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2017 NATIONAL ELECTRICAL ESTIMATOR

By Mark C. Tyler

SAMPLE

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Contents

How to Use This Book	5	Section 2: Wire and Cable	88
Improving Estimating Accuracy and Profits	7	Copper Building Wire.....	93
Section 1: Conduit and Fittings	10	Flexible Cords.....	96
EMT Conduit.....	17	Non-Metallic Cable	100
EMT Fittings	18	Armored Cable	103
Flexible Conduit.....	28	Power Cable.....	104
Flex Connectors	29	Aluminum Wire	105
Flex Couplings.....	32	Steel Messenger Strand	114
Liquid-Tight Flex Conduit.....	33	Wire Connectors.....	115
Liquid-Tight Flex Connectors.....	34	Connector Lugs	118
PVC Conduit.....	37	Section 3: Outlet Boxes	119
PVC Fittings.....	38	Handy Boxes and Covers, Switch Boxes	123
P&C Duct.....	45	Octagon and Square Boxes	125
P&C Fittings.....	46	4" Square Switch Rings and Bar Hangers.....	129
Plastic Spacers.....	47	Gang Boxes.....	132
ENT Conduit and Fittings	48	Fiberglass Boxes	133
Galvanized Rigid Steel Conduit and Elbows	49	Plastic Boxes	140
GRS Elbows and Couplings	51	Cast Aluminum Boxes	143
GRS Terminations, IMC and Elbows	52	Sheet Metal Pull Boxes	146
IMC Elbows, Couplings and Running Thread.....	53	Floor Boxes, Covers, and Accessories.....	153
GRS Locknuts and Bushings.....	54	Section 4: Lighting Fixtures	157
GRS Nipples.....	55	Incandescent Light Fixtures.....	161
Aluminum Rigid Conduit Elbows & Nipples	58	Recessed Light Fixtures	166
ARC Nipples	59	Track Lighting.....	168
Metal Entrance Elbows and Conduit Bodies	63	Exit Fixtures.....	171
Conduit Body Covers.....	64	Fluorescent Fixtures	174
Conduit Body Gaskets and Bodies.....	65	HID Fixtures.....	181
Galvanized Capped Elbows	65	Light Poles.....	195
Galvanized Cast Boxes and Covers.....	66	LED Lamps.....	199
Expansion Fittings	68	Compact Fluorescent Lamps.....	201
Reducing Bushings.....	69	Incandescent Halogen, Quartz, LED Lamps	202
Reducing Washers	70	HID Lamps.....	204
Bushed Nipples	71	Sodium Lamps.....	208
Couplings and Offset Nipples	72	Fluorescent Lamps	210
Couplings and Connectors	73	Ceiling Fans.....	217
Connectors and Straps.....	75	Section 5: Wiring Devices	218
Conduit Clamps and Entrance Caps	77	Switches	223
PVC Coated Conduit and Fittings.....	78	Single and Duplex Receptacles.....	237
Hanger Fittings	86	Ground & Arc Fault Circuit Interrupters	246
Steel Channel and Fittings	87	Power Cord Receptacles and Plugs.....	248
		Locking Receptacles	253
		Plastic Locking Connectors and Plugs	255
		Photo Controls.....	259
		Wiring Device Plates	260

Section 6: Service Entrance Equipment 269

Safety Switches	275
Plug Fuses.....	283
Cartridge Fuses	285
Circuit Breakers	306
Circuit Breaker Enclosures	315
Meter Sockets and Meter Centers.....	317
Loadcenters and Panelboards.....	322
Signal Cabinets	327
Wireway and Wireway Fittings	328
Transformers	332

Section 7: Underfloor Raceway 335

Junction Boxes and Duct Supports	339
Underfloor Raceway Fittings	341
Service Fittings	342

Section 8: Bus Duct 343

Aluminum	346
Copper.....	350
Bus Duct Fittings	354
Bus Duct Plug-in Units.....	356

Section 9: Cable Tray 358

Louvered Tray and Fittings.....	361
Aluminum Ladder Tray and Fittings.....	363

Section 10: Signal Systems 365

Bells, Buzzers and Sirens.....	367
Beacons and Chimes	369
Signal Systems.....	370
Detectors	371
Entry Control.....	372

Section 11: Precast Concrete Access Boxes 373

Handholes, Pull Boxes and Manholes.....	375
Manhole Necking and Transformer Slabs	376

Section 12: Equipment Hookup 377

Motor Hookup and Mechanical Hookup	379
Kitchen Hookup	380
Standby Generator Hookup.....	381

Section 13: Motor Control Equipment 382

Manual Motor Starters	384
Magnetic Contactors.....	390
Magnetic Starters	398
Combination Starters.....	404
Control Stations	418

Section 14: Trenching and Excavation 420

Trenching and Excavation	422
--------------------------------	-----

Section 15: Surface Raceways 423

Steel Raceway, Fittings and Assemblies.....	426
Overhead Distribution Systems	432
Telephone-Power Poles	436

Section 16: Grounding 438

Copper Wire and Bushings.....	442
Lugs and Clamps.....	443
Ground Rods	444
Exothermic Connections.....	445

Section 17: Assemblies 446

EMT Conduit.....	447
Aluminum Flex Conduit	451
Steel Flex Conduit	455
PVC Conduit.....	459
Galvanized Rigid Conduit.....	463
Handy Box Switches.....	467
Sectional Box Switches	471
Switches, 1 and 2 Gang	487
Boxes and Receptacles.....	508
Troffer Fluorescent	518

Section 18: Communications 519

Communications Cable	521
Contacts, Pins, Plugs, Receptacles.....	528
Subminiature D Connectors	529
Data Connectors.....	532
Baluns.....	533
Modular Couplers, Jacks, Connectors.....	534

Wire Conversion Table 537

Section 19: Undercarpet Wiring Systems 538

Wiring, Cables, Connectors, Accessories	539
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Index 542

How to Use This Book

This manual is a guide to the cost of installing electrical work in buildings. It lists costs to the electrical subcontractor for a wide variety of electrical work.

Before using any estimate in this book, you should understand one important point about estimating electrical construction costs. Estimating is an art, not a science. There's no estimate that fits all work. The manhour estimates in this book will be accurate for many jobs, but remember that no two jobs are identical. And no two crews complete all tasks in exactly the same amount of time. That's why electrical cost estimating requires exercising good judgment. Every estimate has to be custom-made for the specific job, crew and contractor. No estimating reference, computerized cost estimating system or estimating service can take into consideration all the variables that make each job unique.

This book isn't meant to replace well-informed decisions. But when supplemented with an estimator's professional evaluation, the figures in this manual will be a good aid in developing a reliable cost of electrical systems.



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Labor Costs

The labor costs listed in this manual will apply to most jobs where the hourly wage in effect is the same or similar to the following rates:

Journeyman Electrician

Base Wage.....	\$30.25 per hr.
Taxable Fringe Benefits at 5.48%.....	\$1.66 per hr.
Taxes & Insurance at 19.86%.....	\$6.36 per hr.
Non-taxable Fringe Benefits at 4.84%...	\$1.47 per hr.
Total Labor Cost.....	\$39.84 per hr.

The total hourly cost includes the basic wage, taxable fringe benefits (vacation pay), workers' compensation insurance, liability insurance, taxes (state and federal unemployment, Social Security and

Medicare), and typical nontaxable fringe benefits such as medical insurance.

If your hourly labor cost is much lower or higher, costs of installation can be expected to be proportionately lower or higher than the installation costs listed in this book. If your total hourly labor cost is 25 percent less, for example, reduce the labor figures in the cost tables by 25 percent to find your local cost.

The Craft@Hrs column shows the recommended crew and manhours per unit for installation. For example, L2 in the Craft@Hrs column means that we recommend a crew of two electricians. L1 means that a crew of one electrician is recommended. Costs in the Labor Cost column are the result of multiplying the manhours per unit by the rate of \$39.84 per hour.

For example, if the Craft@Hrs column shows L2@.250, the Labor Cost column will show \$9.96. That's .250 manhours multiplied by \$39.84 per man-hour and rounded to the nearest penny.

Divide the manhours per unit into 8 to find the number of units one electrician can install in one 8-hour day: 8 divided by .250 equals 32 units per day. Multiply that amount by the number of crew members to find the number of units the crew is likely to install in an 8-hour day. For example, if the crew is two electricians, multiply 32 by 2 to find that the crew can be expected to install 64 units in an 8-hour day.

Some tasks require less labor under certain conditions. For example, when conduit is run in groups, less labor is required for each 100 linear feet. It's the estimator's responsibility to identify conditions likely to require more or less labor than the standard for the type of work being estimated.

This book lists both the labor cost per installed unit and the manhours required for installation. Manhours are listed in hundredths of an hour rather than minutes, making it easier to calculate units.

Material Costs

Material prices in this book are based on actual costs in late 2016, with projections to mid-2017 based on the author's judgment. Prices are neither "retail" nor "wholesale" costs. Instead, they're intended to reflect typical costs to electrical contractors who buy at electrical supply houses in mid-2017. Volume purchases may cost less because many dealers offer quantity discounts to good customers. Expect prices to vary with location, terms demanded, services offered, and competitive conditions.

Prices in this manual are not representative of shelf prices for electrical materials at big box building

material retailers – and for good reason. Most electrical contractors don't buy from big box retailers. They buy from specialized electrical material dealers who offer the selection, service and terms that electrical contractors expect. Big box retailers stock limited quantities, no more than a few hundred electrical SKUs, specialize in commodity-grade merchandise and are generally not set up to meet the needs of professional electrical contractors.

Material costs in this book include normal waste. If waste of materials or breakage is expected to exceed 3 to 5 percent of the materials used on the job, include a separate allowance for excessive waste.

Material delivery cost to the job site isn't included in this book. When delivery cost is significant and can be identified, add that cost to these figures.

Please note that the cost of some electrical materials is highly volatile. For example, copper wire prices have been known to fluctuate 10 percent or more in one month. There's no reliable way to forecast price movements like this. If you're bidding on a project that has a quantity of copper products, you may want to add a qualification to your bid proposal which would allow you to pass on a pricing increase (or decrease), based upon the actual materials pricing at the time of purchase. This way, you can use the current price quoted at the time of your bid, but still leave the door open to any major pricing fluctuations.

Add Sales Tax

No state or local sales tax is included in material prices listed here. Sales tax varies from area to area and may not be applicable on purchases for some types of projects. Add at the appropriate rate when sales tax is charged on materials bought for the job.

Add Overhead and Profit

To complete the estimate, add your overhead and expected profit. Many contractors add an additional 10 to 15 percent for profit to yield an acceptable return on the money invested in the business. But no profit percentage fits all jobs and all contractors. Profit should be based on the current market in each user's local area.

For some electrical contractors, overhead may add as little as 10 percent to the labor and material cost. But routinely adding 10 percent for overhead is poor estimating practice. Overhead should be based on each user's built-in costs. It's the estimator's responsibility to identify all overhead costs and include them in the estimate, either as a lump sum or as a percentage of the total labor and material cost.

Other Costs to Add

A few other costs are excluded from the figures in this manual: electrical building permits, special hoist-

ing costs, freight costs not absorbed by the supplier, utility company charges for installation and service, special insurance and bonds, power equipment other than small tools, mobilization to remote sites, demobilization, nonproductive labor, and nonworking supervisors. If these costs are significant and can be determined, add them to your estimate. If not, you should exclude them and specify clearly that they're not a part of your bid.

All Tables Assume "Good" Conditions

This means that there are few or no unusual conditions to delay production. Conditions are good when work is performed during usual working hours in relatively clean surroundings and in readily accessible areas not over 12 feet above the finish floor. The temperature is between 50 and 85 degrees F. Electricians are working no more than 8 hours a day, 5 days a week.

Good conditions require that all tools and materials be available on the job site when needed. Tools, including power tools, are assumed to be in good working order. Where power tools are appropriate, it's assumed that temporary power is provided. Add the cost of temporary power when it's furnished at your expense.

Proper supervision makes a big difference in labor productivity. The tables assume there is adequate supervision but make no allowance for nonproductive labor — supervisors who direct but do no installation. If you plan to have nonproductive supervision on the job, add that cost to the figures in this manual.

Conditions are seldom "good" when the work area is confined, or when a short construction schedule makes it necessary for many trades to work at the same time. The usual result will be stacks of material obstructing the work space and several tradesmen competing for access at the point of installation.

If the conditions on the job you're estimating aren't expected to be "good," adjust the labor figures in this book as appropriate. Occasionally, larger jobs can be done faster because specialized equipment or crews can be used to good advantage. This will usually reduce the installation cost. More often, conditions are less than "good." In that case, labor costs will be higher.

There's no accepted way to decide how much "bad" conditions will increase the labor hours needed. But it's accepted estimating practice to assign a cost multiplier of more than 1.0 to a job that can be expected to require more than the usual amount of labor per unit installed. For example, if conditions are less than "good" only in minor respects, you might multiply labor costs by 1.10. If conditions are very poor, a multiplier of 1.50 or more may be appropriate.

Other Factors That Affect Productivity

This book's tables assume that the crew used for the job is the smallest crew appropriate for the work at hand. Usually this means that the crew is one journeyman electrician.

Most experts on the productivity of construction trades agree that the smallest crew that can do the job is usually the most efficient. For example, it's foolish to have two men working together setting duplex receptacles — one handing tools and material to the other as needed. Only one of them would be working at any given time. It's more productive to use two one-man crews, each working independently.

Of course, there are exceptions. Sometimes a crew of one takes twice as long as a crew of two. When pulling feeder cable or setting floor-standing switchboards or motor control centers, more help usually cuts the labor cost per installed unit. Some jobs simply can't be done by a crew of one.

When work is done on a scaffold, someone should be on the ground to chase parts and equipment and prepare lighting fixtures for hanging. It wastes manpower to have an electrician leave the scaffold and return when parts or tools are needed. Scaffold

installers should install one fixture while the "grunt" below prepares the next. Conduit should be prefabricated on the ground from measurements taken by the electricians on the scaffold. The assistant should bend the conduit and hand it up to the installer.

These labor savings are obvious to anyone who's done this type of work, and are assumed in this book's labor tables.

The Electrician

This book's labor hours are typical of what a trained and motivated journeyman electrician with 5 years of experience will do on most jobs. It's assumed that the installer can read and follow plans and specifications and has the ability to lay out the work to code.

It shouldn't make any difference whether the work is in a hospital, a grocery store, a wood mill or a small convenience store. An experienced journeyman electrician should be able to handle the work at the rates shown here even though the materials and code requirements differ. But you'll have to make allowances if your installers are only familiar with residential work, and the job at hand is something else.

Improving Estimating Accuracy & Profits

It's been said that electrical estimators learn by making mistakes. The best estimators are the ones who've made the most mistakes. Once you've made every mistake possible, you're a real expert.

I can't subscribe 100 percent to that theory, but I know that there are plenty of pitfalls for unsuspecting electrical estimators. This section is intended to suggest ways to spot potential problems before they become major losses. It'll also recommend steps you can take to increase the profit on most jobs.

Labor Productivity

Improving output even slightly can result in major cost savings. Cutting only a minute or two off the installation time for each duplex receptacle or handy box can reduce the labor cost by several hundred to a thousand dollars a job. Getting better productivity from your electricians should be a primary concern for every electrical contractor.

Assuming your electricians are experienced, well-trained, and have all the tools and materials they need to complete the work, the most significant increase in productivity will probably be through motivation.

The best form of motivation for most electricians is to encourage pride in the work they do. Every alert supervisor knows the value of recognizing a job well done. Acknowledging good work builds confidence and encourages extra effort in the future.

Labor Availability

Labor in each locale may not always be readily available. Prior to bidding any project, make an evaluation of the available work force. You may need to make staffing or salary adjustments for the duration of that project. Your work force evaluation will help you prepare for adding another workman, or adjusting a current employee's salary and benefits to compete with rates in your area.

Handling Inspections

The on-site supervisor or foreman should be responsible for dealing with all inspectors. Don't let others circumvent the supervisor's or foreman's authority.

An inspector's only job is to see that the installation complies with the code. They aren't supervisors and don't direct the work. They can and do interpret the code and sometimes make mistakes. Encourage the foreman or supervisor to take issue promptly with a questionable interpretation. Ask the inspector to cite a specific code as his reference. If the inspector insists that his interpretation is correct, and if you believe it's wrong, call the building official to initiate an appeal. Your trade association or the National Electrical Contractors' Association may also be able to persuasively argue in your favor.

Some inspectors have a reputation for being impossible to deal with. Aggressive enforcement of questionable code interpretations can severely hurt project productivity. Following the code carefully will keep you out of most compliance arguments. Every electrician and electrical supervisor must know the code. Code classes are taught at continuation schools in many communities. You can take code classes to both understand how the code is applied and to remain current on code changes.

Mobilization and Demobilization

Many electrical subcontractors have job shacks and lockup boxes that can be moved onto the job for storing tools and materials. Some larger firms have trailers that can be moved from job to job. No matter what type of on-site storage you use, setting up takes time. The bigger the job, the more time will probably be needed.

Usually the first step is getting permission to set up your storage area on the site. Sometimes storage space is at a premium. Some city projects literally have no storage space until parts of the building are completed and can then be used. Occasionally tools and equipment will have to be stored off site. This can require daily mobilization and demobilization, which increases your labor cost substantially. Be sure your estimate includes these costs.

Demobilization usually takes less time and costs less than mobilization. Removing the surplus material, tools and equipment can be done by helpers or material handlers rather than electricians.

One important item in mobilization is temporary electrical service. Be sure you know who pays for installation of temporary power and who pays for power used on site during construction. It's common for the electrical contractor to cover the cost of electrical distribution and service. Installation is usually done by your electricians and will have to pass inspection.

Most communities require temporary electrical permits prior to starting work. Before applying for the permit, contact the electric utility provider and request a meeting with whoever coordinates extensions of service — usually the planner. Before your meeting, determine what size service you need. The planner will tell you what voltage is available and where the point of connection will be. Don't end this meeting with the planner until you've covered every requirement and procedure imposed by the electric utility.

Job Cleanup

Trash and debris that obstructs access to (and on) the job site can make good production next to impossible. That alone should be encouragement to regularly dispose of accumulated waste. Most specifications require that subcontractors remove unused materials, cartons, wrappers and discarded equip-

ment. On many jobs, the general contractor has the right to backcharge subs for removal of their discards if they don't clean the site themselves.

Encourage your crews to do their cleanup while installation is in progress. For example, each time a fixture is removed from a carton, the tradesman should collapse the carton and throw it on the discard pile. It takes slightly more time to dispose of trash this way, but cleanup is less likely to be forgotten.

