
- class 150 cast iron413
- class 153 DI, cement lined408
- class 153 DI, double cement lined410
- class 2400 or 3000 asbestos cement414
- copper, DWV, soldered149
- polypropylene pipe166
- PVC sewer, bell & spigot162
- PVC, DWV161-162
- Bevel machines, rental420
- Billing breakdown worksheet461-462
- Biomass fired
- boilers320-321
- central airspace heater322

Black steel pipe	178	Bowling alleys, HVAC estimates	437	Schedule 160 steel, welded	262
assemblies	177	Branch pipe and fittings, sprinkler ...	183	Schedule 40 steel, cut-grooved	283
Blowers, centrifugal	325	Brass Corporation		Schedule 40 steel, roll-grooved	270
Boiler		Adapter	91	Schedule 40 steel, threaded	227
blowdown	204	Coupling Copper Pipe	91	Schedule 40 steel, welded	218
burners	196	Brazed joint pipe		Schedule 80 steel, threaded	251
connections	191	Type K copper	33	Schedule 80 steel, welded	242
controls	201	Type L copper	53	Type K copper, brazed	38
pumps	206	Type M copper	70	Type K copper, soldered	48
stack	204	Bucket steam trap	128	Type L copper, brazed	57
trim	205	Budget estimating	435	Type L copper, soldered	65
Boilers		Buildings		Type M copper, brazed	74
biomass fired	320-321	HVAC estimates	437	Type M copper, soldered	82
pulse type	323	bulb heater	330	Carbon steel fittings	215-266
removal	425	Burner controls	201	Carbon steel pipe	
steam heating	190	Burners, dual fuel	196	Schedule 40	181
Boilers, commercial		Bushings		Schedule 80	239
accessories	205	ABS	154	Cast iron class 150	413
adjusting	199	PVC, DWV	158	Cast iron DWV pipe, hub & spigot	143
cast iron	186	PVC, Schedule 40	96	1/16 bend	144
chemical feed pump	203	PVC, Schedule 80	106	1/4 bend	143
combustion controls	198-199	Type K copper, brazed	38	1/8 bend	143
combustion train	193	Type K copper, soldered	48	bends	144
components	205	Type L copper, brazed	57	closet flanges	144
deaerator/condenser	202	Type L copper, soldered	65	combinations	145
electrical service	197	Type M copper, brazed	74	gaskets	147
feedwater pumps	198	Type M copper, soldered	82	hanger assemblies	147
firebox	188	Butterfly valves		P-traps	144
firetube	187-188	pipe and plumbing specialty	129	reducers	146
fuel train piping	194-195	PVC, Schedule 40	98	riser clamps	147
packaged, feedwater systems	203	PVC, Schedule 80	108	sanitary tees	144
pumping unit	202	Schedule 10 steel, roll-grooved	278	tees	144
refractory	198	Schedule 40 steel, cut-grooved	284	wyes	145-146
stacks	204	Schedule 40 steel, roll-grooved	271	Cast iron DWV pipe, mechanical	
water softening systems	199	Schedule 40 steel, threaded	231	joint	137
watertube	189	Schedule 40 steel, welded	220-221	Cast iron DWV pipe, no-hub	137
Boilers, gas fired		Schedule 80 steel, threaded	252-253	1/4 bend	138
cast iron	190	Schedule 80 steel, welded	244	1/8 bend	137-138
steel	189	Type K & L copper, roll grooved	90	caps	141
Bolt and gasket sets		Type K copper, brazed	39	closet bends	138
pipe and plumbing specialty	124	Type K copper, soldered	50	closet flanges	138
polypropylene pipe	169	Type L copper, brazed	58	combinations	140
PVC, Schedule 40	101	Type L copper, soldered	66	couplings	141
PVC, Schedule 80	111	Type M copper, brazed	75	crosses	141
Schedule 10 steel, roll-grooved	280	Type M copper, soldered	83	hanger assemblies	142
Schedule 160 steel, full face	265			horizontal assembly	137
Schedule 160 steel, ring face	265			P-traps	138
Schedule 40 steel, cut-grooved	285			reducers	141
Schedule 40 steel, roll-grooved	272			riser clamps	142
Schedule 40 steel, threaded	233			tees	140-141
Schedule 40 steel, welded	223			wyes	138-140
Schedule 80 steel, threaded	254			Cast iron sprinkler pipe fittings	
Schedule 80 steel, welded	246			cap	182
Type K copper, brazed	41			couplings	182
Type K copper, soldered	52			cross	182
Type L copper, brazed	60			ells	181
Type L copper, soldered	68			plugs	182
Type M copper, brazed	77			reducers	181
Type M copper, soldered	85			reducing tee	181
Boom lifts, rental	420			Ceiling diffusers	335-336
Booster heaters	25			Central air space heater	
Bore holes, geothermal	318			biomass fired	322

C

Calcium silicate pipe insulation	400
Can washers, installation costs	435
Caps	
cast iron, no-hub	141
cast iron, threaded	182
CPVC sprinkler pipe	185
PE-AL pipe	116, 119
PEX-AL pipe	116, 119
PVC sewer, bell & spigot	165
PVC, Schedule 40	97
PVC, Schedule 80	107
roll grooved, Victaulic	179
Schedule 10 steel, roll-grooved	277

Central dehumidification	301	copper, DWV, soldered	149	Connections	
Centrifugal blowers	325	PVC, DWV	157-158	air handling unit, HVAC	298-299
Centrifugal fans, air balancing	404	Clothes dryers, exhaust	328	continuous waste	26
Centrifugal pumps, HVAC	207	Cocktail lounges, HVAC estimates	437	fire department	176
Centrifugal water-cooled chiller	212	Coil connection,		flexible duct	344
Ceramic heater	305	air handling unit	298-299	hot and cold water supply	26
Chain hoists, rental	420	Coil, duct mounted, removal	429	indirect waste	26
Change estimates	438-448	Coils, reheat, HVAC	210	kitchen equipment	26
change order log	443	Cold water connections	26	Siamese	176
example	439	Collars, galvanized steel	344	water heaters	21
summary	442, 446	Combinations		Connectors, pipe	125
take-off	440, 444	ABS	153	flexible	126
worksheet	441, 445	cast iron, hub & spigot	145	Construction schedule	453-455
Check valves	173	cast iron, no-hub	140	Contents	3
Chemical feed pump, boiler	203	copper, DWV, soldered	149	Continuous waste connections	26
Chemical feed system	203	polypropylene pipe	167	control modules	
Chemical systems		Combustion controls, boiler	198-199	pollution	200
polypropylene, DWV	166	Combustion monitoring	206	Control valves	
PVC, Schedule 40	93	Combustion train, boiler	193	2-way	406-407
PVC, Schedule 80	103	Come-alongs, rental	420	3-way	406-407
Chilled water systems		Commercial boilers	187-190	electric	406
Schedule 10 steel, roll-grooved	274	combustion trains	193	pipe and plumbing specialty ...	134-135
Schedule 40 steel, cut-grooved	281	components and accessories	205	pneumatic	407
Schedule 40 steel, roll-grooved	267	connections	191	PVC, Schedule 40	101
Schedule 40 steel, threaded	224	Commercial fans and blowers	325	PVC, Schedule 80	111
Schedule 80 steel, threaded	248	Commercial fixture rough-ins	31	Schedule 10 steel, roll-grooved	279
Type K copper, brazed	33	group	32	Schedule 160 steel, flanged ...	264-265
Type K copper, soldered	43	Commercial water heaters	19-20	Schedule 160 steel, threaded	264
Type L copper, brazed	53	Compaction, trenching	418	Schedule 40 steel, cut-grooved	285
Type L copper, soldered	61	Compactors, rental	420	Schedule 40 steel, roll-grooved	272
Type M copper, brazed	70	Companion flanges		Schedule 40 steel, threaded	232
Type M copper, soldered	78	150 pound, threaded	124	Schedule 40 steel, welded	222
Chillers		300 pound, threaded	124	Schedule 80 steel, threaded	254
centrifugal	212	PVC	124	Schedule 80 steel, welded ...	245-246
drinking fountain	30	PVC, Schedule 40	101	Type K copper, brazed	41
reciprocating	212	PVC, Schedule 80	111	Type K copper, soldered	51
removal	426	Schedule 40 steel, threaded	233	Type L copper, brazed	60
water cooled, connection	212	Type K copper, brazed	41	Type L copper, soldered	68
Chlorinated polyvinyl chloride pipe	184	Type K copper, soldered	51	Type M copper, brazed	77
Churches, HVAC estimates	437	Type L copper, brazed	60	Type M copper, soldered	85
Circuit balance valves	129	Type L copper, soldered	68	Controllers	339
Circulating pumps		Type M copper, brazed	77	Controls	
all bronze	122	Type M copper, soldered	85	boiler	201, 204
iron body	123	welding type	123	HVAC	405
Clarifications	8	Composite pipe	113	Cooling systems, residential	287
Classrooms, HVAC estimates	437	compression fittings	118	Cooling towers	
Cleanouts		compression joint fittings	119	connection assembly	214
ABS	154	compression joints	118	demolition	427
ABS/PVC	171	crimped joint	113	forced draft	214
copper, DWV, soldered	149	crimped joint fittings	113-114	galvanized steel	213
end-of-line	171	Compressed air systems		induced draft	213
floor	171	Type K copper, brazed	33	removal	427
installation costs	435	Type L copper, brazed	53	Cooling units, variable volume	338
PVC, DWV	159	Computer rooms, HVAC estimates	437	Copper, pressfit fittings	86
wall	171	Condenser units	206	Copper fittings, roll grooved	89
Closed loop heat pump	307	Condenser water systems		Copper pipe	
Close-out items	421	Schedule 40 steel, cut-grooved	281	ball valve, pressfit	88
Closet bends, ABS, DWV pipe	152	Schedule 40 steel, roll-grooved	267	coupling, pressfit	86
Closet flanges		Condensing units, air cooled	213	ells, pressfit	86
ABS, DWV pipe	152	Condominiums, HVAC estimates	437	female adapter, pressfit	88
cast iron, hub & spigot	144	Configurable controller	339	male adapter, pressfit	88
cast iron, no-hub	138			roll grooved	89

tee, pressfit.....	87	roll grooved.....	89	reducers.....	81
tee, reducing, pressfit.....	87	tees.....	89	strainers.....	84
type K & L.....	89	valves.....	90	tees.....	80
union, pressfit.....	87	Copper pipe, Type L brazed.....	53-54	thermometers with wells.....	85
Copper pipe, DWV, soldered.....	148	adapters.....	56	unions.....	82
1/4 bend.....	149	bolt and gasket sets.....	60	valves.....	83-85
1/8 bend.....	148	bushings.....	57	Copper piping, removal.....	430
adapters.....	150	caps.....	57	Correction factors.....	6
assembly with riser.....	148	companion flanges.....	60	Countertop sinks/lavatories.....	28
cleanouts.....	149	couplings.....	57	Couplings	
closet flanges.....	149	ells.....	54-55	ABS.....	155
combinations.....	149	pressure gauges.....	60	cast iron, no-hub.....	141
couplings.....	150	reducers.....	56	cast iron, threaded.....	182
crosses.....	149	strainers.....	59	copper, DWV, soldered.....	150
hanger assemblies.....	151	tees.....	55	copper, pressfit.....	86
horizontal assemblies.....	148	thermometers with wells.....	60	CPVC sprinkler pipe.....	184
P-traps.....	149	unions.....	57	galvanized steel spiral duct.....	360
reducers.....	150	valves.....	58-60	PE-AL pipe.....	114-115, 119
riser clamps.....	151	Copper pipe, Type L soldered.....	61-62	PEX-AL pipe.....	115, 119
tees.....	149	adapters.....	64	polypropylene pipe.....	168
test caps.....	150	bolt and gasket sets.....	68	PVC sewer, bell & spigot.....	162
test tees.....	150	bushings.....	65	PVC, DWV.....	158
wyes.....	149	caps.....	65	PVC, Schedule 40.....	97
Copper pipe, Type K brazed.....	33-34	companion flanges.....	68	PVC, Schedule 80.....	107
adapters.....	37	couplings.....	65	roll grooved, Victaulic.....	180
bolt and gasket sets.....	41	ells.....	62-63	roll-grooved, Victaulic.....	180
bushings.....	38	hanger assemblies.....	69	Schedule 10 steel, roll-grooved.....	277
caps.....	38	maximum working pressure.....	61	Schedule 40 steel, cut-grooved.....	283
companion flanges.....	41	pressure gauges.....	68	Schedule 40 steel, roll-grooved.....	270
couplings.....	38	reducers.....	64	Schedule 40 steel, threaded.....	227
ells.....	34-35	riser clamps.....	69	Schedule 5 steel, pressfit.....	236-237
hanger assemblies.....	42	strainers.....	67	Schedule 80 steel, threaded.....	252
pressure gauges.....	41	tees.....	63	Type K copper, brazed.....	38
reducers.....	37	thermometers with wells.....	68	Type K copper, soldered.....	49
riser clamp.....	42	unions.....	65	Type K & L copper, roll grooved.....	90
strainers.....	40	valves.....	66-68	Type L copper, brazed.....	57
tees.....	35-36	Copper pipe, Type M brazed.....	70-71	Type L copper, soldered.....	65
thermometers with wells.....	41	adapters.....	73	Type M copper, brazed.....	74
unions.....	38	bolt and gasket sets.....	77	Type M copper, soldered.....	82
valves.....	39-41	bushings.....	74	CPVC sprinkler pipe.....	184
Copper pipe, Type K soldered.....	43-44	caps.....	74	adapters.....	185
adapters.....	47-48	companion flanges.....	77	cap.....	185
bolt and gasket sets.....	52	couplings.....	74	coupling.....	184
bushings.....	48	ells.....	71	elbows.....	184
caps.....	48	maximum working pressure.....	70	fittings.....	185
companion flanges.....	51	pressure gauges.....	77	flange.....	185
couplings.....	49	reducers.....	73	head adapter.....	185
ells.....	44-45	strainers.....	76	reducing tees.....	184
hanger assemblies.....	52	tees.....	72	tees.....	184
pressure gauges.....	52	thermometers with wells.....	77	Craft codes.....	7
reducers.....	47	unions.....	74	Craft@hrs.....	5
riser clamps.....	52	valves.....	75-77	Cranes, rental.....	420
strainers.....	51	Copper pipe, Type M soldered.....	78-79	Crew composition.....	7
tees.....	45-46	adapters.....	81	Crimp rings	
thermometers with wells.....	52	bolt and gasket sets.....	85	PE-AL pipe.....	117, 120
unions.....	48	bushings.....	82	PEX-AL pipe.....	117, 120
valves.....	49-51	caps.....	82	Croll-Reynolds.....	200
Copper pipe, Type K & L.....	89-90	companion flanges.....	85	Cross linked PEX-AL.....	113
coupling.....	90	couplings.....	82	Cross linked Polyethylene-	
ells.....	89	ells.....	79-80	Aluminum pipe.....	118
flange adapter.....	90	maximum working pressure.....	78	Crosses	
reducers.....	90	pressure gauges.....	85	cast iron, no-hub.....	141

cast iron, threaded.....	182
copper, DWV, soldered	149
Schedule 40 steel, threaded.....	226
Schedule 80 steel, threaded.....	251