Some contractors and subcontractors have a reputation for running a dirty job. You've probably seen sites that are so cluttered that you can't understand how anyone could work efficiently. Of course, as the electrical contractor, you can't dictate to the general contractor or the other subcontractors. But the work habits of others affect your productivity, and consequently, your profit.

I believe that if accumulated debris is slowing progress on the job, it's within your rights to discuss it with the general and the other subs. Request a meeting, right in the middle of the clutter. That alone may do the trick.

If you don't insist on a clean site, the fire department probably will. A clean job is more efficient and safer. A cluttered job costs everyone time and money.

Production

No matter how simple and quick you anticipate them to be, most jobs will have some production problems. Every job is unique. Every job brings together skilled tradesmen with varying preferences and habits. Some have never worked together before. Yet each must coordinate the work he does with those who precede him and those who follow. It's normal to expect that some adjustments will be needed before cooperation becomes routine.

Of course, the general contractor is the key to cooperation among the trades. A general who schedules trades properly will have fewer problems and will help all subcontractors earn the profit they're hoping for. This isn't automatic. And some general contractors never learn how to schedule properly. From an estimating prospective, it's more expensive to work for a contractor who has scheduling problems than it is to work for a contractor who's efficient at job coordination. If you anticipate production problems like this on a job, your estimate should reflect it.

Good supervision helps avoid most production problems. Try to schedule material deliveries in a timely manner. Have the right tools on hand when needed. Keep crews as small as possible. Don't work your crews more than 40 hours a week unless absolutely necessary. Too many bodies and too many hours will erode production.

If you're using a larger crew, don't have everyone work at the same time. Instead, break the crew into two units and encourage friendly competition between the two. Offer a reward for the winning crew.

Corrections

This book's tables assume that little or no time is spent making corrections after the work is done. Electrical contractors should have very few callbacks.

If you're called back often to replace faulty materials or correct defective workmanship, one of four things is happening. First, you could be working for some very particular contractors or owners, or handling some very sensitive work. In that case, callbacks could be part of the job and should be included in each estimate. Second, you could be installing substandard materials. Third, your electricians could be doing haphazard work. Finally, your installation procedure could be omitting fixture and circuit tests that could locate problems before the owner finds them.

When qualified electricians install quality materials, the risk of a callback is small. Occasionally a ballast will fail after 10 or 20 hours in use. And sometimes an owner's negligence will damage a circuit or switch. When this happens, accept the service work as routine. Complete it promptly at no extra charge. Consider it cheap advertising — a chance to establish your reputation with the owner. You could turn the service call into some extra work later.

Your Type of Work

Most electrical contractors prefer to handle specific types of work. Only a few have the capital, equipment and skills needed to handle the largest jobs. Most will do residential wiring because that's the most plentiful work available. Some prefer private work with as little government interference as possible. Others bid only government jobs.

The most profitable electrical contractors specialize in one type of work or customer. The electrical construction field is too broad to do everything well. Select an area that you feel comfortable with, and concentrate on doing it as well or better than anyone else. Of course, some of the older and larger electrical shops will do almost any type of work. But nearly every electrical contractor prefers some class of job over all others — and would take only that work if there was enough available to stay busy.

Observe the electrical contractors in your area. Notice the companies that seem to be busiest and most profitable. See what class of customers they service or what type of work they do most. It's probably easier to follow the success of another contractor who's found a winning formula than it is to invent a new formula yourself.

Specialization lets you hire electricians who are specialists, too. That tends to improve productivity, keep costs down, and improve profits — as long as you're handling work that's within your specialty.

Coordination is easier and the profits will usually be higher if you work for a limited number of general contractors. Some contractors seem to be masters at putting a project together. These same contractors probably pay promptly and treat their subs fairly. That makes your job easier and tends to fatten your bottom line. If you've found several contractors who make life more pleasant for you, keep them supplied with competitive bids that'll bring more work into both your shop and theirs.

Most electrical contractors don't bid government work. It's a specialty that requires specific knowledge: complying with detailed general conditions, observing regulations, anticipating inspection criteria and following administrative procedures. And every branch of federal, state and local government has its own requirements. Those who've mastered the procedures usually do quite well when work is plentiful. But government work is a tide that rises and falls just like that of general construction.

Bid Shopping

Many contractors prefer projects that require subcontractor listings. The general contractor must list the subcontractors he plans to use, and has to use the subs he lists. When listing of subs isn't required, in some cases the general contractor shops for lower subcontract bids right up to the time work begins. Even if the general has to list his subs in the contract with the owner, he'll still usually have a month or two to shop bids after the contract is awarded.

When a general contractor uses your bid to land a job, it's normal to expect that your company will get the contract. Giving all your competition a second look at the job is in no one's interest but the general contractor's. It's a waste of time to bid for general contractors who shop their sub bids. Nor is it good practice to undercut another electrical contractor whose estimate was used by the winning general contractor. Support the effort of reputable subcontractors who promote subcontractor listing at bid time.

Need More Help?

This book is concerned primarily with labor and material costs for electrical construction. You'll find only limited information here on how to compile an estimate. If you need a detailed explanation on how to make a material take-off and complete the bid, another book by this publisher may be helpful. You can read about and purchase *Estimating Electrical Construction Revised* using the order form bound into the back of this book.

Section 1: Conduit and Fittings

Every electrical estimator should be familiar with the *National Electrical Code*®. Nearly all inspection authorities follow *NEC*® recommendations on what is and what is not good electrical construction practice. Most inspection authorities accept electrical materials that comply with *NEC* standards. But some cities and counties have special requirements that supplement the current *NEC*. Others are still following an older edition of the *NEC*. The *NEC* is revised every three years to incorporate changes deemed necessary to keep the code up-to-date.

Be aware of the version of the *NEC* that applies at each job you're estimating, and stay current on special requirements that the inspection authority may impose.

Job specifications usually state that all work must comply with the *NEC*. But on many jobs the *NEC* sets only the minimum standard. Job specifications may prohibit what the *NEC* permits. For example, job specs might require specific installation methods or mandate specification grade fixtures.

The *National Electrical Code* classifies all enclosed channels intended to carry electrical conductors as "raceway." This includes conduit, busway and wireway. The most common raceway is electrical conduit. The code identifies the size and number of conductors that can be run through each size of conduit.

Conduit is intended to serve two purposes. First, it's a protective shield for the conductor it carries. It reduces the chance of accidental damage to the wire or insulation. Second, it protects people and property from accidental contact with the conductors. A ground or short is both a safety and a fire hazard.

Conduit is generally required in commercial and industrial buildings, hospitals, hotels, office buildings, stores and underground facilities. It's not generally used in wiring homes and apartments.

Several types of electrical conduit have been approved for electrical construction. Each is designed for a specific purpose or use. All conduit used in electrical construction as a raceway for conductors must bear a label issued by the Underwriter's Laboratories. The UL label indicates that the product has been approved for use under the *National Electrical Code*.

The *NEC* permits a maximum of four bends totaling 360 degrees between terminations in a run

of conduit. Exposed conduit should be installed horizontal or vertical and should run parallel to building members. Concealed conduit should be run in the shortest direct line to reduce the length of run. Long runs waste materials, require excessive labor and, if long enough, can reduce the voltage available at the load end.

Electrical Metallic Tubing

EMT is also known as **thin wall** or **steel tube**. EMT conduit is nonferrous steel tubing sold in 10-foot lengths. Unlike water pipe, the ends aren't threaded. The conduit has a corrosion-resistant coating inside and outside. This coating may be hot-dipped galvanizing, electroplating, or some other material. The conduit sizes are ½", ¾", 1", 1¼", 1½", 2", 2½", 3", 3½" and 4".

Many types of EMT fittings are available. There are elbows, compression, set screw, indent and drive-on fittings which may be made of steel or die cast. Couplings and connectors are sold separately and not included in the price of the conduit. Various types of connectors may be purchased with or without insulated throats. The locknuts for the connectors are included in the cost of the connector.

Couplings are available for joining EMT to rigid metal conduit and to flexible conduit. These couplings are available in compression, set screw and drive-on type and are made of steel or die cast.

EMT conduit is sold without couplings. You have to figure the number of couplings needed and price them separately. To figure the number needed, allow one coupling for each 10 feet of conduit. Then add one coupling for each factory-made elbow.

EMT should be bent with a special conduit bender. The bender has a shoe that fits over and around about half of the conduit to keep the conduit from collapsing as it bends. With a bender it's easy to produce smooth, consistent bends up to 90 degrees. Hand benders are used on sizes from ½" to 1¼". EMT bending machines are available for all sizes of conduit. There are manual, hydraulic and electrically driven machines.

Offsets are made to take EMT conduit around obstructions, and when needed, to align the conduit at a box or cabinet. You can make offsets with a hand bender on sizes up to 1¼". Offsets in EMT conduit over 1¼" should be made with a machine.

In smaller sizes, conduit can be cut with a tubing cutter. Cut larger diameters with a hacksaw or by machine. Cut ends must be reamed to remove the burrs made while cutting. Burrs can damage insulation when wire is pulled through the conduit. Ream with a pocket knife or pliers on smaller sizes and with a metal file or pipe reamer on larger sizes.

EMT must be supported so it doesn't deflect on longer runs. Straps and nailers are the most common way of supporting EMT. Straps usually have one or two holes for securing to the building. Most inspection authorities won't let you support EMT on plumber's perforated metal tape. Straps come in thin steel, heavy duty steel or malleable types. There are special straps made of spring steel for supporting small sizes of EMT to hanger rods or drop ceiling wires.

EMT conduit should be supported at least every 10 feet with a strap or hanger and within 18 inches of every junction box or cabinet.

Other supports include beam clamps for attaching conduit to structural steel members and straps for mounting EMT on steel channel strut. These two-piece straps or clamps are inserted into the strut and bolted together to hold the conduit in place.

EMT can be installed inside or outside, in concrete or masonry, exposed or concealed in walls, floors or ceilings. But be sure to use the correct fittings in wet locations. EMT is not approved for most types of hazardous locations. Some specs limit the use of EMT to dry areas and don't allow placement in masonry or concrete. Conduit placed in concrete floor slab is generally placed below the reinforcing bar curtain or between curtains when two curtains are used. Tie the conduit to the rebar to prevent shifting as the concrete is placed.

Where conduit is turned up above the surface of the concrete, the radius of the turn must be concealed. Part of it can be concealed in a wall, but none should be visible after the building finish has been installed.

As with all types of conduit, EMT should be installed with a minimum of damage to the structure. Keep it clear of heating, ventilating and air conditioning ducts, fire sprinkler systems, plumbing lines, access doors, etc. When necessary, the installer will have to make offsets and bends so the conduit fits into devices, electrical boxes and cabinets.

Flexible Metal Conduit

There are several types of flex conduit: standard wall steel flex, reduced wall steel flex, and aluminum flex. It comes in diameters from 3/8" to 4" and is coiled in rolls of 100 feet in the small sizes and 25 feet in the larger sizes. Flex is usually used

in concealed locations but never underground or in concrete. It's cut with a special flex cutter, a hand hacksaw, or with a power cutter such as a portable band saw. The inside cut edge must be reamed to remove cutting burrs which would damage insulation when wire is pulled through conduit.

Flex connectors are available with set screw, screw-in, clamp type, straight, or angled connectors. They're made of steel or die cast. Insulated connectors are also available. Die cast flex couplings are available for joining flex to flex, flex to EMT, or flex to threaded conduit. Support flex with conduit straps or nailers.

Most inspection authorities require that a bonding conductor be installed when electrical wiring is run in flex. Bonding ensures that there's electrical continuity in the flex from one end to the other.

Some specifications restrict the use of flex to short connections to equipment that is subject to vibration (such as motors and machinery) and for built-ins, recessed lighting, and lay-in lighting fixtures.

Flex conduit is popular in remodeling work where wiring in raceway has to be run through an existing cavity wall or in a ceiling cavity. With a little effort, your installer can fish the flex from point to point without opening the wall or ceiling.

Polyvinyl Chloride Conduit

PVC conduit is approved by the *NEC* for many types of applications. But there are some situations where it cannot replace metallic conduit. It's not approved for hazardous locations or in return air plenums. Check with the inspection authority for other restrictions. The standard length is 10 feet and sizes range from 1/2" to 6". Schedule 40 PVC is the standard weight. Schedule 80 has a heavier wall. PVC can be installed directly underground, concrete encased underground, exposed, in concrete walls, and in unit masonry.

One coupling is furnished with each length of conduit and is usually attached to the conduit. PVC must be bent with a special hot box which heats the conduit until it becomes pliable. Once heated to the right temperature, the tube is bent and then allowed to cool. PVC fittings fit both Schedule 40 and 80 conduit. Couplings, terminal adapters, female adapters, expansion fittings, end bells, caps, conduit bodies, pull boxes, outlet boxes and elbows require a special cement. The glue is air-drying and comes in half-pints, pints, quarts, and gallon containers. The smaller containers have a brush attached to the cap for applying the cement to the conduit or fittings. PVC conduit can join other types of conduit if you use the right fittings to tie the two types together.

PVC is nonconductive. That makes a bonding conductor necessary to ensure electrical continuity

from the device to the service panel. You probably won't need a bonding conductor when PVC is used as communications conduit or in some application that doesn't include electrical wiring. When installed exposed, PVC requires extra support to keep it from sagging.

Some job specs restrict use of PVC to specific locations. One common restriction is to limit PVC to underground installations encased in a concrete envelope. Many specifications restrict its use to certain applications.

PVC conduit can be cut with a hand hacksaw, a wood crosscut saw, or with a power cutting machine. The inside cut edge should be reamed to remove the cutting burr. Use a pocket knife or a file.

Power and communications duct is usually called **P&C duct**. It's made of PVC in 25-foot lengths and in diameters from 1" to 6". There are two types of P&C duct. One is called **EB** for encased burial. The other is **DB** for direct burial. Fittings for P&C duct include couplings (one is furnished with each length), end bells, caps and plugs, terminal adapters, female adapters, elbows, and expansion fittings. The elbows are available in various shapes and with either long or short radii. Fittings can be used either on type EB or DB. Use a special cement to weld the fittings to the conduit.

Bend P&C duct with a hot box. It can be cut with the same tools as PVC conduit. The inside cut edge must be reamed to remove the cutting burr.

P&C duct is used for underground systems only, never above ground.

ABS underground duct is used and installed the same as PVC P&C duct. It requires a special ABS cement to weld the fittings to the conduit. The job specifications or the utility company may require either P&C, ABS or PVC duct, depending on the specific use.

Galvanized Rigid Conduit

GRS or **RSC** (for rigid steel conduit) is made with nonferrous metal and has a corrosion-resistant coating on the inside. The outer coating is either hot-dipped galvanizing or electroplate. It comes in diameters from ½" to 6" and in 10-foot lengths with a thread on each end. A coupling is furnished on one end of each length. GRS can be cut with a hand hacksaw, a pipe cutter, or with a cutting machine. The inner cut edge must be reamed to remove the burr. Use a pipe reamer or a file.

After the pipe has been cut and reamed, it can be threaded. Use a hand die for threading on a small job. Where there's more cutting and threading to be done, use a threading machine. Several types are available. Small portable electric threading tools cut sizes up to 2". Larger threading machines can cut, ream and thread conduit diame-

ters up to 6". Another good choice for GRS up to 6" is a threading set that uses a tripod vise stand and a threading head that clamps to the pipe in the vise stand. The threading head is turned with a universal joint connected to a power vise. Another set uses a tripod vise stand to hold the conduit. The threading head clamped on the conduit is turned with a reduction gear assembly powered by an electric drill. This rig works well on diameters over 2".

Use enough cutting oil to keep the die cool and lubricated during thread cutting. Cutting oil comes in clear or dark and in small cans, gallons and barrels. Use an oil can to keep a film of oil ahead of the dies. Commercial oiling units hold about a gallon of cutting oil and recirculate oil back to the cutting teeth as oil drips into the catch basin. Most threading machines have automatic oilers that filter the oil as it's reused.

Elbows are available for all sizes of GRS. Long radius bends are available for the larger sizes. Some specifications require concentric bends for all exposed conduit installed parallel on a common hanging assembly or trapeze.

GRS fittings include couplings, locknuts, bushings, one-hole straps, two-hole straps, heavy duty two-hole straps, expansion fittings, threadless compression couplings, threadless set-screw couplings, threadless compression connectors, threadless set-screw connectors, three-piece union-type couplings, strut clamps, beam clamps, hanger clamps, condulets, split couplings, caps, and plugs.

Galvanized rigid conduit is bent about the same way as EMT except that the bender is made for bending rigid conduit. Hand benders are used on conduit up to 1". There are hand benders for 1¼" and 1½" rigid steel conduit, but it takes a lot of effort to make the bend. Power benders can be used on all sizes of conduit, even the ½".

There are three common types of rigid steel benders: one-shot benders create a single standard radius arc. Segment benders must be moved along the conduit as each few degrees of bend are made. The electric sidewinder bender has up to three bending shoes in place ready to bend any of three sizes of conduit. The sidewinder saves labor on larger rigid conduit jobs.

Supports for rigid conduit must be no more than 10 feet apart from support to support and within 18 inches of junction boxes or cabinets.

Trapeze hangers are often used to carry multiple runs of GRS conduit. Trapeze hangers can be made from strut, angle iron, or channel iron. The trapeze is supported from the structural frame of the building with threaded rod — usually either ¾" or ½" diameter. The upper part of the rod is attached to beam clamps or concrete anchors. The lower portion of the rod is run through the trapeze and is secured with double nuts and flat washers.

Like other hangers, trapezes have to be placed within 10 feet of each other and should be sized to support the total weight of the conduit and all cable. Trapeze hangers can be stacked one over the other with conduit clamped on each one.

IMC Conduit

Intermediate metal conduit (IMC) has a thinner wall than GRS. It comes in the same sizes and uses the same fittings as GRS. The same tools can be used for cutting, threading, and bending. It's made about the same way as GRS, comes in 10-foot lengths and is galvanized for corrosion resistance. The difference is that IMC is lighter and easier to install than GRS. Some specifications restrict its use to specific applications.

PVC Coated Conduit

Both GRS and IMC conduit come with a PVC coating for use in highly corrosive locations. Aluminum tubing also comes with a PVC coating, but applications are restricted to specific uses. The PVC coating is either 10, 20 or 40 mils thick, and is bonded directly to the conduit wall. Most fittings made for use with GRS are available with a PVC coating.