D

Daily rental, equipment.....	420	Duct lining	
Dampers		calcium silicate	400
actuator.....	405	fiberglass	402
correction factors	341	Duct markers	421
dampers		Ductwork	
fire.....	341	correction factors	341
fusible plug	342	demolition	422
rectangular.....	340	removal.....	422
round	340	Ductwork specialties	
Deaerator/condenser, boiler.....	202	collars	344
Deck drains, installation costs	435	connections	344
Deep well jet pump	314	dampers.....	340-341
dehumidification.....	301	flexible connections	344
Dehumidifiers.....	292-293	turning vanes	343
Demolition.....	422	Ductwork, fiberglass	
Department stores,		fabrication labor	396
HVAC estimates	437	installation costs	397
Dielectric unions	38, 124	vinyl cover.....	397
Diffusers		Ductwork, galvanized steel	
air balancing	403	per pound installed	347-348
ceiling	335-336	rectangular.....	381
removal.....	423	rectangular 20 gauge	379-381
Dishwasher connections	25	rectangular 22 gauge	374-378
Dishwashers, built-in	25	rectangular 24 gauge	372-374
Disinfection unit.....	25	rectangular 26 gauge	370-371
Disposals, garbage.....	25	rectangular fittings	382-394
Domestic hot water softener	24	round fittings.....	395
Domestic water iron filter.....	23	spiral	357-358
Domestic water softener.....	22-23	spiral fittings.....	359-369
Doors.....	123	DWV pipe	
Double check detector valves.....	173	ABS	152
Downblast ventilation	330	cast iron.....	137
Drain, waste, vent pipe		cast iron, hub & spigot.....	143
cast iron, hub & spigot.....	143	copper.....	148
cast iron, no-hub.....	137	polypropylene	166
copper.....	148	polypropylene heat-fused	166
polypropylene	166	PVC	156
PVC	156		
Drains	170	E	
Drawings, as-built.....	421	EDPM valves.....	99, 109
Drilling wells	317	Elastomeric gaskets	161
Drinking fountains.....	30	Elastomeric pipe insulation.....	401
disconnect	433	Elbows, ductwork	
refrigerated	30	galvanized steel spiral duct	359
removal.....	432	rectangular, galvanized steel... 382-391	
Drinking water tank.....	415-416	round, galvanized steel	395
Drops and tees, ductwork	392-394	Elbows, pipe	
Dry valves.....	173	black steel pipe.....	178-179
Dryers, exhaust	328	CPVC sprinkler pipe	184
Dual-fuel burners.....	196	Electric water heaters.....	19
Duct insulation		Electrical service for boilers	197
calcium silicate	400	Ells	
fiberglass	402	cast iron, threaded.....	181
removal.....	434	copper, pressfit.....	86
		PE-AL pipe	113-114, 118-119
		PEX-AL pipe.....	113-114, 118-119
		PVC, DWV.....	156
		PVC, Schedule 40	94
		PVC, Schedule 80	104-105
		Schedule 10 steel, roll-grooved....	275

Schedule 160 steel, threaded...	258-259
Schedule 160 steel, welded ...	258-259
Schedule 40 steel, cut-grooved....	281
Schedule 40 steel, roll-grooved....	268
Schedule 40 steel, threaded.....	225
Schedule 40 steel, welded	216
Schedule 5 steel, pressfit	235-236
Schedule 80 steel, threaded.....	249
Schedule 80 steel, welded	239
Type K & L copper, roll grooved ...	89
Type K copper, brazed	34-35
Type K copper, soldered	44-45
Type L copper, brazed	54-55
Type L copper, soldered.....	62-63
Type M copper, brazed	71
Type M copper, soldered.....	79-80
emissions reduction module.....	200
Emissions sensing.....	206
Energy recovery ventilators.....	292-293
Energy recovery wheel.....	302
Engraved nameplates	421
Enthalpy	
energy recovery.....	302
heat recovery.....	302
Equipment	
nameplates	421
plumbing	19
rental costs	420
Equipment costs.....	7
Estimate detail sheet.....	16
Estimates	
budget.....	435
Estimating	
accuracy	8
guidelines	13
Exclusions	8
Exhaust.....	328
clothes dryer.....	328
fans.....	326-328
wall hood	328
exhaust fan	329-330
exhauster arrays.....	331
exhausters	330
Expansion tank fittings	125
Expansion tanks, galvanized.....	125

F

F.O.B.	9
Fabrication, fiberglass ductwork.....	396
Fan coils	427
Fan coil units	
air balancing	404
HVAC equipment.....	209
Fans	
attic	327
bathroom	327-329
ceiling exhaust.....	327-328
ceiling mounted	327
centrifugal air foil	325
centrifugal utility.....	325

commercial	327	PVC, Schedule 80	103-104	wall	301
controls	328	Schedule 10 steel, roll-grooved	275	with A/C	300
exhaust	329-330	Schedule 40 steel, cut-grooved	281	Fusible plug dampers	342
exhaust, roof	326	Schedule 40 steel, roll-grooved	268		
humidistat	328	Schedule 40 steel, threaded	225		
kitchen	328	Schedule 40 steel, welded	216		
roof	327	Schedule 80 steel, threaded	249		
room ventilation	327	Type K copper, brazed	42	G	
speed controller	328	Type L copper, brazed	54	Galvanized steel collars	344
thru-wall	327	Type L copper, soldered	62	Galvanized steel cooling tower	213
timer	328	Type M copper, brazed	71	Galvanized steel ductwork	
tube-axial	326	Type M copper, soldered	79	installation costs	346
vane-axial	325	Fixtures		per pound installed	347-348
ventilation	327-328	bathroom	28	rectangular	370-371
wall exhaust	327	disconnect	433	rectangular 20 gauge	379-381
wall mounted	327	estimating costs	435	rectangular 22 gauge	374-378
washroom	327-328	removal	432	rectangular 24 gauge	372-374
Feedwater pumps, boiler	198	Flange adapter		rectangular fittings	382-394
feedwater systems	206	Type K & L copper, roll grooved	90	round	395
Fiberglass		Flanges		round elbow	395
blanket	402	CPVC sprinkler pipe	185	round snap-lock	395
rigid board	402	polypropylene pipe	169	spiral	357-358
ductwork	370	roll-grooved, Victaulic	180	spiral coupling	360
flexible	397	Schedule 10 steel, roll-grooved	277	spiral crosses	367-369
installation costs	397	Schedule 160 steel, slip on	263	spiral elbows	359
pipe insulation	398-399	Schedule 160 steel, weld neck	263	spiral tees	361-366
pressure tank	23	Schedule 40 steel, cut-grooved	283	Galvanized steel pipe	
tank	24, 415	Schedule 40 steel, roll-grooved	270	sleeves	155
Filter, iron	24	Schedule 40 steel, threaded	233	Garbage disposals	25
Fire dampers	341	Schedule 40 steel, welded	219	Gas furnaces	
Fire department connection	176	Schedule 80 steel, threaded	254	high efficiency	300
Fire extinguisher	176	Schedule 80 steel, welded	243	residential	300
Fire extinguishing systems	323	Flanges, companion		wall	301
Fire hose cabinet	175	150 pound, threaded	124	with A/C	300
Fire hydrant	176	150 pound, welding type	123	Gas heaters	304
Fire protection		300 pound, threaded	124	Gas trim connections	26
CPVC sprinkler pipe	184	PVC	124	Gas valves	135
fire hose cabinets	175	Flashing		Gas water heaters	19-20
plastic sprinkler pipe	184	pipe	169	tankless	20
pumps	175-176	roof	125, 155, 160	Gaskets	
Siamese connections	176	Flat panel water heater	324	cast iron, hub & spigot	147
sprinkler fittings	178-182	Flexible connections, ductwork	344	elastomeric	161
sprinkler heads	174	Flexible fiberglass duct	397	Gate valves	
sprinkler pipe	177-178	Flexible pipe connectors	126	pipe and plumbing specialty ...	131-132
steel pipe nipples	183	Floor drains	170	PVC, Schedule 40	98
switches	174	estimating	435	PVC, Schedule 80	108
valves	173	Floor sinks	30, 170	Schedule 10 steel, roll-grooved	277
Fire pumps	175	estimating	435	Schedule 160 steel, flanged ...	263-264
Firebox boilers	188	Flues, water heater	21	Schedule 40 steel, cut-grooved	284
Fire-rated doors	123	Foot valve	315	Schedule 40 steel, roll-grooved	270
Firetube boilers	187-188	Forced air heating		Schedule 40 steel, threaded ...	230-231
Fittings		residential	288	Schedule 40 steel, welded	220
ductwork	360	Forced-draft cooling tower	214	Schedule 80 steel, threaded	252
roll grooved	89	Forklifts, rental	420	Schedule 80 steel, welded	243
Fittings, pipe		Forms and letters	438	Type K copper, brazed	39
copper, DWV, soldered	148	Fringe benefits	6	Type K copper, soldered	49
expansion tank	125	Front-end loaders, rental	420	Type L copper, brazed	58
M.I., 150 pound	225	Fuel train piping	194-195	Type L copper, soldered	66
malleable iron, Schedule 40	267	Fume hoods, air balancing	404	Type M copper, brazed	75
polypropylene	166	Furnace removal	425	Type M copper, soldered	83
PVC sewer, bell & spigot	161	Furnaces, residential	300	Geothermal	
PVC, DWV	156	high efficiency	300	bore holes	318
PVC, Schedule 40	94				