To thread PVC coated conduit, the PVC coating must be cut back away from the end to be threaded. When PVC coated conduit is put in a vise, be sure the coating is protected from the vise jaws. Also be careful when you're bending PVC coated conduit not to damage the coating. If the coating is damaged, patching material is available to restore the surface. The material comes in a spray can. Apply several thin layers to repair worn spots.

Conduit Take-Off

Here's how to calculate conduit quantities. First, scan the specs that cover conduit and conduit installation. Absorb all the information that relates to conduit. Then review the drawings for anything about conduit. The symbol list may include the engineer's design notations. Notes on the drawings or in the specs may set specific minimum conduit sizes. It's common for an engineer to require a minimum size conduit in the home run to the panel or cabinets or to specify a minimum size of $\frac{3}{4}$ " throughout the job. It's also common practice to limit the maximum size of EMT to 2". Ignoring a note like that can be expensive.

For your quantity take-off, use any ruled $8\frac{1}{2}$ " by 11" tablet. Draw a pencil line down the left side of the sheet about an inch from the edge. Begin by looking for the smallest diameter of EMT. Write "EMT" at the top left of your take-off sheet. On the next line down, to the left of the vertical line, list the smallest EMT size found in the project — probably $\frac{1}{2}$ ". To the right of the vertical line and on the

same horizontal line as the size, you're going to list lengths of EMT of that diameter. Then you'll go to the next larger diameter, listing quantities until all EMT on the plans has been covered.

Check the plan scale before you start measuring conduit. If the plan has been reduced photographically to save paper, the scale will be inaccurate. Once you're sure of the correct scale, select the appropriate map measure or rule to compute conduit lengths.

Measure the length of each run of $\frac{1}{2}$ " EMT. Add enough conduit to include the run down to the wall switch, receptacle or panel. Write down the calculated length. As each run is listed on your take-off sheet, put a check mark on the plan over the line you just measured. Use an erasable color pencil and let each color stand for a particular conduit type. For example, red might be for GRS conduit. Follow the same color code on all estimates to avoid mistakes.

If there are more than two or three plan sheets, it's good practice to calculate the length of $\frac{1}{2}$ " EMT on each plan sheet and list that number separately on your take-off form. When you've finished taking off $\frac{1}{2}$ " EMT on the first plan sheet, list that quantity, and at the top of the column write in the plan sheet number. Then draw a vertical line to the right of that column and start accumulating lengths from the next plan sheet. As each plan page is taken off, enter the total and write the plan sheet number at the top of the column. Figure 1-1 shows what your take-off might look like if conduit and fittings are found on plan sheets E3 to E11.

When all of the smallest-diameter EMT has been listed, go on to the next larger size. Follow the same procedure.

After listing all EMT, begin with the fittings. Below the last horizontal line used for conduit, and to the left of the vertical line, write the word "Connectors." Below that, list all sizes of connectors needed for the job, again working from the smallest size to the largest. Don't bother to list the couplings. They'll be figured later from the total conduit length — one for each 10 feet and one for each elbow.

Count each connector needed for each conduit run on each plan sheet. Enter the total on your take-off form. When all connectors are counted, count EMT elbows from $1\frac{1}{4}$ " to the largest size needed.

Follow this system for all estimates and for each item on every estimate. Keep it simple and uniform to avoid mistakes and omissions. When finished, your conduit and fitting take-off form might look like Figure 1-1. The right column is the sum of the columns to the left.

Work Sheet						Estimate No.: <u>M351</u>				
Conduit / Fittings										
	E3	E4	E5	E6	E7	E8	E9	E10	E11	Total
½" EMT	550	420	200	90	290	130	190	320		2190
¾"	20		30	20	80					150
1"			3		5		50			58
1¼"			30							30
1½"									90	90
2"					4				16	20
½" Conn	76	52	124	47	48	16	14	18		395
¾"	4		26	4	19	2				55
1"			4		5	2	2			13
1¼"			2							2
1½"									4	4
2"					2				4	6
1¼" Elb			2							2
1½"									3	3
2"									3	3
½" PVC			310	380	50					740
¾"			120	100	220	50				490
1"			40		320	40				400
1¼"						180				180
1½"				60					75	135
2"				10	25			70	75	180
4"								150		150
½" FA			45	30	4					79
¾"			4	4	12	2				22
1"			2		17	2				21
1¼"										0
1½"				4					2	6
2"				2	2				2	6
½" TA			5							5
¾"					4					4
1"					1					1
½" Elb			50	30	4					84
¾"			2	2	16	2				22

Figure 1-1

Many jobs limit the use of EMT to dry locations. So your EMT take-off will probably start with the lighting plans or the lighting portion of the plan.

Taking Off the Wire

Next, compute the quantity of wire needed. Head up another take-off form with the word "Wire" at the top. Put a vertical line down the left side of the page about an inch from the left edge. In this margin, list wire sizes from the smallest to the largest. To the right of the vertical line you'll list lengths for each wire gauge, on each plan sheet.

Start by measuring the length of ½" EMT with two #12 wires. Multiply by 2 to find the wire length. Then measure the length of ½" EMT with three #12 wires and multiply by 3. Keep following this proce-

cedure until the wire needed in all EMT has been computed. But watch for changes in the wire size on long runs. Sometimes the engineer will decide that a larger wire size is needed in the first portion of a run to reduce the voltage drop at the end of the line. This is common where the last device or fixture on a circuit is a long way from the panel.

Follow the same procedure for all conduit and wire. Record all of the measurements on the work sheets. Don't worry about waste of conduit or wire at this point. We'll include an allowance for waste after the totals are added and before figures are transferred to the pricing sheets.

Sometimes the specifications or a note on the plans will allow the use of aluminum feeder wire over a certain size, providing the ampacity of the

wire is maintained and the conduit size is increased to accommodate the larger wire size. Be sure to observe these restrictions.

Taking Off Other Conduit

Some specifications permit the use of aluminum conduit in certain locations. The aluminum conduit is made in the same sizes as GRS. The fittings are identical except that they're made of aluminum instead of steel. Most specs prohibit the use of dissimilar metals in a conduit run and don't allow placing of aluminum conduit in concrete. Aluminum conduit saves time because it's lighter and easier to handle. But large wire sizes may be a little more difficult to pull in aluminum conduit. The insulation of the wire, the length of the conduit run, and the pulling lubricant used have an effect on pulling resistance.

When taking off the underground conduit, start a separate work sheet for trenching, surface cutting, breaking, and patching. List all excavation for underground pull boxes, handholes, manholes, poles, and light pole bases. Be sure the trenches are big enough for the number of duct they have to carry. If the specifications require concrete or sand encasement around underground duct, calculate the amount of concrete or sand as you compute measurements for each trench.

Be systematic. Follow the same procedure consistently on every take-off. If there are other estimators in your office, be sure they are using the same procedures. Being consistent reduces errors, minimizes omissions, and makes the work easier for others to check.

We've covered all common conduit. But some other types are used occasionally for special purposes:

Fiber duct is a paper and creosote duct. Type 1 is intended for concrete encasement and Type 2 is used for direct burial. Sizes range from 2" to 5". Lengths can be 5, 8 or 10 feet. End fittings are tapered. Ends that have been cut must be tapered with a duct lathe.

Transite duct is cement asbestos duct. Type 1 is for concrete encasement and Type 2 is for direct burial. Sizes range from 2" to 6". It's made in 5, 8 and 10-foot lengths. Transite is harder to cut and must have tapered ends for fittings.

Soapstone duct is made from a soapstone-like material in sizes from 2" to 4".

Wrought iron pipe comes in sizes from 2" to 4". It's used only for certain types of underground communications lines and has to be threaded on each end to accept fittings.

Clay conduit comes in sizes from 2" to 4". It's used for underground communication runs only.

These types of conduit are seldom specified today. You'll see them used only when an old duct line has to be extended. It may be hard to find a fitting that will join an existing duct system made with one type of duct to a new run of duct made from some other material. Sometimes an oversize plastic coupling can be used. In some cases an inside plastic coupling can be inserted into the old conduit. Then new conduit can be joined to start the new run.

Before extending an old underground duct system, check the old conduit with a mandrel to be sure the line is clean and clear. Old fiber duct that's been under water for a long time will swell, making the inside diameter too small to pull new cable.

Silicon-bronze conduit comes in sizes from ½" to 4". It's threaded like GRS and uses similar fittings, except that fittings are silicon-bronze also. It's used in extremely corrosive locations. This type of conduit will be available from your dealer on special request only. It's harder to bend, but can be bent with standard rigid bending tools. It threads very well with the standard threading tools and cutting oil.

Liquid-tight flexible metal conduit comes in sizes from ½" to 4". It's used to extend conduit to electrical equipment in damp or wet locations. Special fittings are available for connecting electrical systems and devices with this conduit. Your dealer probably stocks a limited supply of liquid-tight flex and will quote prices on request. The conduit can be cut with a hacksaw. Be sure to remove the cutting burr. Special connectors with grips are available to support the conduit and prevent any pulling strain.

Liquid-tight flexible non-metallic conduit comes in sizes from ½" to 1½". It's used in place of flexible metal conduit in concealed locations. Special fittings are available for making connections. Your dealer may have a limited supply in stock.

Flexible metallic tubing is available only in sizes from 3/8" to 3/4". Special fittings are available for making connections. The tubing can be bent by hand and is cut with a hacksaw. The cutting burr must be removed before connectors are installed.

Other UL-approved raceways for electrical systems are covered in other sections of this book. See the sections on surface metal raceway, under-floor ducts, header ducts, cable tray, and wireway.

Using the Conduit Tables

The labor tables that follow are for conduit runs that average 50 feet. You'll note that there is no modification in the tables for shorter runs or longer runs of conduit. I agree that it takes more time per linear foot to install a 5-foot run of conduit than it does to install a 95-foot run of conduit. But I don't

recommend that you tally shorter runs and longer runs separately and then compute labor separately for each. There's an easier way.

On most jobs the conduit runs average 50 feet. There will usually be about as many runs under 50 feet as there are runs over 50 feet. It's safe then, to use a 50-foot run as our benchmark. As long as the conduit runs on a job average close to 50 feet, there's no need to modify the figures in these tables. If conduit runs average well over 50 feet, consider reducing the cost per linear foot slightly. Increase the cost slightly if conduit runs average less than 50 feet.

The labor costs that follow include the labor needed to bore holes in wood stud walls. Where holes have to be cut through concrete or unit masonry, add these costs separately.

Typical conduit bending is included in the tables that follow. Usually you will have a bend or offset about every 20 feet. Labor needed to make bends and offsets is minor when installing the smaller sizes of conduit.

Concealed conduit is installed where it will be inaccessible once the structure or finish of the building is completed. **Exposed conduit** is attached to the surface where access is possible even after the building is completed. It's usually faster to run concealed conduit through wall and ceiling cavities that will be covered later by finish materials. Installing conduit on surfaces that won't be covered later usually takes more time.

If only a small percentage of the conduit is to be installed exposed, the cost difference will be minor and probably can be ignored. But if most of the job is exposed, add about 20 percent to the labor cost.

The conduit tables that follow assume that electricians are working from ladders and lifts up to 12 feet above the floor. Add to the labor cost for heights beyond 12 feet. If a large quantity of conduit has to be installed at 18 feet above the floor, for example, add 15 percent to the labor cost.

If there are conduit runs over 20 feet above the floor, check your labor contract for a **high time clause**. Some agreements require that electricians be paid time and one-half for heights from 20 to 50 feet and double time for heights beyond 50 feet. If high time must be paid, be sure the extra cost is covered in your bid.

Job Size Modifiers

It's seldom necessary to estimate lower productivity just because the job is small. If you're figuring a very small job with only four or five conduit runs, each with only a strap or two, you might want to use a higher hourly labor rate. On any other job

that takes from two days to several years, you can use the labor units in the tables that follow. Of course, you'll still have to modify the figures for other than "good" conditions. And if you have long runs of feeder conduit with parallel runs on a common trapeze, you can reduce those labor units by as much as 40 percent.

Pitfalls

The most common error when estimating conduit is failing to read the plans and specs. Read carefully! Your profit depends on it. It's easy to miss a little note where the designer sets the minimum size for conduit at $\frac{3}{4}$ " and 1" for all home runs to the panel. Look for a note on the plans that requires stub ups to ceiling cavities from power and lighting panels. The designer may require one $\frac{3}{4}$ " conduit run for each three spare circuit breakers in a panel.

It's common for rigid conduit to be installed in a concrete floor slab. Where GRS is stubbed up out of the concrete for a wall switch, it's easier and cheaper to use EMT for the wall extension. The NEC permits making that extension in EMT. But some specs don't! Others require that a junction box be used to separate the two types of conduit. Failing to catch that note can be an expensive mistake.

You'll find all sorts of restrictions in specs and notes on the plans. That's why it's so important to read the plans and specs carefully. It's elementary, but it's so often overlooked.

Waste of Material

There will always be some waste on a job. Rounding off the conduit and wire needed to the next even 100 feet will usually allow enough extra material to cover all waste. But there are some cases where you can anticipate a waste problem. For example, suppose there will be 2 feet of waste for every 20 feet of conduit installed because of an unusual lighting pattern. Or suppose a row of junction boxes is spaced at 9 feet. Then a 10 percent waste allowance may be called for. That's almost certainly true if your job is installing the lighting only. There may be no chance to use waste materials on another part of the job.

Allowances

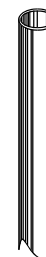
Be sure to make allowances for the vertical portion of every conduit run that stubs up or down in a wall. The floor plan doesn't show the 4 or 5 feet needed to run from the slab to the wall switch or panel. Even worse, if the job is a warehouse, the stub up to a switch or panel may be 15 to 20 feet. That's a wide miss! Watch for stub up.

Electrical Metallic Tubing

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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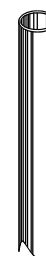
EMT conduit in floor slab or multiple runs on a trapeze

1/2"	L1@3.25	CLF	59.80	129.00	188.80
3/4"	L1@3.50	CLF	113.00	139.00	252.00
1"	L1@4.00	CLF	190.00	159.00	349.00
1-1/4"	L1@4.50	CLF	288.00	179.00	467.00
1-1/2"	L1@5.50	CLF	355.00	219.00	574.00
2"	L1@7.00	CLF	434.00	279.00	713.00
2-1/2"	L1@9.00	CLF	707.00	359.00	1,066.00
3"	L1@10.0	CLF	867.00	398.00	1,265.00
3-1/2"	L1@11.0	CLF	1,260.00	438.00	1,698.00
4"	L1@12.0	CLF	1,280.00	478.00	1,758.00



EMT conduit in concealed areas, walls and closed ceilings

1/2"	L1@3.50	CLF	59.80	139.00	198.80
3/4"	L1@3.75	CLF	113.00	149.00	262.00
1"	L1@4.25	CLF	190.00	169.00	359.00
1-1/4"	L1@5.00	CLF	288.00	199.00	487.00
1-1/2"	L1@6.00	CLF	355.00	239.00	594.00
2"	L1@8.00	CLF	434.00	319.00	753.00
2-1/2"	L1@10.0	CLF	707.00	398.00	1,105.00
3"	L1@12.0	CLF	867.00	478.00	1,345.00
3-1/2"	L1@14.0	CLF	1,260.00	558.00	1,818.00
4"	L1@16.0	CLF	1,280.00	637.00	1,917.00



EMT conduit installed in exposed areas

1/2"	L1@3.75	CLF	59.80	149.00	208.80
3/4"	L1@4.00	CLF	113.00	159.00	272.00
1"	L1@4.50	CLF	190.00	179.00	369.00
1-1/4"	L1@6.00	CLF	288.00	239.00	527.00
1-1/2"	L1@8.00	CLF	355.00	319.00	674.00
2"	L1@10.0	CLF	434.00	398.00	832.00
2-1/2"	L1@12.0	CLF	707.00	478.00	1,185.00
3"	L1@14.0	CLF	867.00	558.00	1,425.00
3-1/2"	L1@16.0	CLF	1,260.00	637.00	1,897.00
4"	L1@18.0	CLF	1,280.00	717.00	1,997.00



Use these figures to estimate the cost of EMT conduit installed in a building under the conditions described on pages 5 and 6. Costs listed are for each 100 linear feet installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include typical bending, boring out wood studs and joists (in concealed locations only), layout, material handling, and normal waste. Add for connectors, couplings, straps, boxes, wire, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Conduit runs are assumed to be 50' long. Shorter runs will take more labor and longer runs will take less labor per linear foot.

EMT Hand Benders are on page 27.

EMT Fittings

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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EMT 45 degree elbows

1"	L1@0.06	Ea	8.67	2.39	11.06
1-1/4"	L1@0.08	Ea	10.90	3.19	14.09
1-1/2"	L1@0.08	Ea	18.40	3.19	21.59
2"	L1@0.10	Ea	23.40	3.98	27.38
2-1/2"	L1@0.15	Ea	57.00	5.98	62.98
3"	L1@0.20	Ea	85.10	7.97	93.07
3-1/2"	L1@0.20	Ea	113.00	7.97	120.97
4"	L1@0.25	Ea	134.00	9.96	143.96

EMT 90 degree elbows

1"	L1@0.08	Ea	11.10	3.19	14.29
1-1/4"	L1@0.10	Ea	13.80	3.98	17.78
1-1/2"	L1@0.10	Ea	15.90	3.98	19.88
2"	L1@0.15	Ea	23.40	5.98	29.38
2-1/2"	L1@0.15	Ea	57.00	5.98	62.98
3"	L1@0.20	Ea	85.10	7.97	93.07
3-1/2"	L1@0.20	Ea	113.00	7.97	120.97
4"	L1@0.25	Ea	134.00	9.96	143.96

Use these figures to estimate the cost of EMT elbows installed on EMT conduit in a building under the conditions described on pages 5 and 6. Costs listed are for each elbow installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs are for factory-made elbows and include layout, material handling, and normal waste. Add for field bending, couplings and connectors at the end of the run, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

Conduit weight per 100 feet (in pounds)

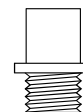
# Diameter	##EMT# steel	# #ENT# plastic	PVC# 40	Rigid# steel	Intermediate# rigid steel	Rigid# aluminum
1/2"	30	11	18	79	57	30
3/4"	46	14	23	105	78	40
1"	66	20	35	153	112	59
1-1/4"	96	—	48	201	114	80
1-1/2"	112	—	57	249	176	96
2"	142	—	76	334	230	129
2-1/2"	230	—	125	527	393	205
3"	270	—	164	690	483	268
3-1/2"	350	—	198	831	561	321
4"	400	—	234	982	625	382
5"	—	—	317	1344	—	522
6"	—	—	412	1770	—	678

EMT Connectors

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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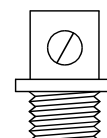
Indent EMT connectors

1/2"	L1@0.05	Ea	.73	1.99	2.72
3/4"	L1@0.06	Ea	1.34	2.39	3.73



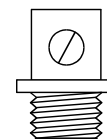
Die cast set screw EMT connectors

1/2"	L1@0.05	Ea	.45	1.99	2.44
3/4"	L1@0.06	Ea	.73	2.39	3.12
1"	L1@0.08	Ea	1.41	3.19	4.60
1-1/4"	L1@0.10	Ea	2.48	3.98	6.46
1-1/2"	L1@0.10	Ea	3.37	3.98	7.35
2"	L1@0.15	Ea	4.50	5.98	10.48
2-1/2"	L1@0.15	Ea	10.20	5.98	16.18
3"	L1@0.20	Ea	12.40	7.97	20.37
3-1/2"	L1@0.20	Ea	14.70	7.97	22.67
4"	L1@0.25	Ea	18.50	9.96	28.46



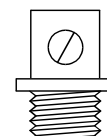
Insulated die cast set screw EMT connectors

1/2"	L1@0.05	Ea	.74	1.99	2.73
3/4"	L1@0.06	Ea	1.14	2.39	3.53
1"	L1@0.08	Ea	2.06	3.19	5.25
1-1/4"	L1@0.10	Ea	4.11	3.98	8.09
1-1/2"	L1@0.10	Ea	5.02	3.98	9.00
2"	L1@0.15	Ea	6.74	5.98	12.72
2-1/2"	L1@0.15	Ea	18.30	5.98	24.28
3"	L1@0.20	Ea	21.30	7.97	29.27
3-1/2"	L1@0.20	Ea	27.10	7.97	35.07
4"	L1@0.25	Ea	30.00	9.96	39.96



Steel set screw EMT connectors

1/2"	L1@0.05	Ea	1.12	1.99	3.11
3/4"	L1@0.06	Ea	1.83	2.39	4.22
1"	L1@0.08	Ea	3.20	3.19	6.39
1-1/4"	L1@0.10	Ea	6.68	3.98	10.66
1-1/2"	L1@0.10	Ea	9.72	3.98	13.70
2"	L1@0.15	Ea	13.80	5.98	19.78
2-1/2"	L1@0.15	Ea	45.40	5.98	51.38
3"	L1@0.20	Ea	53.30	7.97	61.27
3-1/2"	L1@0.20	Ea	70.00	7.97	77.97
4"	L1@0.25	Ea	80.40	9.96	90.36



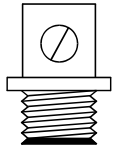
Use these figures to estimate the cost of EMT connectors installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each connector or expanded elbow installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the connector locknut, removing the knockout, layout, material handling, and normal waste. Add for insulated bushings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

Indenter tools are on page 22.

EMT Connectors

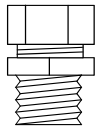
Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Insulated steel set screw EMT connectors



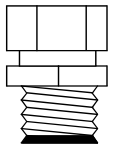
1/2"	L1@0.05	Ea	1.50	1.99	3.49
3/4"	L1@0.06	Ea	2.42	2.39	4.81
1"	L1@0.08	Ea	4.01	3.19	7.20
1-1/4"	L1@0.10	Ea	8.04	3.98	12.02
1-1/2"	L1@0.10	Ea	11.80	3.98	15.78
2"	L1@0.15	Ea	17.10	5.98	23.08
2-1/2"	L1@0.15	Ea	76.50	5.98	82.48
3"	L1@0.20	Ea	95.40	7.97	103.37
3-1/2"	L1@0.20	Ea	128.00	7.97	135.97
4"	L1@0.25	Ea	140.00	9.96	149.96

Die cast compression EMT connectors, raintight



1/2"	L1@0.05	Ea	.73	1.99	2.72
3/4"	L1@0.06	Ea	1.31	2.39	3.70
1"	L1@0.08	Ea	2.15	3.19	5.34
1-1/4"	L1@0.10	Ea	3.56	3.98	7.54
1-1/2"	L1@0.10	Ea	4.65	3.98	8.63
2"	L1@0.15	Ea	7.39	5.98	13.37
2-1/2"	L1@0.15	Ea	15.80	5.98	21.78
3"	L1@0.20	Ea	19.20	7.97	27.17
3-1/2"	L1@0.20	Ea	25.40	7.97	33.37
4"	L1@0.25	Ea	29.70	9.96	39.66

Insulated die cast compression EMT connectors, raintight



1/2"	L1@0.05	Ea	.97	1.99	2.96
3/4"	L1@0.06	Ea	1.72	2.39	4.11
1"	L1@0.08	Ea	2.67	3.19	5.86
1-1/4"	L1@0.10	Ea	4.99	3.98	8.97
1-1/2"	L1@0.10	Ea	6.17	3.98	10.15
2"	L1@0.15	Ea	9.09	5.98	15.07
2-1/2"	L1@0.15	Ea	26.80	5.98	32.78
3"	L1@0.20	Ea	31.50	7.97	39.47
3-1/2"	L1@0.20	Ea	39.40	7.97	47.37
4"	L1@0.25	Ea	45.90	9.96	55.86

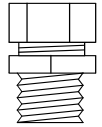
Use these figures to estimate the cost of EMT connectors installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the connector locknut, removing the knockout, layout, material handling, and normal waste. Add for insulated bushings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

EMT Connectors

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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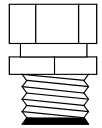
Steel compression EMT connectors, raintight

1/2"	L1@0.05	Ea	.14	1.99	2.13
3/4"	L1@0.06	Ea	.21	2.39	2.60
1"	L1@0.08	Ea	.29	3.19	3.48
1-1/4"	L1@0.10	Ea	.65	3.98	4.63
1-1/2"	L1@0.10	Ea	.94	3.98	4.92
2"	L1@0.15	Ea	1.34	5.98	7.32
2-1/2"	L1@0.15	Ea	6.48	5.98	12.46
3"	L1@0.20	Ea	8.99	7.97	16.96
3-1/2"	L1@0.20	Ea	13.60	7.97	21.57
4"	L1@0.25	Ea	13.90	9.96	23.86



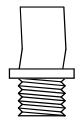
Insulated steel compression EMT connectors, raintight

1/2"	L1@0.05	Ea	.15	1.99	2.14
3/4"	L1@0.06	Ea	.23	2.39	2.62
1"	L1@0.08	Ea	.40	3.19	3.59
1-1/4"	L1@0.10	Ea	.83	3.98	4.81
1-1/2"	L1@0.10	Ea	1.21	3.98	5.19
2"	L1@0.15	Ea	1.75	5.98	7.73
2-1/2"	L1@0.15	Ea	10.90	5.98	16.88
3"	L1@0.20	Ea	14.10	7.97	22.07
3-1/2"	L1@0.20	Ea	20.60	7.97	28.57
4"	L1@0.25	Ea	21.20	9.96	31.16



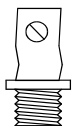
Die cast indent offset EMT connectors

1/2"	L1@0.10	Ea	2.31	3.98	6.29
3/4"	L1@0.10	Ea	3.17	3.98	7.15



Die cast set screw offset EMT connectors

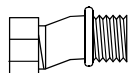
1/2"	L1@0.10	Ea	2.89	3.98	6.87
3/4"	L1@0.10	Ea	4.20	3.98	8.18
1"	L1@0.15	Ea	6.06	5.98	12.04



Use these figures to estimate the cost of EMT connectors installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the connector locknut, removing the knockout, layout, material handling, and normal waste. Add for insulated bushings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

Indenter tools are on page 22.

EMT Connectors and Couplings

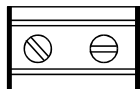


Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Steel compression offset EMT connectors, raintight					
1/2"	L1@0.10	Ea	4.43	3.98	8.41
3/4"	L1@0.10	Ea	6.42	3.98	10.40
1"	L1@0.15	Ea	7.13	5.98	13.11

Indent EMT couplings

1/2"	L1@0.05	Ea	.77	1.99	2.76
3/4"	L1@0.06	Ea	1.50	2.39	3.89

Die cast set screw EMT couplings



1/2"	L1@0.05	Ea	.50	1.99	2.49
3/4"	L1@0.06	Ea	.77	2.39	3.16
1"	L1@0.08	Ea	1.31	3.19	4.50
1-1/4"	L1@0.10	Ea	2.29	3.98	6.27
1-1/2"	L1@0.10	Ea	3.49	3.98	7.47
2"	L1@0.15	Ea	4.66	5.98	10.64
2-1/2"	L1@0.15	Ea	8.91	5.98	14.89
3"	L1@0.20	Ea	10.20	7.97	18.17
3-1/2"	L1@0.20	Ea	11.80	7.97	19.77
4"	L1@0.25	Ea	14.40	9.96	24.36

Indenter tools

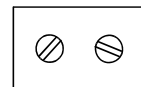


With jaws for 1/2" EMT	—	Ea	47.00	—	47.00
With jaws for 3/4" EMT	—	Ea	65.40	—	65.40
Replacement points, 1/2" EMT	—	Ea	3.55	—	3.55
Replacement points, 3/4" EMT	—	Ea	3.70	—	3.70

Use these figures to estimate the cost of EMT connectors and couplings installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each coupling or connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the connector or coupling, layout, material handling, and normal waste. Add for conduit, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Drive-on EMT fittings are rated as raintight and are also concrete tight. They are threaded with a standard electrical pipe thread and can be adapted easily to rigid conduit or other threaded fittings. Material costs assume purchase of full box quantities.

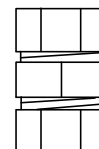
EMT Couplings

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Set screw steel EMT couplings					
1/2"	L1@0.05	Ea	.27	1.99	2.26
3/4"	L1@0.06	Ea	.35	2.39	2.74
1"	L1@0.08	Ea	.56	3.19	3.75
1-1/4"	L1@0.10	Ea	1.13	3.98	5.11
1-1/2"	L1@0.10	Ea	1.71	3.98	5.69
2"	L1@0.15	Ea	2.25	5.98	8.23
2-1/2"	L1@0.15	Ea	4.91	5.98	10.89
3"	L1@0.20	Ea	5.49	7.97	13.46
3-1/2"	L1@0.20	Ea	6.74	7.97	14.71
4"	L1@0.25	Ea	7.33	9.96	17.29



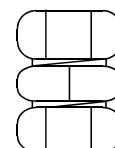
Die cast compression EMT couplings, raintight

1/2"	L1@0.05	Ea	.41	1.99	2.40
3/4"	L1@0.06	Ea	.53	2.39	2.92
1"	L1@0.08	Ea	.86	3.19	4.05
1-1/4"	L1@0.10	Ea	1.60	3.98	5.58
1-1/2"	L1@0.10	Ea	2.48	3.98	6.46
2"	L1@0.15	Ea	3.03	5.98	9.01
2-1/2"	L1@0.15	Ea	11.80	5.98	17.78
3"	L1@0.20	Ea	12.60	7.97	20.57
3-1/2"	L1@0.20	Ea	15.40	7.97	23.37
4"	L1@0.25	Ea	16.10	9.96	26.06



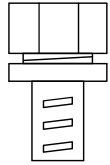
Steel compression EMT couplings, raintight

1/2"	L1@0.05	Ea	.41	1.99	2.40
3/4"	L1@0.06	Ea	.59	2.39	2.98
1"	L1@0.08	Ea	.90	3.19	4.09
1-1/4"	L1@0.10	Ea	1.64	3.98	5.62
1-1/2"	L1@0.10	Ea	2.38	3.98	6.36
2"	L1@0.15	Ea	3.25	5.98	9.23
2-1/2"	L1@0.15	Ea	13.40	5.98	19.38
3"	L1@0.20	Ea	17.10	7.97	25.07
3-1/2"	L1@0.20	Ea	24.50	7.97	32.47
4"	L1@0.25	Ea	25.10	9.96	35.06

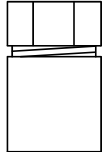


Use these figures to estimate the cost of EMT couplings installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each coupling installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the coupling, layout, material handling, and normal waste. Add for conduit, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Compression fittings are raintight and can be used in concrete. Material costs assume purchase of full box quantities.

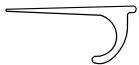
EMT Couplings and Straps



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Die cast EMT to flex couplings					
1/2"	L1@0.05	Ea	2.13	1.99	4.12
3/4"	L1@0.05	Ea	2.86	1.99	4.85
1"	L1@0.06	Ea	3.99	2.39	6.38



Steel EMT to GRS compression couplings, raintight					
1/2"	L1@0.05	Ea	3.27	1.99	5.26
3/4"	L1@0.06	Ea	4.65	2.39	7.04
1"	L1@0.08	Ea	7.07	3.19	10.26
1-1/4"	L1@0.10	Ea	12.30	3.98	16.28
1-1/2"	L1@0.10	Ea	15.10	3.98	19.08
2"	L1@0.15	Ea	30.00	5.98	35.98



Steel EMT nail straps					
1/2"	L1@0.02	Ea	.13	.80	.93
3/4"	L1@0.03	Ea	.14	1.20	1.34
1"	L1@0.05	Ea	.18	1.99	2.17



Steel one hole EMT straps					
1/2"	L1@0.03	Ea	.05	1.20	1.25
3/4"	L1@0.04	Ea	.10	1.59	1.69
1"	L1@0.05	Ea	.16	1.99	2.15
1-1/4"	L1@0.06	Ea	.25	2.39	2.64
1-1/2"	L1@0.06	Ea	.40	2.39	2.79
2"	L1@0.10	Ea	.48	3.98	4.46
2-1/2"	L1@0.10	Ea	1.81	3.98	5.79
3"	L1@0.15	Ea	2.22	5.98	8.20
3-1/2"	L1@0.15	Ea	3.45	5.98	9.43
4"	L1@0.15	Ea	4.37	5.98	10.35

Use these figures to estimate the cost of EMT couplings and EMT straps installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each coupling and strap installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include cutting the EMT conduit, layout, material handling, and normal waste. Add the cost of conduit, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

EMT Straps

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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One hole heavy duty steel EMT straps

1/2"	L1@0.03	Ea	.23	1.20	1.43
3/4"	L1@0.04	Ea	.30	1.59	1.89
1"	L1@0.05	Ea	.54	1.99	2.53
1-1/4"	L1@0.06	Ea	.72	2.39	3.11
1-1/2"	L1@0.06	Ea	1.09	2.39	3.48
2"	L1@0.10	Ea	1.66	3.98	5.64



One hole malleable EMT straps

1/2"	L1@0.03	Ea	.34	1.20	1.54
3/4"	L1@0.04	Ea	.49	1.59	2.08
1"	L1@0.05	Ea	.69	1.99	2.68
1-1/4"	L1@0.06	Ea	1.40	2.39	3.79
1-1/2"	L1@0.06	Ea	1.60	2.39	3.99
2"	L1@0.10	Ea	3.15	3.98	7.13
2-1/2"	L1@0.10	Ea	6.80	3.98	10.78
3"	L1@0.15	Ea	8.59	5.98	14.57
3-1/2"	L1@0.15	Ea	11.20	5.98	17.18
4"	L1@0.15	Ea	24.80	5.98	30.78



Two hole steel EMT straps

1/2"	L1@0.03	Ea	.21	1.20	1.41
3/4"	L1@0.04	Ea	.29	1.59	1.88
1"	L1@0.05	Ea	.47	1.99	2.46
1-1/4"	L1@0.06	Ea	.68	2.39	3.07
1-1/2"	L1@0.06	Ea	.81	2.39	3.20
2"	L1@0.10	Ea	1.38	3.98	5.36
2-1/2"	L1@0.10	Ea	2.03	3.98	6.01
3"	L1@0.15	Ea	2.39	5.98	8.37
3-1/2"	L1@0.15	Ea	2.48	5.98	8.46
4"	L1@0.15	Ea	2.95	5.98	8.93



Use these figures to estimate the cost of EMT straps installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each strap installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include cutting the EMT conduit, layout, material handling, and normal waste. Add the cost of conduit, screws or nails to hold the straps, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

EMT Straps, Hangers and Clips

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Two hole heavy duty steel EMT straps

1"	L1@0.05	Ea	.22	1.99	2.21
1-1/4"	L1@0.06	Ea	.29	2.39	2.68
1-1/2"	L1@0.06	Ea	.43	2.39	2.82
2"	L1@0.10	Ea	.69	3.98	4.67
2-1/2"	L1@0.10	Ea	.81	3.98	4.79
3"	L1@0.10	Ea	1.18	3.98	5.16
3-1/2"	L1@0.15	Ea	1.75	5.98	7.73
4"	L1@0.15	Ea	2.99	5.98	8.97

Steel EMT conduit hangers with bolt

1/2"	L1@0.03	Ea	.53	1.20	1.73
3/4"	L1@0.04	Ea	.60	1.59	2.19
1"	L1@0.05	Ea	.70	1.99	2.69
1-1/4"	L1@0.06	Ea	.85	2.39	3.24
1-1/2"	L1@0.06	Ea	1.05	2.39	3.44
2"	L1@0.10	Ea	1.31	3.98	5.29
2-1/2"	L1@0.10	Ea	1.50	3.98	5.48
3"	L1@0.15	Ea	1.98	5.98	7.96
3-1/2"	L1@0.15	Ea	2.31	5.98	8.29
4"	L1@0.15	Ea	6.17	5.98	12.15

Beam clamp EMT conduit hanger assembly

1/2"	L1@0.05	Ea	1.05	1.99	3.04
3/4"	L1@0.06	Ea	1.22	2.39	3.61
1"	L1@0.08	Ea	1.41	3.19	4.60
1-1/4"	L1@0.10	Ea	1.69	3.98	5.67
1-1/2"	L1@0.10	Ea	2.12	3.98	6.10
2"	L1@0.15	Ea	2.61	5.98	8.59

EMT Strut Clamp

1/2"	L1@0.06	Ea	.77	2.39	3.16
3/4"	L1@0.08	Ea	.79	3.19	3.98
1"	L1@0.10	Ea	.91	3.98	4.89
1-1/4"	L1@0.10	Ea	1.03	3.98	5.01
1-1/2"	L1@0.10	Ea	1.26	3.98	5.24
2"	L1@0.15	Ea	1.31	5.98	7.29

Use these figures to estimate the cost of EMT straps, hangers and clips installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each strap, hanger or clip installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include cutting the EMT conduit, layout, material handling, and normal waste. Add the cost of conduit, screws or nails to hold the straps, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

EMT Clips, Adapters, Elbows, Caps and Benders

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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EMT clips for rod, wire, or steel flange

1/2"	L1@0.04	Ea	.25	1.59	1.84
3/4"	L1@0.05	Ea	.28	1.99	2.27
1"	L1@0.06	Ea	.32	2.39	2.71
1-1/4"	L1@0.08	Ea	.39	3.19	3.58

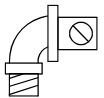


EMT split adapters

1/2"	L1@0.08	Ea	2.23	3.19	5.42
3/4"	L1@0.10	Ea	1.99	3.98	5.97
1"	L1@0.15	Ea	2.75	5.98	8.73

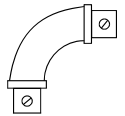
Die cast 90 degree EMT elbows

1/2"	L1@0.10	Ea	4.40	3.98	8.38
3/4"	L1@0.10	Ea	6.87	3.98	10.85
1"	L1@0.15	Ea	9.54	5.98	15.52
1-1/4"	L1@0.15	Ea	47.40	5.98	53.38
1-1/2"	L1@0.15	Ea	61.70	5.98	67.68



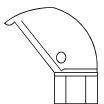
90 degree EMT short elbows

1/2"	L1@0.10	Ea	3.91	3.98	7.89
3/4"	L1@0.10	Ea	5.47	3.98	9.45
1"	L1@0.15	Ea	9.63	5.98	15.61
1-1/4"	L1@0.15	Ea	38.10	5.98	44.08



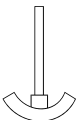
Slip-fitter EMT entrance caps

1/2"	L1@0.10	Ea	6.47	3.98	10.45
3/4"	L1@0.10	Ea	7.58	3.98	11.56
1"	L1@0.15	Ea	8.91	5.98	14.89
1-1/4"	L1@0.15	Ea	9.99	5.98	15.97



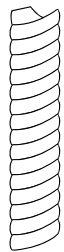
EMT hand benders

1/2"	—	Ea	32.60	—	32.60
3/4"	—	Ea	70.70	—	70.70
1"	—	Ea	79.00	—	79.00

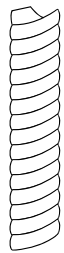


Use these figures to estimate the cost of items shown above installed on EMT conduit under the conditions described on pages 5 and 6. Costs listed are for each item installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the connector locknut, removing the knockout when required, layout, material handling, and normal waste. Add for conduit boxes, insulated bushings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full box quantities.