heat pump.....	307-309	Heat cool thermostat	406	Schedule 40 steel, cut-grooved....	281
wells.....	317	Heat exchanger		Schedule 40 steel, roll-grooved....	267
Globe valves		demolition	429	Type K copper, brazed	33
pipe and plumbing specialty ...	132-133	removal.....	429	Type K copper, soldered	43
PVC, Schedule 40	98	Heat exchangers, HVAC	208	Type L copper, brazed	53
PVC, Schedule 80	108	assembly	208	Type L copper, soldered.....	61
Schedule 10 steel, roll-grooved....	278	connections	208	Type M copper, brazed	70
Schedule 160 steel, flanged	264	Heat pumps	308-312	Type M copper, soldered.....	78
Schedule 40 steel, cut-grooved....	284	accessories.....	313	Hot water tank	
Schedule 40 steel, roll-grooved....	271	air to air	310	disconnect	433
Schedule 40 steel, threaded	231	demolition.....	428	removal.....	432
Schedule 40 steel, welded	220	geothermal.....	307	Hourly labor costs.....	6
Schedule 80 steel, threaded.....	252	removal.....	428	How to use this book.....	5
Schedule 80 steel, welded ...	243-244	split system.....	310	HRV (heat recovery	
Type K copper, brazed	39	supplemental electric		ventilators).....	292-293
Type K copper, soldered	49	heating coil	313	Hub & spigot C.I. pipe, DWV.....	143
Type L copper, brazed	58	thermostats	313	Humidistat control.....	328
Type L copper, soldered.....	66	Heat reclaimer	205	HVAC	
Type M copper, brazed	75	Heat recovery	204, 206, 302	boiler connections.....	191
Type M copper, soldered.....	83	Heat recovery systems		controls.....	405
Grease and oil interceptors	25	continuous blowdown	203	demolition	422
Green sand filter	23	stack waste	200	HVAC balancing	
Greywater tank	417	Heat recovery ventilators.....	293	air.....	404
Grilles		Heat transfer equipment.....	211	wet.....	405
air balancing	404	Heat-A-Lamp®.....	330	HVAC equipment	
removal.....	423	Heaters		air conditioning units.....	289
return air	334	bathroom	329	air handling equipment	332
Ground source heat pump	307	biomass fired	322	air handling units	290-291
		ceramic	305	boilers	186-190
		commercial	305	centrifugal blowers.....	325
		gas fired	305	connections, air handling unit ...	298-299
		heat pumps.....	311-312	fan coil units	209
		infrared	305	heat exchanger connections	208
		infrared bulb.....	329	heat exchangers	208
		infrared tube	305	heat transfer equipment	211
		residential furnaces	300	pumps.....	207
		resistance	330	reheat coils	210
		unit.....	304	unit heaters.....	211
		Heat-fused joint pipe,		variable-air volume units	338
		polypropylene	166	HVAC systems	
		Heating systems.....	288	Type K copper, brazed	33
		estimating	435	Type K copper, soldered	43
		residential	288	Type L copper, brazed	53
		Help	5	Type L copper, soldered.....	61
		High rise offices, HVAC estimates ...	437	Type M copper, brazed	70
		Holding tank	415-416	Type M copper, soldered.....	78
		Hood, duct kit	328	Hydrant, fire.....	176
		Hooks, pipe	127	Hydraulic benders, rental	420
		Hose bibbs	135		
		Hot and cold water connections	26		
		Hot water boilers			
		biomass fired	320-321		
		connections, HVAC	191		
		gas fired.....	186, 188		
		gas fired, cast iron	190		
		gas fired, steel	189		
		high pressure.....	189		
		oil fired	188		
		Hot water reheat coils	210		
		Hot water softener	24		
		Hot water systems			
		piping	215		

H

Hair and lint interceptors	25			Indicator post.....	176
Hanger assemblies				Indirect waste connections	26
ABS	155			Indirect water heater.....	204
cast iron, hub & spigot.....	147			Induced-draft cooling tower	213
cast iron, no-hub.....	142			Infrared	
copper, DWV, soldered	151			heater	305
polypropylene pipe	169			tube heater	305
PVC, DWV	159			Infrared bulb heater	329
PVC, Schedule 40	102			Injector.....	315
PVC, Schedule 80	112			Installation costs, ductwork	397
Schedule 10 steel, roll-grooved....	280				
Schedule 160 steel.....	266				
Schedule 40 steel, cut-grooved....	286				
Schedule 40 steel, roll-grooved....	273				
Schedule 40 steel, threaded.....	233				
Schedule 40 steel, welded	223				
Schedule 80 steel, threaded.....	255				
Schedule 80 steel, welded	247				
Type K copper, brazed	42				
Type K copper, soldered	52				
Type L copper, soldered.....	69				
Hangers, pipe	126				
PE-AL	117, 120				
PEX-AL.....	117, 120				
steel band	126				
Hard water softener.....	22-24				
Head adapter, CPVC.....	185				
Headers					
PEX-AL pipe	116				
Heads, sprinkler	174				

Instructing, operating personnel	421
Instructions for this book	5
Insulation, pipe	
calcium silicate	400
elastomeric	401
fiberglass	398-399
Insulation, removal	434
Insurance	6
Interceptors	
grease and oil	25
hair and lint	25
Iron filter	23-24
accessories	23
Iron removal	23
Irrigation systems	
PVC, Schedule 40	93
PVC, Schedule 80	103

J

Jet pump	314
----------------	-----

K

Kitchen equipment	25
connections	26
Kitchen fixtures	
tailpiece connections	26
trap connections	26
Kitchen sinks	29
disconnect	433

L

Labor costs	6
Laboratories, HVAC estimates	437
Laboratory DWV pipe systems	166
Laundry sinks	29
disconnect	433
Lavatories	28
estimating	435
Lead	
flashing	125, 155, 160
LEED certification ... 186-190, 287, 306, 309, 313, 320-321, 323	
Letter of intent	456-457
Libraries, HVAC estimates	437
Line voltage thermostat	406
Lined ductwork, installed	347-348
Low voltage thermostat	406

M

Makeup air units	337
Malleable iron fittings	
150 pound	215
300 pound	238
Schedule 10 steel pipe	275

Schedule 40 steel, roll-grooved	267
Manganese filters	
green sand	23
iron	23
Manhours	5
Manifolds, PEX-AL pipe	116
Manufacturing plants,	
HVAC estimates	437
Markers, pipe and duct	421
Markets, HVAC estimates	437
Material costs	7
Material pricing conditions	9
Materials, equipment, and tool form ...	10
Maximum working pressures	
Type K copper, brazed	33
Type K copper, soldered	43
Type L copper, brazed	53
Type L copper, soldered	61
Type M copper, brazed	70
Type M copper, soldered	78
Mechanical joint coupling	141
Mechanical tee	
roll-grooved, Victaulic	180
Medical buildings,	
HVAC estimates	437
MET	10
worksheet	14
Miscellaneous tools	
PE-AL pipe	117, 120
PEX-AL pipe	117, 120
MJ coupling	141
Molded stone	
mop sinks	29
shower basins	28
Monthly rental, equipment	420
Mop sink	
disconnect	433
Motels, HVAC estimates	437
Museums, HVAC estimates	437

N

Nail clips	
PE-AL pipe	117, 120
PEX-AL pipe	117, 120
Nameplates, equipment	421
Nipples	
Schedule 40 steel, threaded ...	228-230
steel pipe, fire protection	183
Non-taxable fringe benefits	6
NPT pump, in-line	25, 122-123
Nursing homes, HVAC estimates	437

O

Office buildings	
HVAC estimates	437
Office trailers, rental	420
oil fuel train piping	206

Old estimates	12
Open loop heat pump	308-309
O-rings	
PE-AL pipe	117, 120
PEX-AL pipe	117, 120
Overflow drains	170
estimating	435
Overhead and profit	7