Flexible Conduit



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Flex steel conduit					
3/8"	L1@2.50	CLF	31.90	99.60	131.50
1/2"	L1@2.75	CLF	28.40	110.00	138.40
3/4"	L1@3.00	CLF	38.70	120.00	158.70
1"	L1@3.25	CLF	70.70	129.00	199.70
1-1/4"	L1@3.50	CLF	90.90	139.00	229.90
1-1/2"	L1@3.75	CLF	149.00	149.00	298.00
2"	L1@4.00	CLF	182.00	159.00	341.00
2-1/2"	L1@4.25	CLF	220.00	169.00	389.00
3"	L1@4.50	CLF	383.00	179.00	562.00
3-1/2"	L1@4.75	CLF	545.00	189.00	734.00
4"	L1@5.00	CLF	493.00	199.00	692.00



Flex aluminum conduit					
3/8"	L1@2.25	CLF	34.90	89.60	124.50
1/2"	L1@2.50	CLF	29.00	99.60	128.60
3/4"	L1@2.75	CLF	40.00	110.00	150.00
1"	L1@3.00	CLF	75.20	120.00	195.20
1-1/4"	L1@3.25	CLF	99.90	129.00	228.90
1-1/2"	L1@3.50	CLF	180.00	139.00	319.00
2"	L1@3.75	CLF	191.00	149.00	340.00
2-1/2"	L1@4.00	CLF	305.00	159.00	464.00
3"	L1@4.25	CLF	500.00	169.00	669.00
3-1/2"	L1@4.50	CLF	577.00	179.00	756.00
4"	L1@4.75	CLF	643.00	189.00	832.00

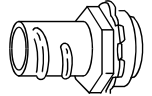
Use these figures to estimate the cost of flexible conduit installed in a building, and for equipment hookup under the conditions described on pages 5 and 6. Costs listed are for each 100 linear feet installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include boring or notching wood studs and joists (in concealed locations), cutting flex conduit, layout, material handling, and normal waste. Add for connectors, couplings, straps, boxes, wire, bonding wire, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Conduit runs are assumed to be 25' long. Labor costs per linear foot will be higher on shorter runs and lower on longer runs.

Flexible Conduit Connectors

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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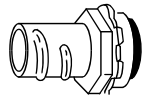
Die cast screw-in flex connectors

3/8"	L1@0.03	Ea	.24	1.20	1.44
1/2"	L1@0.03	Ea	.32	1.20	1.52
3/4"	L1@0.05	Ea	.56	1.99	2.55
1"	L1@0.06	Ea	1.23	2.39	3.62
1-1/4"	L1@0.10	Ea	2.37	3.98	6.35
1-1/2"	L1@0.10	Ea	3.31	3.98	7.29
2"	L1@0.15	Ea	4.02	5.98	10.00



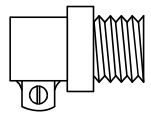
Insulated die cast screw-in flex connectors

3/8"	L1@0.03	Ea	.50	1.20	1.70
1/2"	L1@0.03	Ea	.57	1.20	1.77
3/4"	L1@0.05	Ea	.74	1.99	2.73
1"	L1@0.06	Ea	1.60	2.39	3.99
1-1/4"	L1@0.10	Ea	3.69	3.98	7.67
1-1/2"	L1@0.10	Ea	4.38	3.98	8.36
2"	L1@0.15	Ea	5.05	5.98	11.03



Die cast squeeze flex connectors

3/8"	L1@0.05	Ea	.97	1.99	2.96
1/2"	L1@0.05	Ea	1.12	1.99	3.11
3/4"	L1@0.06	Ea	1.25	2.39	3.64
1"	L1@0.08	Ea	2.48	3.19	5.67
1-1/4"	L1@0.10	Ea	5.39	3.98	9.37
1-1/2"	L1@0.10	Ea	10.20	3.98	14.18
2"	L1@0.15	Ea	17.30	5.98	23.28

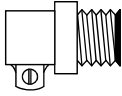


Use these figures to estimate the cost of flexible conduit connectors installed on flex conduit under the conditions described on pages 5 and 6. Costs listed are for each connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the locknut, removing the knockout, layout, material handling, and normal waste. Add for connectors, couplings, straps, boxes, wire, bonding wire, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full boxes.

Squeeze Flexible Conduit Connectors

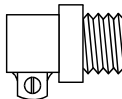
Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Insulated die cast squeeze flex connectors



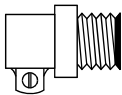
1/2"	L1@0.05	Ea	1.71	1.99	3.70
3/4"	L1@0.06	Ea	1.74	2.39	4.13
1"	L1@0.08	Ea	2.12	3.19	5.31
1-1/4"	L1@0.10	Ea	5.13	3.98	9.11
1-1/2"	L1@0.10	Ea	8.42	3.98	12.40
2"	L1@0.15	Ea	12.80	5.98	18.78

Malleable squeeze flex connectors



3/8"	L1@0.05	Ea	.95	1.99	2.94
1/2"	L1@0.05	Ea	1.41	1.99	3.40
3/4"	L1@0.06	Ea	1.13	2.39	3.52
1"	L1@0.08	Ea	4.16	3.19	7.35
1-1/4"	L1@0.10	Ea	6.54	3.98	10.52
1-1/2"	L1@0.10	Ea	8.91	3.98	12.89
2"	L1@0.15	Ea	12.50	5.98	18.48
2-1/2"	L1@0.15	Ea	24.40	5.98	30.38
3"	L1@0.20	Ea	33.80	7.97	41.77

Insulated malleable squeeze flex connectors



3/8"	L1@0.05	Ea	1.94	1.99	3.93
1/2"	L1@0.05	Ea	2.06	1.99	4.05
3/4"	L1@0.06	Ea	2.29	2.39	4.68
1"	L1@0.08	Ea	4.16	3.19	7.35
1-1/4"	L1@0.10	Ea	8.91	3.98	12.89
1-1/2"	L1@0.10	Ea	13.10	3.98	17.08
2"	L1@0.15	Ea	19.80	5.98	25.78
2-1/2"	L1@0.15	Ea	38.80	5.98	44.78
3"	L1@0.20	Ea	50.90	7.97	58.87
3-1/2"	L1@0.25	Ea	141.00	9.96	150.96
4"	L1@0.25	Ea	166.00	9.96	175.96

Use these figures to estimate the cost of flexible conduit connectors installed on flex conduit under the conditions described on pages 5 and 6. Costs listed are for each connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include the locknut, removing the knockout, layout, material handling, and normal waste. Add for conduit boxes, insulated bushings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Material costs assume purchase of full boxes.

Copper 600 Volt Non-metallic Sheathed Cable

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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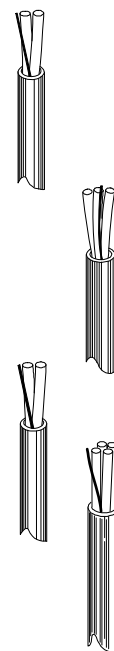
Type UF 600 volt copper stranded direct burial cable with ground

#14-2	L1@5.00	KLF	717.00	199.00	916.00
#12-2	L1@5.25	KLF	1,090.00	209.00	1,299.00
#10-2	L1@6.00	KLF	1,100.00	239.00	1,339.00
# 8-2	L1@7.00	KLF	1,750.00	279.00	2,029.00
# 6-2	L1@8.00	KLF	4,220.00	319.00	4,539.00
#14-3	L1@5.25	KLF	983.00	209.00	1,192.00
#12-3	L1@5.50	KLF	1,500.00	219.00	1,719.00
#10-3	L1@6.25	KLF	2,420.00	249.00	2,669.00
# 8-3	L1@7.25	KLF	3,610.00	289.00	3,899.00
# 6-3	L1@8.25	KLF	5,840.00	329.00	6,169.00

Type SEU 600 volt copper stranded service entrance cable

#10-3	L1@8.50	KLF	1,640.00	339.00	1,979.00
# 8-3	L1@11.0	KLF	2,590.00	438.00	3,028.00
# 6-3	L1@13.0	KLF	4,430.00	518.00	4,948.00
# 4-3	L1@14.0	KLF	7,340.00	558.00	7,898.00
# 2-3	L1@16.0	KLF	10,900.00	637.00	11,537.00
# 1-3	L1@18.0	KLF	14,000.00	717.00	14,717.00
#1/0-3	L1@20.0	KLF	17,400.00	797.00	18,197.00
#2/0-3	L1@22.0	KLF	21,800.00	876.00	22,676.00
#3/0-3	L1@24.0	KLF	27,300.00	956.00	28,256.00
#4/0-3	L1@26.0	KLF	30,300.00	1,040.00	31,340.00
# 6-2 & 8-1	L1@13.0	KLF	3,910.00	518.00	4,428.00
# 4-2 & 6-1	L1@14.5	KLF	6,130.00	578.00	6,708.00
# 2-2 & 4-1	L1@16.0	KLF	9,560.00	637.00	10,197.00

Use these figures to estimate the cost of copper UF and SEU cable installed underground, and SEU in buildings, under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include circuit make-up, reel set-up, phase identification, circuit testing, stripping, layout, material handling, and normal waste. Add for trenching supports, connectors, the SEU service entrance cap, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Always bury a warning tape about 12 inches above UF cable.



Copper 600 Volt Non-metallic Sheathed Cable



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Type SER 600 copper cable, style U					
# 6-4	L1@14.5	KLF	7,230.00	578.00	7,808.00
# 4-3 & 6-1	L1@16.0	KLF	10,400.00	637.00	11,037.00
# 3-3 & 5-1	L1@17.0	KLF	13,500.00	677.00	14,177.00
# 2-3 & 4-1	L1@18.0	KLF	16,400.00	717.00	17,117.00
# 1-3 & 3-1	L1@21.0	KLF	20,500.00	837.00	21,337.00
# 1/0-3 & 2-1	L1@22.0	KLF	25,700.00	876.00	26,576.00
# 2/0-3 & 1-1	L1@24.0	KLF	32,300.00	956.00	33,256.00
# 3/0-1/0-1	L1@26.0	KLF	40,400.00	1,040.00	41,440.00
# 4/0-2/0-1	L1@28.0	KLF	50,900.00	1,120.00	52,020.00



Soft drawn solid bare copper wire

#14	L1@4.00	KLF	162.00	159.00	321.00
#12	L1@4.25	KLF	255.00	169.00	424.00
#10	L1@4.50	KLF	403.00	179.00	582.00
# 8	L1@4.75	KLF	650.00	189.00	839.00
# 6	L1@5.00	KLF	1,140.00	199.00	1,339.00
# 4	L1@6.00	KLF	1,930.00	239.00	2,169.00



Soft drawn stranded bare copper wire

# 8	L1@4.75	KLF	710.00	189.00	899.00
# 6	L1@5.00	KLF	1,240.00	199.00	1,439.00
# 4	L1@6.00	KLF	1,970.00	239.00	2,209.00
# 2	L1@8.00	KLF	3,140.00	319.00	3,459.00
# 1	L1@10.0	KLF	4,500.00	398.00	4,898.00
# 1/0	L1@11.0	KLF	5,190.00	438.00	5,628.00
# 2/0	L1@12.0	KLF	5,680.00	478.00	6,158.00
# 3/0	L1@13.0	KLF	7,140.00	518.00	7,658.00
# 4/0	L1@14.0	KLF	9,020.00	558.00	9,578.00

Use these figures to estimate the cost of copper SEU service entrance cable and bare copper wire installed in buildings, under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include circuit make-up, reel set-up, phase identification, circuit testing, stripping, layout, material handling, and normal waste. Add for connectors, supports, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: The NEC permits installation of bare copper wire in conduit with conductors. But bare copper wire installed outside conduit must be protected against damage. Some dealers sell bare copper wire by weight rather than length. The table at the bottom of the page shows weights per 1,000 linear feet.

Approximate weight per 1000' for soft drawn bare copper wire (pounds)

Size		Weight	Size		Weight
#14	solid	12.40	#2	stranded	204.90
#12	solid	19.80	#1	stranded	258.40
#10	solid	31.43	#1/0	stranded	325.80
#8	stranded	50.97	#2/0	stranded	410.90
#6	stranded	81.05	#3/0	stranded	518.10
#4	stranded	128.90	#4/0	stranded	653.30

Copper Armored Cable (BX)

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Copper solid armored (MC) cable

#14-2	L1@8.50	KLF	1,490.00	339.00	1,829.00
#12-2	L1@9.50	KLF	1,530.00	378.00	1,908.00
#10-2	L1@11.0	KLF	2,680.00	438.00	3,118.00
#14-3	L1@9.50	KLF	2,320.00	378.00	2,698.00
#12-3	L1@10.5	KLF	2,550.00	418.00	2,968.00
#10-3	L1@14.0	KLF	5,160.00	558.00	5,718.00
#14-4	L1@11.0	KLF	3,120.00	438.00	3,558.00
#12-4	L1@13.0	KLF	3,440.00	518.00	3,958.00
#10-4	L1@15.0	KLF	6,920.00	598.00	7,518.00

Copper stranded armored (MC) cable

# 8-2	L1@12.0	KLF	6,690.00	478.00	7,168.00
# 6-2	L1@15.0	KLF	10,400.00	598.00	10,998.00
# 8-3	L1@15.0	KLF	8,570.00	598.00	9,168.00
# 6-3	L1@17.0	KLF	13,800.00	677.00	14,477.00
# 4-3	L1@20.0	KLF	19,300.00	797.00	20,097.00
# 2-3	L1@24.0	KLF	27,800.00	956.00	28,756.00
# 8-4	L1@17.0	KLF	13,900.00	677.00	14,577.00
# 6-4	L1@20.0	KLF	19,000.00	797.00	19,797.00
# 4-4	L1@24.0	KLF	26,400.00	956.00	27,356.00

Copper solid armored (MC) cable with bare copper ground

# 8	L1@10.0	KLF	2,130.00	398.00	2,528.00
# 6	L1@12.0	KLF	2,260.00	478.00	2,738.00

Copper stranded armored (MC) cable with bare copper ground

# 4	L1@14.0	KLF	4,010.00	558.00	4,568.00
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Anti-short bushings

3/8"	L1@0.02	Ea	.08	.80	.88
1/2"	L1@0.02	Ea	.10	.80	.90
3/4"	L1@0.02	Ea	.21	.80	1.01

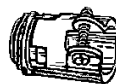
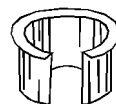
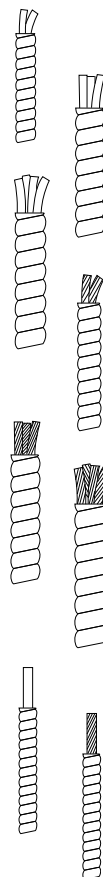
MC connectors, 1 screw squeeze type

3/8" standard cable	L1@0.05	Ea	1.49	1.99	3.48
3/8" oversize cable	L1@0.05	Ea	2.00	1.99	3.99
1/2" standard cable	L1@0.05	Ea	2.15	1.99	4.14
3/4" standard cable	L1@0.06	Ea	3.18	2.39	5.57

MC connectors, 2 screw

3/8" standard cable	L1@0.05	Ea	1.33	1.99	3.32
1/2" standard cable	L1@0.05	Ea	2.66	1.99	4.65
3/4" standard cable	L1@0.05	Ea	4.75	1.99	6.74

Use these figures to estimate the cost of copper MC cable installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each 1000 linear feet of cable, bushing or connector installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include boring, notching, stripping, circuit makeup, layout, material handling, and normal waste. Add for supports, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: the NEC and your local code restrict the ways MC can be used.



Single Conductor Copper Power Cable



5000 volt cross-linked polyethylene non-shielded copper (XLP) power cable

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
# 6	L2@14.0	KLF	3,370.00	558.00	3,928.00
# 4	L2@16.0	KLF	4,260.00	637.00	4,897.00
# 2	L2@18.0	KLF	5,350.00	717.00	6,067.00
# 1/0	L3@22.0	KLF	9,940.00	876.00	10,816.00
# 2/0	L3@24.0	KLF	12,300.00	956.00	13,256.00
# 4/0	L3@28.0	KLF	15,000.00	1,120.00	16,120.00
#350 KCMIL	L3@34.0	KLF	25,600.00	1,350.00	26,950.00
#500 KCMIL	L3@36.0	KLF	34,000.00	1,430.00	35,430.00



5000 volt cross-linked polyethylene tape shielded copper (XLP) power cable

# 6	L2@14.0	KLF	6,880.00	558.00	7,438.00
# 4	L2@16.0	KLF	7,140.00	637.00	7,777.00
# 2	L2@18.0	KLF	7,460.00	717.00	8,177.00
# 1/0	L3@22.0	KLF	13,000.00	876.00	13,876.00
# 2/0	L3@24.0	KLF	18,500.00	956.00	19,456.00
# 4/0	L3@28.0	KLF	21,800.00	1,120.00	22,920.00
# 350 KCMIL	L3@34.0	KLF	32,700.00	1,350.00	34,050.00
# 500 KCMIL	L3@36.0	KLF	43,300.00	1,430.00	44,730.00



15000 volt ethylene-propylene-rubber tape shielded copper (EPR) power cable

# 2	L2@20.0	KLF	15,200.00	797.00	15,997.00
# 1/0	L3@26.0	KLF	19,000.00	1,040.00	20,040.00
# 2/0	L3@28.0	KLF	22,700.00	1,120.00	23,820.00
# 4/0	L3@32.0	KLF	27,600.00	1,270.00	28,870.00
# 350 KCMIL	L3@38.0	KLF	39,100.00	1,510.00	40,610.00
# 500 KCMIL	L3@42.0	KLF	45,000.00	1,670.00	46,670.00

Use these figures to estimate the cost of medium-voltage copper power cable used for the primary service under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is two electricians for sizes to #1 and three or four electricians for sizes over #1. Cost per manhour is \$39.84. These costs include fishing string, reel set-up, pulling gear set-up, phase identification, pulling compound, layout, material handling, and normal waste. Add for terminations, splices, fire-proofing, high-potential testing, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: These figures assume that cable is pulled in conduit runs of 100 feet or less and that three conductors are pulled at the same time. Keep medium-voltage cable sealed against moisture at all times.

600 Volt Aluminum Wire

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Type THW 600 volt 75 degree stranded aluminum wire

# 6	L2@9.00	KLF	1,050.00	359.00	1,409.00
# 4	L2@10.0	KLF	1,310.00	398.00	1,708.00
# 2	L2@11.0	KLF	1,770.00	438.00	2,208.00
# 1	L2@12.0	KLF	2,560.00	478.00	3,038.00
# 1/0	L3@13.0	KLF	3,100.00	518.00	3,618.00
# 2/0	L3@14.0	KLF	3,660.00	558.00	4,218.00
# 3/0	L3@15.0	KLF	4,540.00	598.00	5,138.00
# 4/0	L3@16.0	KLF	5,060.00	637.00	5,697.00
# 250 KCMIL	L3@18.0	KLF	6,160.00	717.00	6,877.00
# 300 KCMIL	L3@19.0	KLF	8,540.00	757.00	9,297.00
# 350 KCMIL	L3@20.0	KLF	8,660.00	797.00	9,457.00
# 400 KCMIL	L3@21.0	KLF	10,200.00	837.00	11,037.00
# 500 KCMIL	L3@22.0	KLF	11,200.00	876.00	12,076.00
# 600 KCMIL	L3@23.0	KLF	14,300.00	916.00	15,216.00
# 700 KCMIL	L3@24.0	KLF	16,400.00	956.00	17,356.00
# 750 KCMIL	L3@25.0	KLF	16,700.00	996.00	17,696.00
#1000 KCMIL	L3@30.0	KLF	24,400.00	1,200.00	25,600.00



Type THHN-THWN 600 volt 90 degree stranded aluminum wire

# 6	L2@9.00	KLF	1,050.00	359.00	1,409.00
# 4	L2@10.0	KLF	1,310.00	398.00	1,708.00
# 2	L2@11.0	KLF	1,770.00	438.00	2,208.00
# 1	L2@12.0	KLF	2,530.00	478.00	3,008.00
# 1/0	L3@13.0	KLF	3,100.00	518.00	3,618.00
# 2/0	L3@14.0	KLF	3,660.00	558.00	4,218.00
# 3/0	L3@15.0	KLF	4,540.00	598.00	5,138.00
# 4/0	L3@16.0	KLF	5,060.00	637.00	5,697.00
# 250 KCMIL	L3@18.0	KLF	6,160.00	717.00	6,877.00
# 300 KCMIL	L3@19.0	KLF	8,540.00	757.00	9,297.00
# 350 KCMIL	L3@20.0	KLF	8,660.00	797.00	9,457.00
# 400 KCMIL	L3@21.0	KLF	10,200.00	837.00	11,037.00
# 500 KCMIL	L3@22.0	KLF	11,200.00	876.00	12,076.00
# 600 KCMIL	L3@23.0	KLF	14,300.00	916.00	15,216.00
# 700 KCMIL	L3@24.0	KLF	16,400.00	956.00	17,356.00
# 750 KCMIL	L3@25.0	KLF	16,700.00	996.00	17,696.00
#1000 KCMIL	L3@30.0	KLF	24,400.00	1,200.00	25,600.00



Use these figures to estimate the cost of aluminum THW and THHN-THWN wire installed in conduit under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is two electricians for sizes to #1 and three electricians for sizes over #1. The labor cost per manhour is \$39.84. These costs include fishing string, reel set-up, pulling gear set-up, phase identification, pulling compound, layout, material handling, and normal waste. Add for splicing, anti-oxidation compound, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: These figures assume that wire is pulled in conduit runs of 100 feet or less and that three conductors are pulled at the same time. Use anti-oxidation compound on all aluminum connections. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the NEC before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings.

See Wire Conversion Table on Page 537
Copper To Aluminum Wire Ampacities

600 Volt Aluminum Wire

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Type XHHW cross-linked polyethylene 600 volt 90 degree (XLP) aluminum wire

# 6	L2@9.00	KLF	1,050.00	359.00	1,409.00
# 4	L2@10.0	KLF	1,310.00	398.00	1,708.00
# 2	L2@11.0	KLF	1,770.00	438.00	2,208.00
# 1	L2@12.0	KLF	2,560.00	478.00	3,038.00
# 1/0	L3@13.0	KLF	3,100.00	518.00	3,618.00
# 2/0	L3@14.0	KLF	3,660.00	558.00	4,218.00
# 3/0	L3@15.0	KLF	4,540.00	598.00	5,138.00
# 4/0	L3@16.0	KLF	5,060.00	637.00	5,697.00
# 250 KCMIL	L3@18.0	KLF	6,160.00	717.00	6,877.00
# 300 KCMIL	L3@19.0	KLF	8,540.00	757.00	9,297.00
# 350 KCMIL	L3@20.0	KLF	8,660.00	797.00	9,457.00
# 400 KCMIL	L3@21.0	KLF	10,200.00	837.00	11,037.00
# 500 KCMIL	L3@22.0	KLF	11,200.00	876.00	12,076.00
# 600 KCMIL	L3@23.0	KLF	14,300.00	916.00	15,216.00
# 700 KCMIL	L3@24.0	KLF	16,400.00	956.00	17,356.00
# 750 KCMIL	L3@25.0	KLF	16,700.00	996.00	17,696.00
#1000 KCMIL	L3@30.0	KLF	24,400.00	1,200.00	25,600.00

Type USE, RHH-RHW 600 volt cross-linked polyethylene (XLP) aluminum wire

# 6	L2@9.00	KLF	910.00	359.00	1,269.00
# 4	L2@10.0	KLF	1,050.00	398.00	1,448.00
# 2	L2@11.0	KLF	1,450.00	438.00	1,888.00
# 1	L2@12.0	KLF	1,130.00	478.00	1,608.00
# 1/0	L3@13.0	KLF	2,500.00	518.00	3,018.00
# 2/0	L3@14.0	KLF	2,930.00	558.00	3,488.00
# 3/0	L3@15.0	KLF	3,450.00	598.00	4,048.00
# 4/0	L3@16.0	KLF	3,840.00	637.00	4,477.00
# 250 KCMIL	L3@18.0	KLF	5,180.00	717.00	5,897.00
# 300 KCMIL	L3@19.0	KLF	6,060.00	757.00	6,817.00
# 350 KCMIL	L3@20.0	KLF	6,900.00	797.00	7,697.00
# 400 KCMIL	L3@21.0	KLF	8,430.00	837.00	9,267.00
# 500 KCMIL	L3@22.0	KLF	9,270.00	876.00	10,146.00
# 600 KCMIL	L3@23.0	KLF	10,800.00	916.00	11,716.00
# 700 KCMIL	L3@24.0	KLF	12,300.00	956.00	13,256.00
# 750 KCMIL	L3@25.0	KLF	13,800.00	996.00	14,796.00
#1000 KCMIL	L3@30.0	KLF	16,100.00	1,200.00	17,300.00

Use these figures to estimate the cost of aluminum XHHW wire installed in conduit or USE RHH-RHW wire installed under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is two electricians for sizes to #1 and three electricians for sizes over #1. The labor cost per manhour is \$39.84. These costs include fishing string, reel set-up, pulling gear set-up, phase identification, pulling compound, layout, material handling, and normal waste. Add for splicing, anti-oxidation compound, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: The figures for XHHW wire assume that wire is pulled in conduit runs of 100 feet or less and that three conductors are pulled at the same time. Use anti-oxidation compound on all aluminum connections. Type USE, RHH-RHW wire is approved for use overhead, direct burial or in underground duct systems. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the NEC before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings.

600 Volt Aluminum Cable and Wire

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Type SEU 600 volt plastic jacket service entrance aluminum cable

# 8-3	L2@10.0	KLF	4,300.00	398.00	4,698.00
# 6-3	L2@11.0	KLF	4,350.00	438.00	4,788.00
# 4-2 & 6	L2@12.0	KLF	5,230.00	478.00	5,708.00
# 4-3	L2@13.0	KLF	5,580.00	518.00	6,098.00
# 2-2 & 4	L2@14.0	KLF	6,810.00	558.00	7,368.00
# 1-2 & 3	L2@16.0	KLF	7,450.00	637.00	8,087.00
# 1-3	L2@17.0	KLF	10,100.00	677.00	10,777.00
# 1/0-3	L2@19.0	KLF	11,300.00	757.00	12,057.00
# 2/0-3	L2@21.0	KLF	13,100.00	837.00	13,937.00
# 3/0-3	L2@23.0	KLF	17,400.00	916.00	18,316.00
# 4/0-3	L2@25.0	KLF	18,300.00	996.00	19,296.00



Type SE-SER 600 volt plastic jacket aluminum cable

# 8-3	#2 Gr	L2@11.0	KLF	3,270.00	438.00	3,708.00
# 6-3	#6 Gr	L2@12.0	KLF	3,710.00	478.00	4,188.00
# 4-3	#6 Gr	L2@14.0	KLF	4,140.00	558.00	4,698.00
# 2-3	#4 Gr	L2@16.0	KLF	6,130.00	637.00	6,767.00
# 1-3	#3 Gr	L2@18.0	KLF	7,940.00	717.00	8,657.00
# 1/0-3	#2 Gr	L2@20.0	KLF	9,220.00	797.00	10,017.00
# 2/0-3	#2 Gr	L2@22.0	KLF	10,900.00	876.00	11,776.00
# 3/0-3	#1/0 Gr	L2@24.0	KLF	13,400.00	956.00	14,356.00
# 4/0-3	#2/0 Gr	L2@26.0	KLF	15,500.00	1,040.00	16,540.00



Weatherproof polyethylene 600 volt solid aluminum wire

	Code Name					
#6	Apple	L2@8.00	KLF	1,080.00	319.00	1,399.00
#4	Pear	L2@9.00	KLF	1,230.00	359.00	1,589.00
#2	Cherry	L2@10.0	KLF	1,620.00	398.00	2,018.00



Use these figures to estimate the cost of aluminum service entrance cable installed under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is two electricians working at the cost of \$39.84 per manhour. These costs include stripping, phase identification, layout, material handling, and normal waste. Add for service entrance cap, anti-oxidation compound, supports, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Use anti-oxidation compound on all aluminum connections. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the *NEC* before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings.

See Wire Conversion Table On Page 537

Copper to Aluminum Wire Ampacities

600 Volt Aluminum Wire



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Weatherproof polyethylene 600 volt stranded aluminum wire					
#6	Plum	7 L2@8.00	KLF 327.00	319.00	646.00
#4	Apricot	7 L2@9.00	KLF 425.00	359.00	784.00
#2	Peach	7 L2@9.25	KLF 558.00	369.00	927.00
#1/0	Quince	7 L4@10.0	KLF 789.00	398.00	1,187.00
#2/0	Orange	7 L4@10.3	KLF 1,040.00	410.00	1,450.00
#3/0	Fig	7 L4@12.0	KLF 1,290.00	478.00	1,768.00
#4/0	Olive	7 L4@13.0	KLF 1,780.00	518.00	2,298.00



600 volt aluminum conductor steel reinforced (ACSR) aluminum wire

#6	Walnut	6 L4@8.00	KLF 993.00	319.00	1,312.00
#4	Butternut	6 L4@9.00	KLF 1,340.00	359.00	1,699.00
#4	Hickory	7 L4@9.00	KLF 1,290.00	359.00	1,649.00
#2	Pignut	6 L4@10.0	KLF 1,950.00	398.00	2,348.00
#2	Beech	7 L4@10.0	KLF 2,090.00	398.00	2,488.00
#1/0	Almond	6 L5@12.0	KLF 2,400.00	478.00	2,878.00
#2/0	Pecan	6 L5@13.0	KLF 2,850.00	518.00	3,368.00
#3/0	Filbert	6 L5@14.0	KLF 3,420.00	558.00	3,978.00
#4/0	Buckeye	6 L5@15.0	KLF 4,020.00	598.00	4,618.00



600 volt cross-linked polyethylene (XLP) solid aluminum wire

#6	Apple-XLP	L2@8.00	KLF 495.00	319.00	814.00
#4	Pear-XLP	L2@9.00	KLF 734.00	359.00	1,093.00
#2	Cherry-XLP	L2@10.0	KLF 1,100.00	398.00	1,498.00

Use these figures to estimate the cost of aluminum wire installed on overhead supports under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. For wire other than ACSR, the crew is two electricians for wire up to #2 and four electricians for wire over #2. For ACSR wire on overhead poles, use four electricians on wire to #2 and five electricians on wire over #2. The labor cost is \$39.84 per manhour. These costs include reel set-up, pulling gear set-up, tensioning, layout, material handling, and normal waste. Add for insulators, terminations, line hardware, anti-oxidation compound, pre-formed ties, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Use anti-oxidation compound on all aluminum connections, fittings and lugs. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the NEC before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings.

**See Wire Conversion Table On Page 537
Copper to Aluminum Wire Ampacities**

600 Volt Aluminum Wire

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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600 volt cross-linked polyethylene (XLP) stranded aluminum wire

	Code Name	Strands				
#6	Plum-XLP	7 L2@8.00	KLF	377.00	319.00	696.00
#4	Apricot-XLP	7 L2@9.00	KLF	425.00	359.00	784.00
#2	Peach-XLP	7 L2@10.0	KLF	628.00	398.00	1,026.00
#1/0	Quince-XLP	7 L4@12.0	KLF	920.00	478.00	1,398.00
#2/0	Orange-XLP	7 L4@13.0	KLF	1,310.00	518.00	1,828.00
#3/0	Fig-XLP	7 L4@14.0	KLF	1,640.00	558.00	2,198.00
#4/0	Olive-XLP	7 L4@15.0	KLF	1,780.00	598.00	2,378.00



600 volt cross-linked polyethylene ACSR aluminum wire

	Code Name	Strands				
#6	Walnut-XLP	6 L4@8.00	KLF	1,060.00	319.00	1,379.00
#4	Butternut-XLP	6 L4@9.00	KLF	573.00	359.00	932.00
#4	Hickory-XLP	7 L4@9.00	KLF	1,230.00	359.00	1,589.00
#2	Pignut-XLP	6 L4@10.0	KLF	773.00	398.00	1,171.00
#2	Beech-XLP	7 L4@10.0	KLF	934.00	398.00	1,332.00
#1/0	Almond-XLP	6 L5@12.0	KLF	1,100.00	478.00	1,578.00
#2/0	Pecan-XLP	6 L5@13.0	KLF	1,230.00	518.00	1,748.00
#3/0	Filbert-XLP	6 L5@14.0	KLF	1,560.00	558.00	2,118.00
#4/0	Buckeye-XLP	6 L5@15.0	KLF	1,830.00	598.00	2,428.00



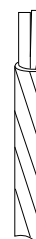
600 volt polyethylene duplex aluminum service drop wire

	Code Name	Strands				
#6	Pekingese	1 L2@12.0	KLF	1,040.00	478.00	1,518.00
#6	Collie	7 L2@11.0	KLF	1,120.00	438.00	1,558.00
#4	Spaniel	7 L2@14.0	KLF	1,520.00	558.00	2,078.00
#2	Doberman	7 L2@16.0	KLF	2,460.00	637.00	3,097.00
#1/0	Malamute	19 L4@18.0	KLF	3,880.00	717.00	4,597.00



600 volt triplex aluminum service drop wire, ACSR

	Code Name	Strands				
#4	Oyster	7 L4@14.0	KLF	2,500.00	558.00	3,058.00
#2	Clam	7 L4@16.0	KLF	3,210.00	637.00	3,847.00
#1/0	Murex	7 L5@18.0	KLF	4,920.00	717.00	5,637.00
#2/0	Nassa	7 L5@20.0	KLF	5,730.00	797.00	6,527.00
#4/0	Portunas	19 L5@24.0	KLF	8,910.00	956.00	9,866.00



Use these figures to estimate the cost of aluminum wire installed on overhead supports under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. For wire other than ACSR, the crew is two electricians for wire up to #2 and four electricians for wire over #2. For ACSR wire on overhead poles, use four electricians on wire to #2 and five electricians on wire over #2. The labor cost is \$39.84 per manhour. These costs include reel set-up, pulling gear set-up, tensioning, layout, material handling, and normal waste. Add for insulators, terminations, line hardware, anti-oxidation compound, pre-formed ties, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Use anti-oxidation compound on all aluminum connections, fittings and lugs. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the NEC before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings.