P

Packaged boiler	
feedwater systems	203
PE-AL pipe	113-120
adapters	115
brass fittings	113
caps	116, 119
compression brass fittings	118
couplings	114-115, 119
crimp rings	117, 120
crimped brass fittings	113
ells	113-114, 118-119
hangers	117, 120
miscellaneous tools	117, 120
nail clips	117, 120
O-rings rings	117, 120
tees	114, 119
valves	116, 120
PEX-AL pipe	113-118, 120
adapters	115
brass fittings	113
caps	116, 119
compression brass fittings	118
couplings	114-115, 119
crimp rings	117, 120
crimped brass fittings	113
ells	113-114, 118-119
hangers	117, 120
manifolds	116
miscellaneous tools	117, 120
nail clips	117, 120
O-rings	117, 120
tees	114, 119
valves	116, 120
Pipe	
connector	125-126
flashing	125, 155, 160, 169
hangers	126
hooks	127
markers	421
sleeves	127, 155, 160, 169
sleeves, cut-grooved	286
Pipe insulation	
calcium silicate	400
elastomeric	401
fiberglass	398-399, 415
removal	434
Pipe machines, rental	420
Pipe sizes	
Type K copper, brazed	33

Type K copper, soldered	43	removal	432	Schedule 80 steel, welded	246
Type L copper, brazed	53	Pollution control modules	200	Type K copper, brazed	41
Type L copper, soldered	61	Pollution control stack		Type K copper, soldered	52
Type M copper, brazed	70	retrofit	320, 322	Type L copper, brazed	60
Type M copper, soldered	78	Polyethylene sewage pit	417	Type L copper, soldered	68
Piping		Polyethylene sump pit	417	Type M copper, brazed	77
air handling unit coil	298-299	Polyethylene-aluminum		Type M copper, soldered	85
cast iron	143	pipe	113-118, 120	Pressure pump	176
class 110 DI, cement lined	412	Polypropylene DWV pipe	166	Pressure reducing valves	135
class 150 cast iron	413	adapters	168	Pressure switches	174, 315
class 153 DI, cement lined	408	bends	166	Pressure tank	23-24, 315
class 153 DI, double		bolt and gasket sets	169	Pressure/temperature taps	
cement lined	410	combinations	167	Schedule 10 steel, roll-grooved	280
class 2400 or 3000 asbestos		couplings	168	Schedule 160 steel	265
cement	414	fittings	166	Schedule 40 steel, cut-grooved	286
copper	148	flanges	169	Schedule 40 steel, roll-grooved	273
CPVC sprinkler	184	hanger assemblies	169	Schedule 40 steel, threaded	233
polypropylene	166	heat-fused joint pipe	166	Schedule 40 steel, welded	223
PVC	156	plugs	168	Schedule 80 steel, threaded	255
PVC, DWV	156	P-traps	166	Schedule 80 steel, welded	246
Schedule 10 steel,		reducers	169	Price updates	5
roll-grooved	274-275	riser clamps	169	Pricing, HVAC systems	435
Schedule 40 steel, cut-grooved	281	tees	167	Process systems	
Schedule 40 steel, roll-grooved	267	wyes	167-168	PVC, Schedule 40	93-94
Schedule 40 steel, threaded	224	Polyvinyl chloride pipe		PVC, Schedule 80	103-104
Schedule 40 steel, welded	215	Schedule 40	93	Project summary	12
schedule 80 steel, threaded	249	Schedule 80	103	Project summary worksheet	15
Schedule 80 steel, welded ...	238-239	Potable water storage tank	416	Proposal, preparing	13
Piping specialties	136	Potable water systems		P-traps	
Piping systems		PVC, Schedule 40	93	ABS	153
chilled water	215	PVC, Schedule 80	103	cast iron, hub & spigot	144
hot water	215	Type K copper, brazed	33	cast iron, no-hub	138
recirculating water	247	Type K copper, soldered	43	copper, DWV, soldered	149
Piping removal		Type L copper, brazed	53	polypropylene pipe	166
copper	430	Type L copper, soldered	61	PVC, DWV	158
plastic	430	Type M copper, brazed	70	Pulse type boilers	323
steel	430	Type M copper, soldered	78	Pumping unit for boilers	202
Planter drains	170	Pressfit		pumps	
Plastic piping		ball valve, copper	88	boiler	206
removal	430	copper fittings	86	Pumps	314
Plastic sewage pit	417	coupling, copper	86	centrifugal	207
Plastic sprinkler pipe	184	ells, copper	86	heat	307-309
Plastic sump pit	417	female adapter, copper	88	in-line	25
Plastic tank	416	fittings	235	in-line circulating	122-123
plug dampers		male adapter, copper	88	removal	431
fusible	342	tee, copper	87	submersible	314
Plugs		tee, reducing, copper	87	sump, installation costs	435
cast iron, threaded	182	Type O o-rings	235	well water	314
polypropylene pipe	168	union, copper	87	Purchase order	451-452
PVC, Schedule 40	97	Pressure controller	339	PVC	
PVC, Schedule 80	107	Pressure fiberglass tank	24	valves, EDPM	99, 109
Schedule 40 steel, threaded	227	Pressure gauges		valves, threaded	99, 109
Schedule 80 steel, threaded	251	dial-type	127	valves, Tru-union	99, 109
Plumbing		PVC, Schedule 40	102	valves, Union type, Solvent	
budget estimates	435	PVC, Schedule 80	111	weld	100, 109
equipment	26	Schedule 10 steel, roll-grooved	280	PVC sewer pipe, bell & spigot	161
fixture costs	435	Schedule 160 steel	265	1/16 bend	161
fixture rough-in	31-32	Schedule 40 steel, cut-grooved	286	1/4 bend	162
fixtures	32	Schedule 40 steel, roll-grooved	272	1/8 bend	161, 162
specialties	136	Schedule 40 steel, threaded	233	adapters	165
Plumbing fixture		Schedule 40 steel, welded	223	caps	165
disconnect	433	Schedule 80 steel, threaded	255	couplings	162

gasket joints.....	161
reducers.....	165
tees.....	164
test plugs.....	165
wyes.....	162-164
PVC, DWV pipe.....	156
adapters.....	158
bushings.....	158
cleanouts.....	159
closet flanges.....	157-158
couplings.....	158
ells.....	156
fittings.....	156
hanger assemblies.....	159
P-traps.....	158
reducers.....	159
riser clamps.....	159
solvent-weld joints.....	156
tees.....	157
wyes.....	157
PVC, Schedule 40 pipe.....	94
adapters.....	96
assembly.....	93
bolt and gasket sets.....	101
bushings.....	96
caps.....	97
companion flange.....	101
control valves.....	101
couplings.....	97
ells.....	94
hanger assemblies.....	102
plugs.....	97
pressure gauges.....	102
pressure/temperature taps.....	102
riser clamps.....	102
solvent-weld joints.....	93
strainers.....	100-101
tees.....	95
thermometers with wells.....	102
unions.....	97
valves.....	98-101
PVC, Schedule 80 pipe.....	103-104
adapters.....	106
assembly.....	103-104
bolt and gasket sets.....	111
bushings.....	106
caps.....	107
companion flanges.....	111
couplings.....	107
ells.....	104-105
hanger assemblies.....	112
plugs.....	107
pressure gauges.....	111
pressure/temperature taps.....	112
riser clamps.....	112
solvent-weld joints.....	103
strainers.....	110
tees.....	105
thermometers with wells.....	111
unions.....	107
valves.....	108-111