See Wire Conversion Table On Page 537
Copper to Aluminum Wire Ampacities

600 Volt Aluminum Service Drop Wire



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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600 volt triplex aluminum service drop wire, ACSR

	Code Name	Strands				
#6	Paludina	1	L3@14.0	KLF	1,830.00	2,388.00
#6	Voluta	7	L3@14.0	KLF	2,160.00	2,718.00
#4	Periwinkle	7	L3@16.0	KLF	2,930.00	3,567.00
#2	Conch	7	L3@18.0	KLF	4,210.00	4,927.00
#1/0	Neritina	7	L3@20.0	KLF	5,680.00	6,477.00
#1/0	Cenia	19	L3@20.0	KLF	6,170.00	6,967.00
#2/0	Runcina	7	L3@24.0	KLF	6,460.00	7,416.00
#4/0	Zurara	19	L3@28.0	KLF	10,100.00	11,220.00

600 volt triplex aluminum service drop wire with reduced neutral

	Code Name	Strands				
#4	Scallop	1	L3@16.0	KLF	2,500.00	3,137.00
#4	Strombus	7	L3@16.0	KLF	2,920.00	3,557.00
#2	Cockle	7	L3@18.0	KLF	3,760.00	4,477.00
#1/0	Janthina	7	L3@20.0	KLF	5,600.00	6,397.00
#2/0	Clio	19	L3@24.0	KLF	7,130.00	8,086.00
#4/0	Cerapus	19	L3@28.0	KLF	10,200.00	11,320.00

600 volt quadruplex aluminum service drop wire

	Code Name	Strands				
#4	Pinto	7	L3@18.0	KLF	3,590.00	4,307.00
#2	Mustang	7	L3@20.0	KLF	4,960.00	5,757.00
#1/0	Criollo	7	L3@24.0	KLF	8,540.00	9,496.00
#2/0	Percheron	19	L3@26.0	KLF	10,300.00	11,340.00
#4/0	Oldenberg	19	L3@30.0	KLF	14,400.00	15,600.00

Use these figures to estimate the cost of aluminum service drop wire installed on overhead supports under the conditions described on pages 5 and 6. Costs listed are for each 1,000 linear feet installed. The crew is three electricians working at a labor rate of \$39.84 per manhour. These costs include reel set-up, pulling gear set-up, tensioning, layout, material handling, and normal waste. Add for insulators, terminations, line hardware, anti-oxidation compound, pre-formed ties, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Use anti-oxidation compound on all aluminum connections, fittings and lugs. The ampacity of copper wire is greater than the ampacity of aluminum wire of the same size. Check the NEC before substituting aluminum wire for copper wire. Terminations for aluminum wire must be made with approved fittings. Multi-conductor service drop is factory-twisted and sold on spools of 500 and 1,000 feet. Many suppliers will sell service drop wire in special lengths at a modest additional charge.

Locking Receptacles

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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2 pole, 2 wire, single non-grounding locking receptacles

15A, 125V, NEMA L1-15R	L1@0.20	Ea	7.52	7.97	15.49
20A, 250V, NEMA L2-20R	L1@0.20	Ea	10.00	7.97	17.97

2 pole, 3 wire, single grounding locking receptacles

15A, 125V, NEMA L5-15R	L1@0.20	Ea	10.90	7.97	18.87
20A, 125V, NEMA L5-20R	L1@0.20	Ea	12.70	7.97	20.67
30A, 125V, NEMA L5-30R	L1@0.20	Ea	17.90	7.97	25.87
15A, 250V, NEMA L6-15R	L1@0.25	Ea	11.20	9.96	21.16
20A, 250V, NEMA L6-20R	L1@0.25	Ea	12.80	9.96	22.76
30A, 250V, NEMA L6-30R	L1@0.25	Ea	19.50	9.96	29.46
15A, 277V, NEMA L7-15R	L1@0.25	Ea	11.30	9.96	21.26
20A, 277V, NEMA L7-20R	L1@0.25	Ea	12.80	9.96	22.76
30A, 277V, NEMA L7-30R	L1@0.30	Ea	19.50	12.00	31.50
20A, 480V, NEMA L8-20R	L1@0.25	Ea	16.00	9.96	25.96
30A, 480V, NEMA L8-30R	L1@0.30	Ea	23.50	12.00	35.50
20A, 600V, NEMA L9-20R	L1@0.25	Ea	10.80	9.96	20.76
30A, 600V, NEMA L9-30R	L1@0.30	Ea	23.70	12.00	35.70



2 pole, 3 wire, single orange isolated ground locking receptacles

15A, 125V, NEMA L5-15R	L1@0.20	Ea	21.30	7.97	29.27
20A, 125V, NEMA L5-20R	L1@0.25	Ea	14.90	9.96	24.86
30A, 125V, NEMA L5-30R	L1@0.25	Ea	20.50	9.96	30.46
20A, 250V, NEMA L6-20R	L1@0.30	Ea	15.30	12.00	27.30

3 pole, 3 wire, single non-grounding locking receptacles

20A, 125/250V, NEMA L10-20R	L1@0.25	Ea	16.80	9.96	26.76
30A, 125/250V, NEMA L10-30R	L1@0.30	Ea	21.60	12.00	33.60

3 pole, 3 wire, 3 phase non-grounding locking receptacles

20A, 250V, NEMA L11-20R	L1@0.25	Ea	19.40	9.96	29.36
30A, 250V, NEMA L11-30R	L1@0.30	Ea	21.60	12.00	33.60
20A, 480V, NEMA L12-20R	L1@0.25	Ea	16.80	9.96	26.76
30A, 600V, NEMA L13-30R	L1@0.30	Ea	21.60	12.00	33.60



Use these figures to estimate the cost of locking receptacles under the conditions described on pages 5 and 6. Costs listed are for each receptacle installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for outlet boxes and switch rings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead, and profit. There's a special configuration for each voltage and amperage. Receptacles with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade receptacles.

Locking Receptacles

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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3 pole, 4 wire, single orange isolated ground locking receptacles

20A, 125/250V, NEMA L14-20R	L1@0.25	Ea	19.60	9.96	29.56
30A, 125/250V, NEMA L14-30R	L1@0.30	Ea	16.80	12.00	28.80

3 pole, 4 wire, single non-grounding locking receptacles

20A, 125/250V, NEMA L14-20R	L1@0.25	Ea	19.60	9.96	29.56
30A, 125/250V, NEMA L14-30R	L1@0.30	Ea	16.80	12.00	28.80

3 pole, 4 wire, 3 phase single grounding locking receptacles

20A, 250V, NEMA L15-20R	L1@0.25	Ea	17.80	9.96	27.76
30A, 250V, NEMA L15-30R	L1@0.30	Ea	28.40	12.00	40.40
20A, 480V, NEMA L16-20R	L1@0.25	Ea	21.30	9.96	31.26
30A, 480V, NEMA L16-30R	L1@0.30	Ea	33.40	12.00	45.40
30A, 600V, NEMA L17-30R	L1@0.30	Ea	32.40	12.00	44.40

4 pole, 4 wire, 3 phase Y single non-grounding locking receptacles

20A, 120/208V, NEMA L18-20R	L1@0.25	Ea	26.80	9.96	36.76
30A, 120/208V, NEMA L18-30R	L1@0.30	Ea	39.70	12.00	51.70
20A, 277/480V, NEMA L19-20R	L1@0.25	Ea	27.30	9.96	37.26
30A, 277/480V, NEMA L19-30R	L1@0.30	Ea	39.80	12.00	51.80
20A, 600V, NEMA L20-20R	L1@0.25	Ea	27.30	9.96	37.26
30A, 600V, NEMA L20-30R	L1@0.30	Ea	39.90	12.00	51.90

4 pole, 5 wire, 3 phase Y grounding locking receptacles

20A, 120/208V, NEMA L21-20R	L1@0.25	Ea	21.70	9.96	31.66
30A, 120/208V, NEMA L21-30R	L1@0.30	Ea	30.20	12.00	42.20
20A, 277/480V, NEMA L22-20R	L1@0.25	Ea	26.10	9.96	36.06
30A, 277/480V, NEMA L22-30R	L1@0.30	Ea	36.10	12.00	48.10
20A, 347/600V, NEMA L23-20R	L1@0.25	Ea	26.10	9.96	36.06
30A, 347/600V, NEMA L23-30R	L1@0.30	Ea	44.90	12.00	56.90

Use these figures to estimate the cost of locking receptacles under the conditions described on pages 5 and 6. Costs listed are for each receptacle installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for outlet boxes and switch rings, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead, and profit. There's a special configuration for each voltage and amperage. Receptacles with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade receptacles.

Plastic Locking Connectors

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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2 pole, 3 wire, grounding locking type connector bodies

15A, 125V, NEMA L5-15R	L1@0.20	Ea	14.00	7.97	21.97
15A, 250V, NEMA L6-15R	L1@0.20	Ea	14.40	7.97	22.37
20A, 125V, NEMA L5-20R	L1@0.25	Ea	15.50	9.96	25.46
20A, 250V, NEMA L6-20R	L1@0.25	Ea	15.50	9.96	25.46
20A, 277V, NEMA L7-20R	L1@0.25	Ea	15.50	9.96	25.46
20A, 480V, NEMA L8-20R	L1@0.25	Ea	23.20	9.96	33.16
20A, 600V, NEMA L9-20R	L1@0.25	Ea	19.20	9.96	29.16
20A, 125/250V, NEMA L10-20R	L1@0.25	Ea	16.80	9.96	26.76
30A, 125V, NEMA L5-30R	L1@0.30	Ea	30.90	12.00	42.90
30A, 250V, NEMA L6-30R	L1@0.30	Ea	31.20	12.00	43.20
30A, 277V, NEMA L7-30R	L1@0.30	Ea	31.20	12.00	43.20
30A, 480V, NEMA L8-30R	L1@0.30	Ea	37.10	12.00	49.10
30A, 600V, NEMA L9-30R	L1@0.30	Ea	37.30	12.00	49.30
30A, 125/250V, NEMA L10-30R	L1@0.30	Ea	37.40	12.00	49.40

3 pole, 4 wire, grounding locking type connector bodies

20A, 120/250V, NEMA L14-20R	L1@0.35	Ea	21.30	13.90	35.20
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3 pole, 3 phase, grounding locking type connector bodies

20A, 250V, NEMA L11-20R	L1@0.35	Ea	19.60	13.90	33.50
20A, 480V, NEMA L12-20R	L1@0.35	Ea	16.80	13.90	30.70
30A, 250V, NEMA L11-30R	L1@0.35	Ea	37.40	13.90	51.30
30A, 480V, NEMA L12-30R	L1@0.35	Ea	37.40	13.90	51.30
30A, 600V, NEMA L13-30R	L1@0.35	Ea	37.40	13.90	51.30



Use these figures to estimate the cost of locking connector bodies under the conditions described on pages 5 and 6. Costs listed are for each connector installed on a power cable. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add sales tax, supervision, mobilization, demobilization, cleanup, overhead, and profit. Connectors with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade connectors.

Plastic Locking Connectors



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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3 pole, 4 wire, 3 phase grounding locking connector bodies

20A, 250V, NEMA L15-20R	L1@0.40	Ea	21.30	15.90	37.20
20A, 480V, NEMA L16-20R	L1@0.40	Ea	25.60	15.90	41.50
20A, 125/208V, NEMA L18-20R	L1@0.40	Ea	33.00	15.90	48.90
20A, 277/480V, NEMA L19-20R	L1@0.40	Ea	33.00	15.90	48.90
20A, 347/600V, NEMA L20-20R	L1@0.40	Ea	33.00	15.90	48.90
30A, 250V, NEMA L15-30R	L1@0.45	Ea	43.10	17.90	61.00
30A, 480V, NEMA L16-30R	L1@0.45	Ea	50.10	17.90	68.00
30A, 600V, NEMA L17-30R	L1@0.45	Ea	51.90	17.90	69.80
30A, 120/208V, NEMA L18-30R	L1@0.45	Ea	63.40	17.90	81.30
30A, 277/480V, NEMA L19-30R	L1@0.45	Ea	63.40	17.90	81.30
30A, 347/600V, NEMA L20-30R	L1@0.45	Ea	63.40	17.90	81.30

4 pole, 5 wire, 3 phase Y grounding locking connector bodies

20A, 120/208V, NEMA L21-20R	L1@0.50	Ea	33.60	19.90	53.50
20A, 277/480V, NEMA L22-20R	L1@0.50	Ea	40.30	19.90	60.20
20A, 347/600V, NEMA L23-20R	L1@0.50	Ea	40.40	19.90	60.30
30A, 120/208V, NEMA L21-30R	L1@0.55	Ea	42.50	21.90	64.40
30A, 277/480V, NEMA L22-30R	L1@0.55	Ea	51.00	21.90	72.90
30A, 347/600V, NEMA L23-30R	L1@0.55	Ea	63.50	21.90	85.40

Use these figures to estimate the cost of locking connector bodies under the conditions described on pages 5 and 6. Costs listed are for each connector installed on a power cable. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add sales tax, supervision, mobilization, demobilization, cleanup, overhead, and profit. Connectors with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade connectors.

Plastic Locking Plugs

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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2 pole, 2 wire, non-grounding locking plugs

15A, 125V, NEMA L1-15P	L1@0.15	Ea	8.51	5.98	14.49
20A, 250V, NEMA L2-20P	L1@0.20	Ea	7.52	7.97	15.49

2 pole, 3 wire, grounding locking plugs

15A, 125V, NEMA L5-15P	L1@0.15	Ea	7.85	5.98	13.83
20A, 125V, NEMA L5-20P	L1@0.20	Ea	10.00	7.97	17.97
30A, 125V, NEMA L5-30P	L1@0.25	Ea	15.50	9.96	25.46
15A, 250V, NEMA L6-15P	L1@0.15	Ea	8.34	5.98	14.32
20A, 250V, NEMA L6-20P	L1@0.20	Ea	10.00	7.97	17.97
30A, 250V, NEMA L6-30P	L1@0.25	Ea	15.50	9.96	25.46
15A, 277V, NEMA L7-15P	L1@0.15	Ea	5.09	5.98	11.07
20A, 277V, NEMA L7-20P	L1@0.20	Ea	10.00	7.97	17.97
30A, 277V, NEMA L7-30P	L1@0.25	Ea	15.30	9.96	25.26
20A, 480V, NEMA L8-20P	L1@0.20	Ea	12.30	7.97	20.27
30A, 480V, NEMA L8-30P	L1@0.25	Ea	18.50	9.96	28.46
20A, 600V, NEMA L9-20P	L1@0.20	Ea	12.30	7.97	20.27
30A, 600V, NEMA L9-30P	L1@0.25	Ea	17.80	9.96	27.76



3 pole, 3 wire, non-grounding locking plugs

20A, 125/250V, NEMA L10-20P	L1@0.20	Ea	11.70	7.97	19.67
30A, 125/250V, NEMA L10-30P	L1@0.25	Ea	17.00	9.96	26.96

3 pole, 3 wire, 3 phase non-grounding locking plugs

20A, 250V, NEMA L11-20P	L1@0.20	Ea	13.60	7.97	21.57
30A, 250V, NEMA L11-30P	L1@0.25	Ea	19.10	9.96	29.06
20A, 480V, NEMA L12-20P	L1@0.20	Ea	11.70	7.97	19.67
30A, 480V, NEMA L12-30P	L1@0.25	Ea	19.10	9.96	29.06
30A, 600V, NEMA L13-30P	L1@0.25	Ea	19.10	9.96	29.06



Use these figures to estimate the cost of locking plugs under the conditions described on pages 5 and 6. Costs listed are for each plug installed on a power cord. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for sales tax, supervision, mobilization, demobilization, cleanup, overhead, and profit. Plugs with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade plugs.

Plastic Locking Plugs

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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3 pole, 4 wire, grounding locking plugs

20A, 125/250V, NEMA L14-20P	L1@0.20	Ea	15.30	7.97	23.27
30A, 125/250V, NEMA L14-30P	L1@0.25	Ea	20.70	9.96	30.66

3 pole, 4 wire, 3 phase grounding locking plugs

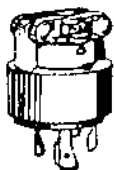
20A, 250V, NEMA L15-20P	L1@0.20	Ea	16.10	7.97	24.07
30A, 250V, NEMA L15-30P	L1@0.25	Ea	20.90	9.96	30.86
20A, 480V, NEMA L16-20P	L1@0.20	Ea	16.40	7.97	24.37
30A, 480V, NEMA L16-30P	L1@0.25	Ea	24.60	9.96	34.56
30A, 600V, NEMA L17-30P	L1@0.25	Ea	24.80	9.96	34.76

4 pole, 4 wire, 3 phase non-grounding locking plugs

20A, 120/208V, NEMA L18-20P	L1@0.25	Ea	23.80	9.96	33.76
30A, 120/208V, NEMA L18-30P	L1@0.30	Ea	30.00	12.00	42.00
20A, 277/480V, NEMA L19-20P	L1@0.25	Ea	23.80	9.96	33.76
30A, 277/480V, NEMA L19-30P	L1@0.30	Ea	30.00	12.00	42.00
20A, 600V, NEMA L20-20P	L1@0.25	Ea	24.00	9.96	33.96
30A, 600V, NEMA L20-30P	L1@0.30	Ea	30.00	12.00	42.00

4 pole, 5 wire, 3 phase grounding locking plugs

20A, 120/208V, NEMA L21-20P	L1@0.25	Ea	19.50	9.96	29.46
30A, 120/208V, NEMA L21-30P	L1@0.30	Ea	22.90	12.00	34.90
20A, 277/480V, NEMA L22-20P	L1@0.25	Ea	23.50	9.96	33.46
30A, 277/480V, NEMA L22-30P	L1@0.30	Ea	27.90	12.00	39.90
20A, 600V, NEMA L23-20P	L1@0.25	Ea	23.50	9.96	33.46
30A, 600V, NEMA L23-30P	L1@0.30	Ea	34.50	12.00	46.50



Use these figures to estimate the cost of locking plugs under the conditions described on pages 5 and 6. Costs listed are for each plug installed on a power cord. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for sales tax, supervision, mobilization, demobilization, cleanup, overhead, and profit. Plugs with special contact materials designed for durability under heavy use can be considerably more expensive than standard grade plugs.