Q

Quotation sheet.....	17
----------------------	----

R

Rainwater systems, PVC.....	161
Reciprocating water-cooled chiller.....	212
Recirculating water systems.....	247
Record of telephone conversation.....	18
Recorder, digital.....	406
recording equipment.....	206
Rectangular duct, galvanized steel.....	346, 381
Rectangular elbow, galvanized steel.....	391
Reducers	
ABS.....	155
cast iron, hub & spigot.....	146
cast iron, no-hub.....	141
cast iron, threaded.....	181
class 110 DI, cement lined.....	412
class 150 cast iron.....	413
class 153 DI, cement lined.....	409
class 153 DI, double cement lined.....	411
class 2400 or 3000 asbestos cement.....	414
copper, DWV, soldered.....	150
galvanized steel spiral duct.....	360
polypropylene pipe.....	169
PVC.....	165
PVC, DWV.....	159
roll-grooved, Victaulic.....	179
Schedule 10 steel, roll-grooved.....	276
Schedule 160 steel, welded... ..	261-262
Schedule 40 steel, cut-grooved.....	283
Schedule 40 steel, roll-grooved.....	269
Schedule 40 steel, threaded.....	226
Schedule 40 steel, welded.....	218
Schedule 80 steel, threaded.....	250
Schedule 80 steel, welded... ..	241-242
Type K & L copper, roll grooved.....	90
Type K copper, brazed.....	37
Type K copper, soldered.....	47
Type L copper, brazed.....	56
Type L copper, soldered.....	64
Type M copper, brazed.....	73
Type M copper, soldered.....	81
Reducing costs.....	9
Reducing ells	
Schedule 5 steel, pressfit.....	236
Reducing tees	
cast iron.....	181
CPVC sprinkler pipe.....	184
roll-grooved, Victaulic.....	179
Schedule 10 steel, roll-grooved.....	276
Schedule 40 steel, cut-grooved.....	282
Schedule 40 steel, roll-grooved.....	269
Schedule 40 steel, threaded.....	226
Schedule 5 steel, pressfit.....	237
Schedule 80 steel, threaded.....	250

Reducing valves, pressure.....	135
Refractory, boiler.....	198
Refrigeration systems	
Type K copper, brazed.....	33
Type L copper, brazed.....	53
Registers	
return.....	335
supply.....	334
Reheat coils	
electric.....	210
hot water.....	210
HVAC.....	210
Reheat units	
variable volume.....	338
Removal costs	
air cooled condensers.....	426
air handling units.....	424
air mixing box.....	423
boilers.....	425
chillers.....	426
cooling towers.....	427
copper piping.....	430
diffusers.....	423
duct insulation.....	434
duct mounted coils.....	429
ductwork.....	422-423
fan coils.....	427
furnaces.....	425
grilles.....	423
heat exchangers.....	429
heat pumps.....	428
hot water tank.....	432
pipe insulation.....	434
plastic piping.....	430
plumbing fixtures.....	432
pumps.....	431
roof top unit.....	424
steel piping.....	430
unit heaters.....	428
valves.....	431
Rental costs, equipment.....	420
Residences	
HVAC estimates.....	437
Residential fixture rough-ins.....	32
Residential furnaces.....	300-301
Residential water heaters.....	19-20
resistance heater.....	330
Retail shops, HVAC estimates.....	437
Retrofit pollution control stack... ..	320, 322
Return air grilles.....	334
Return registers.....	335
Riser clamps	
ABS.....	155
cast iron, hub & spigot.....	147
cast iron, no-hub.....	142
copper, DWV, soldered.....	151
pipe and plumbing specialty.....	127
polypropylene pipe.....	169
PVC, DWV.....	159
PVC, Schedule 40.....	102
PVC, Schedule 80.....	112
Schedule 10 steel, roll-grooved.....	280

Schedule 160 steel.....	266
Schedule 40 steel, cut-grooved.....	286
Schedule 40 steel, roll-grooved.....	273
Schedule 40 steel, threaded.....	234
Schedule 40 steel, welded.....	223
Schedule 80 steel, threaded.....	255
Schedule 80 steel, welded.....	247
Type K copper, brazed.....	42
Type K copper, soldered.....	52
Type L copper, soldered.....	69
Rollairtrol type air separators.....	202
Roll-grooved fittings.....	180
Roll-grooved joint	
Schedule 40 carbon steel.....	267
Roof	
drains.....	170
exhaust fan.....	326
fans.....	327
flashing.....	125, 155, 160
Roof exhauster.....	327
Roof flashing, lead.....	125, 155, 160
Roof top unit, removal.....	424
Rough-ins	
commercial fixture.....	31
commercial group.....	32
residential.....	32
Round galvanized steel ductwork.....	395
Roustabouts, rental.....	420
Run and branch, tees,	
galvanized steel.....	366

S

Saddle tee, roll-grooved, Victaulic.....	180
Safety, trenching.....	418
Sandstone, trenching.....	418
Sanitary tee, cast iron DWV pipe.....	144
Sanitary tees	
cast iron DWV pipe.....	144
polypropylene pipe.....	167
Schedule construction.....	453-455
Schedule 5 carbon steel pipe,	
pressfit.....	235
adapters.....	237
couplings.....	236, 237
ells.....	235, 236
reducing ells.....	236
reducing tees.....	237
tees.....	237
Schedule 10 carbon steel pipe,	
roll-grooved.....	274-275
adapters.....	276
bolt and gasket sets.....	280
caps.....	277
couplings.....	277
ells.....	275
flanges.....	277
hanger assemblies.....	280
horizontal assembly.....	274
pressure gauges.....	280
pressure/temperature taps.....	280

reducers.....	276
reducing tees.....	276
riser clamps.....	280
strainers.....	279
tees.....	275
thermometers with wells.....	280
valves.....	277-279
vertical assembly.....	274
Schedule 40	
threadolet.....	136
weldolet.....	136
Schedule 40 carbon steel pipe.....	216
Schedule 40 carbon steel pipe,	
cut grooved.....	281
adapters.....	282
bolt and gasket sets.....	285
caps.....	283
couplings.....	283
ells.....	281
flanges.....	283
hanger assemblies.....	286
pipe sleeves.....	286
pressure gauges.....	286
pressure/temperature taps.....	286
reducers.....	283
reducing tees.....	282
riser clamps.....	286
strainers.....	285
tees.....	282
thermometers with wells.....	286
valves.....	284-285
Schedule 40 carbon steel pipe,	
roll-grooved.....	267-268
adapters.....	269
bolt and gasket sets.....	272
caps.....	270
couplings.....	270
ells.....	268
flanges.....	270
hanger assemblies.....	273
horizontal assembly.....	267
pressure gauges.....	272
pressure/temperature taps.....	273
reducers.....	269
reducing tees.....	269
riser clamps.....	273
strainers.....	272
tees.....	268
thermometers with wells.....	272
valves.....	270-272
vertical assembly.....	267
Schedule 40 carbon steel pipe,	
threaded.....	225
bolt and gasket sets.....	233
caps.....	227
companion flanges.....	233
control valves.....	232-233
couplings.....	227
crosses.....	226
ells.....	225
fire protection.....	181

hanger assemblies.....	233
horizontal assembly.....	224
nipples.....	228-230
plugs.....	227
pressure gauges.....	233
pressure/temperature taps.....	233
reducers.....	226
reducing tees.....	226
riser clamps.....	234
strainers.....	232
tees.....	225
thermometers with wells.....	233
unions.....	227
valves.....	228, 230-232
vertical assembly.....	224
Schedule 40 carbon steel pipe,	
welded.....	215
bolt and gasket sets.....	223
caps.....	218-219
companion flanges.....	219
ells.....	216
pressure gauges.....	223
pressure/hanger assemblies.....	223
pressure/temperature tap.....	223
reducers.....	218
riser clamp.....	223
strainers.....	221-222
tees.....	217
thermometers with wells.....	223
threadolets.....	219
valves.....	220-222
vertical assembly.....	215
weldolets.....	219
Schedule 40 polypropylene pipe.....	166
Schedule 40 PVC pipe.....	93-94
assembly.....	93
Schedule 80	
PVC pipe.....	103
threadolet.....	136
weldolet.....	136
Schedule 80 carbon steel pipe,	
threaded.....	248-249
bolt and gasket sets.....	254
caps.....	251
couplings.....	252
crosses.....	251
ells.....	249
flanges.....	254
hanger assemblies.....	255
horizontal assembly.....	248
plugs.....	251
pressure gauges.....	255
pressure/temperature taps.....	255
reducers.....	250
reducing tees.....	250
riser clamps.....	255
strainers.....	253-254
tees.....	250
thermometers with wells.....	255
unions.....	251
valves.....	252-254
vertical assembly.....	248

Schedule 80 carbon steel pipe, welded.....239	Shoring, trench.....418	Solvent-weld joint pipe PVC, DWV.....156
bolt and gasket sets.....246	Shower stall disconnect.....433	PVC, Schedule 40.....93
caps.....242	removal.....432	PVC, Schedule 80.....103
ells.....239	Showers.....28	Specialties, piping and plumbing.....136
flanges.....243	estimating.....435	Speed controller, fan.....328
hanger assemblies.....247	Siamese connection.....176	Spin-ins, plain.....344
horizontal assembly.....238	Silent check valves	Spiral crosses, galvanized steel.....367-369
pressure gauges.....246	pipe and plumbing specialty.....131	Spiral duct, galvanized steel.....357-358, 367-369
pressure/temperature tap.....246	PVC, Schedule 40.....100	Spiral tees, galvanized steel...364, 366
reducers.....241-242	PVC, Schedule 80.....110	Sprinkler fittings.....178-182
riser clamps.....247	Schedule 10 steel, roll-grooved...279	Sprinkler heads.....174
strainers.....245	Schedule 40 steel, cut-grooved...285	Sprinkler systems black steel pipe.....177-178
tees.....240-241	Schedule 40 steel, roll-grooved...271	branch pipe and fittings.....183
thermometers with wells.....246	Schedule 40 steel, threaded.....232	heads.....174
threadolets.....243	Schedule 40 steel, welded.....221	per head costs.....172
unions.....242	Schedule 80 steel, threaded.....253	square foot costs.....172
valves.....243-246	Schedule 80 steel, welded.....245	switches.....174
vertical assembly.....238	Type K copper, brazed.....40	valves.....173
weldolets.....242	Type K copper, soldered.....50	Square-foot costs, HVAC.....435
Schedule 80 PVC pipe.....104	Type L copper, brazed.....59	Stack waste, heat recovery.....200
Schedule 160 carbon steel pipe, plain end.....257	Type L copper, soldered.....67	Stainless steel doors.....123
Schedule 160 carbon steel pipe, threaded.....256-258	Type M copper, brazed.....76	sinks.....29
ells.....258-259	Type M copper, soldered.....84	Standard form subcontract.....448
horizontal assembly.....256	Sinks.....28-30	Steam boiler connections, HVAC....191
tees.....260	acrylic.....29	Steam boilers biomass fired.....321
unions.....261	bar.....29	connections.....191
vertical assembly.....257	cast iron.....29	gas fired.....186
Schedule 160 carbon steel pipe, welded.....256-257	countertop.....28	Steam heating boilers.....190
bolt and gasket sets.....265	disconnect.....433	Steam systems, piping.....239
caps.....262	exam room.....29	Steam traps.....127, 205
ells.....258-259	kitchen.....29	Steel collars.....344
flanges.....263	laboratory.....29	Steel doors.....123
hanger assemblies.....266	laundry.....29	Steel ductwork, galvanized.....357-358, 360
horizontal assembly.....256	medical.....29	fittings.....359
pressure gauges.....265	molded stone.....29	Steel pipe black.....178
pressure/temperature taps.....265	mop.....29	cooling systems.....235
reducers.....261-262	removal.....432	heating systems.....235
riser clamps.....266	slop.....30	nipples, threaded.....183, 230
tees.....260	stainless steel.....29	pressfit system.....235
thermometers with wells.....265	Skip loaders, rental.....420	process applications.....235
threadolets.....263	Sleeves	Steel pipe fittings, Schedule 40 steel, roll-grooved.....267
unions.....261	galvanized steel pipe.....155, 160	Steel pipe nipples, threaded....228-230
valves.....263-265	polypropylene pipe.....169	Steel pipe, black.....177-178
weldolets.....262	Slop sink	Steel pipe, Schedule 5 pressfit.....235
Scissors-lifts, rental.....420	disconnect.....433	adapters.....237
Scotch marine firetube boilers...187-188	Slope, trench.....418	couplings.....236-237
Self-sticking markers.....421	Softener	ells.....235-236
Sensor	water.....22	reducing ells.....236
CO2.....406	software.....339	reducing tees.....237
HVAC controls.....405	air balance.....339	tees.....237
Septic tank.....415	Solar water heater.....324	Steel pipe, Schedule 10 roll-grooved.....274-275
Service sinks.....29	Solder, soft.....33, 43	adapters.....276
estimating.....435	Soldered joint fittings	bolt and gasket sets.....280
Sewage lift tank.....417	Type K copper.....43	
Sewage tank.....415	Type L copper.....61	
Sewer pipe, PVC bell & spigot.....161	Soldered joint pipe.....43, 78	
Shale, trenching.....418	copper, DMV.....148	
Shallow well water pump.....314	Type K copper.....43	
Sheet metal.....347-348	Type L copper.....61	
	Type M copper.....78	
	Solenoid valves.....205	

caps	277	couplings	227	thermometers with wells	255
control valves	279	crosses	226	unions	251
couplings	277	ells	225	valves	254
ells	275	hanger assemblies	233	Steel pipe, Schedule 80	
flanges	277	horizontal assembly	224	welded	238, 239
hanger assemblies	280	nipples	228-230	bolt and gasket sets	246
horizontal assembly	274	plugs	227	butterfly valves	244
pressure gauges	280	pressure gauges	233	caps	242
pressure/temperature taps	280	pressure/temperature taps	233	control valves	245-246
reducers	276	reducers	226	ells	239
reducing tees	276	riser clamps	234	flanges	243
riser clamps	280	silent check valves	232	gate valves	243
strainers	279	strainers	232	globe valves	243-244
tees	275	swing check valves	232	hanger assemblies	247
thermometers with wells	280	tees	225-226	pressure gauges	246
valves	277-279	thermometers with wells	233	pressure/temperature tap	246
vertical assembly	274	unions	227	reducers	241-242
Steel pipe, Schedule 40		valves	230-231, 233	riser clamps	247
cut-grooved	281	vertical assembly	224	silent check valves	245
adapters	282	Steel pipe, Schedule 40		strainers	245
bolt and gasket sets	285	welded	215-216	swing check valves	244
caps	283	bolt and gasket sets	223	tees	240-241
couplings	283	caps	218	thermometers with wells	246
ells	281	control valves	222	threadolets	243
flanges	283	ells	216	unions	242
hanger assemblies	286	flanges	219	valves	246
pipe sleeves	286	hanger assemblies	223	weldolets	242
pressure gauges	286	pressure gauges	223	Steel pipe, Schedule 160	257
pressure/temperature taps	286	pressure/temperature tap	223	bolt and gasket sets	265
reducers	283	reducers	218	ells	259
reducing tees	282	riser clamp	223	hanger assemblies	266
riser clamps	286	strainers	221-222	pressure gauges	265
strainers	285	tees	217	pressure/temperature taps	265
tees	282	thermometers	223	riser clamps	266
thermometers with wells	286	threadolets	219	thermometers with wells	265
valves	284-285	unions	219	Steel pipe, Schedule 160	
Steel pipe, Schedule 40		valves	220-222	plain end	257
roll-grooved	267	weldolets	219	Steel pipe, Schedule 160	
adapters	269	Steel pipe, Schedule 80		threaded	257, 261
bolt and gasket sets	272	threaded	248-249	ells	258-259
caps	270	ball valves	253	horizontal assembly	256
couplings	270	bolt and gasket sets	254	tees	260
ells	268	butterfly valves	252-253	unions	261
flanges	270	caps	251	vertical assembly	257
hanger assemblies	273	control valves	254	Steel pipe, Schedule 160 welded	257
pressure gauges	272	couplings	252	caps	262
pressure/temperature taps	273	crosses	251	ells	258-259
reducers	269	ells	249	flanges	263
reducing tees	269	flanges	254	horizontal assembly	256
riser clamps	273	gate valves	252	reducers	261-262
strainers	272	globe valves	252	tees	260
tees	268	hanger assemblies	255	threadolets	263
thermometers with wells	272	plugs	251	unions	261
valves	270-272	pressure gauges	255	valves	263-265
Steel pipe, Schedule 40		pressure/temperature taps	255	vertical assembly	257
threaded	225	reducers	250	weldolets	262
ball valves	231	reducing tees	250	Steel piping	
bolt and gasket sets	233	riser clamps	255	removal	430
butterfly valves	231	silent check valves	253	Storage vans, rental	420
caps	227	strainers	253-254	Stores, HVAC estimates	437
companion flanges	233	swing check valves	253	Strainers	
control valves	232	tees	250	pipe and plumbing specialty ...	133-134

PVC, Schedule 40	100-101	Tank tee	315	Type K copper, brazed	35-36
PVC, Schedule 80	110	Tankless water heaters	20, 204	Type K copper, soldered	45, 46
Schedule 10 steel, roll-grooved	279	Tanks		Type L copper, brazed	55
Schedule 40 steel, cut-grooved	285	above ground	416	Type L copper, soldered	63
Schedule 40 steel, roll-grooved	272	buried	415-416	Type M copper, brazed	72
Schedule 40 steel, threaded	232	deep burial	415-416	Type M copper, soldered	80
Schedule 40 steel, welded ...	221-222	drinking water	415-416	with run and branch,	
Schedule 80 steel, threaded ...	253-254	expansion	125	galvanized steel	366
Schedule 80 steel, welded	245	fiberglass	415	Terminal box controller	339
Type K copper, brazed	40	greywater	417	Terminal boxes, air balancing	403
Type K copper, soldered	51	heat/cool	406	Test caps	
Type L copper, brazed	59	holding	415-416	ABS DWV	154
Type L copper, soldered	67	line voltage	406	copper, DWV, soldered	150
Type M copper, brazed	76	low voltage	406	Test plugs, PVC sewer, bell	
Type M copper, soldered	84	plastic	416-417	& spigot	165
Subcontract		polyethylene	416	Test tees, copper, DWV, soldered ...	150
change order	450	septic	415-416	Theaters	
forms	447	sewage	415	HVAC estimates	437
Submersible pump	314	sewage lift	417	Thermometers with wells	
Submittal data	458-459	sewer	416	pipe and plumbing specialty	128
Submittal index	460	shallow burial	415-416	PVC, Schedule 40	102
Suction diffusers	122	sump	417	PVC, Schedule 80	111
Sump pit	417	swimming pool	292	Schedule 10 steel, roll-grooved	280
Sump pumps, installation costs	435	water	416	Schedule 160 steel	265
Supermarkets, HVAC estimates	437	Taxable fringe benefits	6	Schedule 40 steel, cut-grooved	286
Supervision expense	6	Taxes	6	Schedule 40 steel, roll-grooved	272
Supervision valves		Tee, reducing		Schedule 40 steel, threaded	233
flanged	172	copper, pressfit	87	Schedule 40 steel, welded	223
grooved	173	Tees		Schedule 80 steel, threaded	255
Supply registers	334	ABS	153-154	Schedule 80 steel, welded	246
Supports, wall bracket	126	cast iron, hub & spigot	144	Type K copper, brazed	41
Surplus materials	10	cast iron, no-hub	140-141	Type K copper, soldered	52
Swimming pool heat recovery		cast iron, threaded	181	Type L copper, brazed	60
ventilators	292	class 110 DI, cement lined	412	Type L copper, soldered	68
Swing check valves		class 150 cast iron	413	Type M copper, brazed	77
pipe and plumbing specialty ...	129-130	class 153 DI, cement lined	408	Type M copper, soldered	85
PVC, Schedule 40	100	class 153 DI, double cement		Thermostats, heat pump	313
PVC, Schedule 80	110	lined	411	Threadolets	
Schedule 10 steel, roll-grooved	278	class 2400 or 3000 asbestos		pipe and plumbing specialty	136
Schedule 160 steel, flanged	264	cement	414	Schedule 160 steel, welded	263
Schedule 40 steel, cut-grooved	284	copper, DWV, soldered	149	Schedule 40 steel, welded	219
Schedule 40 steel, roll-grooved	271	CPVC sprinkler pipe	184	Schedule 80 steel, welded	243
Schedule 40 steel, threaded	232	PE-AL pipe	114, 119	Tier IV	200
Schedule 40 steel, welded	221	PEX-AL pipe	114, 119	Timer, fan	328
Schedule 80 steel, threaded	253	polypropylene pipe	167	Tin solder	33, 43, 61, 78
Schedule 80 steel, welded	244	PVC sewer, bell & spigot	164	Toilet	
Type K copper, brazed	40	PVC, DWV	157	disconnect	433
Type K copper, soldered	50	PVC, Schedule 40	95	removal	432
Type L copper, brazed	59	PVC, Schedule 80	105	Tools	117, 120
Type L copper, soldered	67	roll-grooved, Victaulic	179-180	Trailers, office, rental	420
Type M copper, brazed	76	Schedule 10 steel, roll-grooved	275	Transceiver	339
Type M copper, soldered	84	Schedule 160 steel, threaded	260	Trap primers, installation costs	435
Switches, sprinkler system	174	Schedule 160 steel, welded	260	Traps with bushing connections	26
		Schedule 40 steel, cut-grooved	282	Traps, steam	127
		Schedule 40 steel, roll-grooved	268	Treatment tank	417
		Schedule 40 steel, threaded	225	Triple duty valves	122
		Schedule 40 steel, welded	217	Trucks, rental	420
		Schedule 5 steel, pressfit	237	Tub	
		Schedule 80 steel, threaded	250	disconnect	433
		Schedule 80 steel, welded ...	240-241	removal	432
		spiral, galvanized steel	361-366	Tub and shower combinations	28
		Type K & L copper, roll grooved ...	89	Tube-axial fan	326

T

Table of contents	3
Tables	
budget estimates	435
trenching costs	418-419
Tailpiece connections	26

477

Schedule 40, welded	222	W - X - Y - Z	
Schedule 80 steel, threaded.....	254	Wall exhauster.....	327
Schedule 80 steel, welded	246	Wall fan	327
Schedule 160 steel, flanged.....	264	Wash fountains, installation costs ...	435
solenoid	205	Waste heat controls.....	204
solvent weld.....	99, 109	Waste systems	
sprinkler system.....	173	cast iron, hub & spigot.....	143
supervision, flanged.....	172	cast iron, no-hub.....	143
supervision, grooved	173	copper.....	148
tags	421	PVC	156
triple duty.....	122	PVC, DWV.....	156
Type K copper, brazed	40	Water closets	27
Type K copper, soldered	50	disconnect	433
Type L copper, brazed	60	estimating	435
Type L copper, soldered.....	66-68	Water coil piping	295
Type M copper, brazed	75-77	Water connections, hot and cold.....	26
Type M copper, soldered.....	83-85	Water cooled chiller connection	212
Vane-axial fan	325	Water hammer arresters	135
Vans, storage, rental	420	Water heaters	
Variable-air volume		commercial	19-20
cooling units.....	338	connections	21
reheat units.....	338	estimating	435
Vent systems.....	435	residential	19-20
cast iron, hub & spigot.....	143	solar	324
cast iron, no-hub.....	143	tankless	20
copper.....	148	tankless indirect.....	204
PVC, DWV	156	Water meters	
Ventilation		by-pass and connection	
ductwork	347-348	assembly	121
exhausters	330	compound type	121
fans	328	turbine type	121
Ventilator		Water motor gong.....	176
heat recovery.....	302	Water pump	314
fans.....	327	jet.....	314
Vents, air	123	well	314
Verantis	200	Water softener.....	22-24
Victaulic roll-grooved fittings....	178-180	accessories.....	23
		Water softening systems, boiler	199
		Water source heat pump.....	308-309
		Water storage tank.....	416
		Water wells	
		drilling	317
		Watertube boilers	189
		Weekly rental, equipment.....	420
		Welding machines, rental	420
		Weldolets	
		pipe and plumbing specialty	136
		Schedule 160 steel, welded	262
		Schedule 40 steel, welded	219
		Schedule 80 steel, welded	242
		Wells	
		drilling	317
		geothermal.....	317
		pipe.....	315
		water pump.....	314
		Well-to-well heat pump.....	308-309
		Wheel	
		heat recovery.....	302
		Wireless transceiver	339
		Wyes	
		ABS	153-154
		cast iron, hub & spigot.....	145-146
		cast iron, no-hub.....	138-140
		class 150 cast iron.....	413
		class 153 DI, cement lined	409
		class 153 DI, double cement	
		lined.....	411
		class 2400 or 3000 asbestos	
		cement.....	414
		copper, DWV, soldered	149
		polypropylene pipe	167-168
		PVC sewer, bell & spigot.....	162-164
		PVC, DWV	157

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