Photo Controls

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Flush wire-in type

1000W, 120V SPST	L1@0.20	Ea	8.18	7.97	16.15
1000W, 208/277V SPST	L1@0.20	Ea	9.84	7.97	17.81

Flush wire-in with single gang wall plate

1000W, 120V SPST	L1@0.20	Ea	9.84	7.97	17.81
1000W, 208/277V SPST	L1@0.20	Ea	12.90	7.97	20.87



Adjustable light control, wall plate

1800W, 120V SPST	L1@0.25	Ea	10.70	9.96	20.66
1800W, 208/277V SPST	L1@0.25	Ea	13.20	9.96	23.16
1800W, 480V SPST	L1@0.25	Ea	19.90	9.96	29.86
2000W, 120V SPST	L1@0.25	Ea	10.40	9.96	20.36
2000W, 208/277V SPST	L1@0.25	Ea	12.30	9.96	22.26
2000W, 480V SPST	L1@0.25	Ea	18.50	9.96	28.46
3000W, 120V SPST	L1@0.25	Ea	18.70	9.96	28.66
3000W, 208/277V SPST	L1@0.25	Ea	19.30	9.96	29.26



Plug-in locking type, delayed response, thermal

1800W, 120V SPST	L1@0.25	Ea	6.67	9.96	16.63
1800W, 208/277V SPST	L1@0.25	Ea	8.18	9.96	18.14
1800W, 480V SPST	L1@0.25	Ea	21.40	9.96	31.36

Plug-in locking type, delayed response, thermal, low maintenance

1800W, 120V SPST	L1@0.25	Ea	14.70	9.96	24.66
1800W, 208/277V SPST	L1@0.25	Ea	17.10	9.96	27.06
1800W, 480V SPST	L1@0.25	Ea	23.40	9.96	33.36



Use these figures to estimate the cost of photo controls under the conditions described on pages 5 and 6. Costs are for each photo control installed on a box or lighting fixture. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for boxes, covers, sales tax, supervision, mobilization, demobilization, cleanup, overhead, and profit.

Wiring Device Plates

	Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Switch cover plates						
	1 gang brown	L1@0.05	Ea	.29	1.99	2.28
	1 gang ivory	L1@0.05	Ea	.29	1.99	2.28
	1 gang gray	L1@0.05	Ea	.33	1.99	2.32
	1 gang white	L1@0.05	Ea	.33	1.99	2.32
	1 gang red	L1@0.05	Ea	.33	1.99	2.32
	1 gang black	L1@0.05	Ea	.33	1.99	2.32
	1 gang brass	L1@0.05	Ea	3.63	1.99	5.62
	1 gang aluminum	L1@0.05	Ea	1.81	1.99	3.80
	1 gang stainless steel	L1@0.05	Ea	1.43	1.99	3.42
	2 gang brown	L1@0.10	Ea	.61	3.98	4.59
	2 gang ivory	L1@0.10	Ea	.61	3.98	4.59
	2 gang gray	L1@0.10	Ea	.61	3.98	4.59
	2 gang white	L1@0.10	Ea	.67	3.98	4.65
	2 gang red	L1@0.10	Ea	.67	3.98	4.65
	2 gang black	L1@0.10	Ea	.67	3.98	4.65
	2 gang brass	L1@0.10	Ea	8.02	3.98	12.00
	2 gang aluminum	L1@0.10	Ea	3.63	3.98	7.61
	2 gang stainless steel	L1@0.10	Ea	2.76	3.98	6.74
	3 gang brown	L1@0.15	Ea	.91	5.98	6.89
	3 gang ivory	L1@0.15	Ea	.91	5.98	6.89
	3 gang gray	L1@0.15	Ea	.91	5.98	6.89
	3 gang white	L1@0.15	Ea	1.00	5.98	6.98
	3 gang red	L1@0.15	Ea	1.00	5.98	6.98
	3 gang black	L1@0.15	Ea	1.00	5.98	6.98
	3 gang brass	L1@0.15	Ea	12.40	5.98	18.38
	3 gang aluminum	L1@0.15	Ea	6.20	5.98	12.18
	3 gang stainless steel	L1@0.15	Ea	4.10	5.98	10.08
	4 gang brown	L1@0.20	Ea	1.34	7.97	9.31
	4 gang ivory	L1@0.20	Ea	1.34	7.97	9.31
	4 gang gray	L1@0.20	Ea	1.53	7.97	9.50
	4 gang white	L1@0.20	Ea	1.53	7.97	9.50
	4 gang red	L1@0.20	Ea	1.53	7.97	9.50
	4 gang black	L1@0.20	Ea	1.53	7.97	9.50
	4 gang brass	L1@0.20	Ea	18.40	7.97	26.37
	4 gang aluminum	L1@0.20	Ea	9.36	7.97	17.33
	4 gang stainless steel	L1@0.20	Ea	7.07	7.97	15.04

Use these figures to estimate the cost of trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
Switch cover plates (continued)					
5 gang brown	L1@0.25	Ea	2.49	9.96	12.45
5 gang ivory	L1@0.25	Ea	2.49	9.96	12.45
5 gang gray	L1@0.25	Ea	2.87	9.96	12.83
5 gang white	L1@0.25	Ea	2.87	9.96	12.83
5 gang red	L1@0.25	Ea	2.87	9.96	12.83
5 gang black	L1@0.25	Ea	2.87	9.96	12.83
5 gang brass	L1@0.25	Ea	23.10	9.96	33.06
5 gang aluminum	L1@0.25	Ea	11.70	9.96	21.66
5 gang stainless steel	L1@0.25	Ea	8.78	9.96	18.74
6 gang brown	L1@0.30	Ea	2.95	12.00	14.95
6 gang ivory	L1@0.30	Ea	2.95	12.00	14.95
6 gang gray	L1@0.30	Ea	3.33	12.00	15.33
6 gang white	L1@0.30	Ea	3.33	12.00	15.33
6 gang red	L1@0.30	Ea	3.33	12.00	15.33
6 gang black	L1@0.30	Ea	3.33	12.00	15.33
6 gang brass	L1@0.30	Ea	27.00	12.00	39.00
6 gang aluminum	L1@0.30	Ea	16.20	12.00	28.20
6 gang stainless steel	L1@0.30	Ea	10.50	12.00	22.50



Duplex receptacle cover plates

1 gang brown	L1@0.05	Ea	.29	1.99	2.28
1 gang ivory	L1@0.05	Ea	.29	1.99	2.28
1 gang gray	L1@0.05	Ea	.33	1.99	2.32
1 gang white	L1@0.05	Ea	.33	1.99	2.32
1 gang red	L1@0.05	Ea	.33	1.99	2.32
1 gang black	L1@0.05	Ea	.33	1.99	2.32
1 gang brass	L1@0.05	Ea	3.63	1.99	5.62
1 gang aluminum	L1@0.05	Ea	1.81	1.99	3.80
1 gang stainless steel	L1@0.05	Ea	1.43	1.99	3.42
2 gang brown	L1@0.10	Ea	.67	3.98	4.65
2 gang ivory	L1@0.10	Ea	.67	3.98	4.65
2 gang gray	L1@0.10	Ea	.76	3.98	4.74
2 gang white	L1@0.10	Ea	.76	3.98	4.74
2 gang red	L1@0.10	Ea	.76	3.98	4.74
2 gang black	L1@0.10	Ea	.76	3.98	4.74
2 gang brass	L1@0.10	Ea	8.98	3.98	12.96
2 gang aluminum	L1@0.10	Ea	8.59	3.98	12.57
2 gang stainless steel	L1@0.10	Ea	3.44	3.98	7.42



Use these figures to estimate the cost of trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Combination switch and duplex receptacle cover plates

2 gang brown	L1@0.10	Ea	.61	3.98	4.59
2 gang ivory	L1@0.10	Ea	.61	3.98	4.59
2 gang gray	L1@0.10	Ea	.67	3.98	4.65
2 gang white	L1@0.10	Ea	.67	3.98	4.65
2 gang red	L1@0.10	Ea	.67	3.98	4.65
2 gang black	L1@0.10	Ea	.67	3.98	4.65
2 gang brass	L1@0.10	Ea	8.29	3.98	12.27
2 gang aluminum	L1@0.10	Ea	4.10	3.98	8.08
2 gang stainless steel	L1@0.10	Ea	3.05	3.98	7.03
3 gang brown	L1@0.15	Ea	1.06	5.98	7.04
3 gang ivory	L1@0.15	Ea	1.06	5.98	7.04
3 gang gray	L1@0.15	Ea	1.20	5.98	7.18
3 gang white	L1@0.15	Ea	1.20	5.98	7.18
3 gang red	L1@0.15	Ea	1.20	5.98	7.18
3 gang black	L1@0.15	Ea	1.20	5.98	7.18
3 gang brass	L1@0.15	Ea	12.40	5.98	18.38
3 gang aluminum	L1@0.15	Ea	6.96	5.98	12.94
3 gang stainless steel	L1@0.15	Ea	4.58	5.98	10.56

Single receptacle cover plates

1 gang brown	L1@0.05	Ea	.30	1.99	2.29
1 gang ivory	L1@0.05	Ea	.30	1.99	2.29
1 gang gray	L1@0.05	Ea	.35	1.99	2.34
1 gang white	L1@0.05	Ea	.35	1.99	2.34
1 gang red	L1@0.05	Ea	.35	1.99	2.34
1 gang black	L1@0.05	Ea	.35	1.99	2.34
1 gang brass	L1@0.05	Ea	4.01	1.99	6.00
1 gang aluminum	L1@0.05	Ea	1.91	1.99	3.90
1 gang stainless steel	L1@0.05	Ea	1.53	1.99	3.52

Blank wiring device cover plates

1 gang brown	L1@0.05	Ea	.39	1.99	2.38
1 gang ivory	L1@0.05	Ea	.39	1.99	2.38
1 gang gray	L1@0.05	Ea	.46	1.99	2.45
1 gang white	L1@0.05	Ea	.46	1.99	2.45
1 gang red	L1@0.05	Ea	.46	1.99	2.45
1 gang black	L1@0.05	Ea	.46	1.99	2.45
1 gang brass	L1@0.05	Ea	4.34	1.99	6.33
1 gang aluminum	L1@0.05	Ea	1.91	1.99	3.90
1 gang stainless steel	L1@0.05	Ea	1.53	1.99	3.52
2 gang brown	L1@0.10	Ea	1.36	3.98	5.34
2 gang ivory	L1@0.10	Ea	1.36	3.98	5.34
2 gang gray	L1@0.10	Ea	1.56	3.98	5.54
2 gang white	L1@0.10	Ea	1.56	3.98	5.54
2 gang red	L1@0.10	Ea	1.56	3.98	5.54
2 gang black	L1@0.10	Ea	1.56	3.98	5.54

Use these figures to estimate the cost of trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, receptacle and switch, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Blank wiring device plates

2 gang brass	L1@0.10	Ea	9.79	3.98	13.77
2 gang aluminum	L1@0.10	Ea	3.12	3.98	7.10
2 gang stainless steel	L1@0.10	Ea	1.45	3.98	5.43



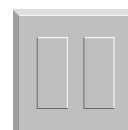
Telephone wiring device plates

1 gang brown	L1@0.05	Ea	.37	1.99	2.36
1 gang ivory	L1@0.05	Ea	.37	1.99	2.36
1 gang gray	L1@0.05	Ea	.44	1.99	2.43
1 gang white	L1@0.05	Ea	.44	1.99	2.43
1 gang red	L1@0.05	Ea	.44	1.99	2.43
1 gang brass	L1@0.05	Ea	4.17	1.99	6.16
1 gang aluminum	L1@0.05	Ea	1.97	1.99	3.96
1 gang stainless steel	L1@0.05	Ea	1.49	1.99	3.48



Decorator wiring device plates

1 gang brown	L1@0.05	Ea	.56	1.99	2.55
1 gang ivory	L1@0.05	Ea	.51	1.99	2.50
1 gang gray	L1@0.05	Ea	.67	1.99	2.66
1 gang white	L1@0.05	Ea	.51	1.99	2.50
1 gang red	L1@0.05	Ea	.69	1.99	2.68
1 gang black	L1@0.05	Ea	.67	1.99	2.66
1 gang brass	L1@0.05	Ea	3.55	1.99	5.54
1 gang aluminum	L1@0.05	Ea	2.04	1.99	4.03
1 gang stainless steel	L1@0.05	Ea	1.54	1.99	3.53
2 gang brown	L1@0.10	Ea	1.26	3.98	5.24
2 gang ivory	L1@0.10	Ea	1.13	3.98	5.11
2 gang gray	L1@0.10	Ea	1.36	3.98	5.34
2 gang white	L1@0.10	Ea	1.02	3.98	5.00
2 gang red	L1@0.10	Ea	1.36	3.98	5.34
2 gang black	L1@0.10	Ea	1.36	3.98	5.34
2 gang brass	L1@0.10	Ea	7.16	3.98	11.14
2 gang aluminum	L1@0.10	Ea	4.09	3.98	8.07
2 gang stainless steel	L1@0.10	Ea	3.90	3.98	7.88
3 gang brown	L1@0.15	Ea	2.97	5.98	8.95
3 gang ivory	L1@0.15	Ea	2.97	5.98	8.95
3 gang gray	L1@0.15	Ea	2.97	5.98	8.95
3 gang white	L1@0.15	Ea	2.97	5.98	8.95
3 gang red	L1@0.15	Ea	2.97	5.98	8.95
3 gang black	L1@0.15	Ea	2.97	5.98	8.95
3 gang brass	L1@0.15	Ea	15.30	5.98	21.28
3 gang stainless steel	L1@0.15	Ea	5.98	5.98	11.96



Use these figures to estimate the cost of trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Decorator wiring device plates

4 gang brown	L1@0.20	Ea	5.34	7.97	13.31
4 gang ivory	L1@0.20	Ea	5.34	7.97	13.31
4 gang gray	L1@0.20	Ea	5.34	7.97	13.31
4 gang white	L1@0.20	Ea	5.34	7.97	13.31
4 gang black	L1@0.20	Ea	5.34	7.97	13.31
4 gang brass	L1@0.20	Ea	19.00	7.97	26.97
4 gang stainless steel	L1@0.20	Ea	7.93	7.97	15.90
5 gang brown	L1@0.25	Ea	7.48	9.96	17.44
5 gang ivory	L1@0.25	Ea	7.48	9.96	17.44
5 gang gray	L1@0.25	Ea	7.48	9.96	17.44
5 gang white	L1@0.25	Ea	7.48	9.96	17.44
5 gang red	L1@0.25	Ea	7.48	9.96	17.44
5 gang black	L1@0.25	Ea	7.48	9.96	17.44
5 gang brass	L1@0.25	Ea	25.70	9.96	35.66
5 gang stainless steel	L1@0.25	Ea	23.80	9.96	33.76

Combination decorator and standard switch plates

2 gang brown	L1@0.10	Ea	1.30	3.98	5.28
2 gang ivory	L1@0.10	Ea	1.30	3.98	5.28
2 gang gray	L1@0.10	Ea	1.36	3.98	5.34
2 gang white	L1@0.10	Ea	1.36	3.98	5.34
2 gang red	L1@0.10	Ea	1.36	3.98	5.34
2 gang black	L1@0.10	Ea	1.36	3.98	5.34
2 gang brass	L1@0.10	Ea	7.74	3.98	11.72
2 gang aluminum	L1@0.10	Ea	4.09	3.98	8.07
2 gang stainless steel	L1@0.10	Ea	3.90	3.98	7.88

Combination decorator and two standard switch plates

3 gang brown	L1@0.15	Ea	2.63	5.98	8.61
3 gang ivory	L1@0.15	Ea	2.63	5.98	8.61
3 gang gray	L1@0.15	Ea	2.63	5.98	8.61
3 gang white	L1@0.15	Ea	2.63	5.98	8.61
3 gang brass	L1@0.15	Ea	11.70	5.98	17.68
3 gang aluminum	L1@0.15	Ea	6.21	5.98	12.19
3 gang stainless steel	L1@0.15	Ea	5.92	5.98	11.90

Use these figures to estimate the cost of switch trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Combination decorator and three standard switch plates

4 gang brown	L1@0.20	Ea	5.86	7.97	13.83
4 gang ivory	L1@0.20	Ea	5.86	7.97	13.83
4 gang white	L1@0.20	Ea	5.86	7.97	13.83



Semi-jumbo switch plates

1 gang brown	L1@0.05	Ea	.84	1.99	2.83
1 gang ivory	L1@0.05	Ea	.84	1.99	2.83
1 gang white	L1@0.05	Ea	.91	1.99	2.90
1 gang gray	L1@0.05	Ea	.91	1.99	2.90
2 gang brown	L1@0.10	Ea	1.81	3.98	5.79
2 gang ivory	L1@0.10	Ea	1.81	3.98	5.79
2 gang white	L1@0.10	Ea	1.81	3.98	5.79
2 gang gray	L1@0.10	Ea	1.81	3.98	5.79
3 gang brown	L1@0.15	Ea	2.71	5.98	8.69
3 gang ivory	L1@0.15	Ea	2.71	5.98	8.69
3 gang white	L1@0.15	Ea	2.71	5.98	8.69
3 gang gray	L1@0.15	Ea	2.71	5.98	8.69



Semi-jumbo duplex wiring device plates

1 gang brown	L1@0.05	Ea	.75	1.99	2.74
1 gang ivory	L1@0.05	Ea	.75	1.99	2.74
1 gang white	L1@0.05	Ea	.91	1.99	2.90
1 gang gray	L1@0.05	Ea	.91	1.99	2.90



Semi-jumbo single receptacle plates

1 gang brown	L1@0.05	Ea	1.01	1.99	3.00
1 gang ivory	L1@0.05	Ea	1.01	1.99	3.00
1 gang white	L1@0.05	Ea	1.01	1.99	3.00
1 gang gray	L1@0.05	Ea	1.01	1.99	3.00



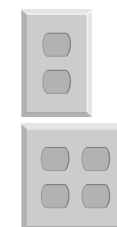
Semi-jumbo double duplex wiring device plates

2 gang brown	L1@0.10	Ea	1.82	3.98	5.80
2 gang ivory	L1@0.10	Ea	1.82	3.98	5.80
2 gang white	L1@0.10	Ea	1.82	3.98	5.80
2 gang gray	L1@0.10	Ea	1.82	3.98	5.80



Use these figures to estimate the cost of switch and receptacle trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch and receptacle, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates



Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Semi-jumbo decorator wiring device plates

1 gang brown	L1@0.05	Ea	.91	1.99	2.90
1 gang ivory	L1@0.05	Ea	.91	1.99	2.90
1 gang white	L1@0.05	Ea	.91	1.99	2.90
2 gang brown	L1@0.10	Ea	2.67	3.98	6.65
2 gang ivory	L1@0.10	Ea	2.67	3.98	6.65
2 gang white	L1@0.10	Ea	2.67	3.98	6.65
3 gang brown	L1@0.15	Ea	5.23	5.98	11.21
3 gang ivory	L1@0.15	Ea	5.23	5.98	11.21
3 gang white	L1@0.15	Ea	5.23	5.98	11.21

Jumbo switch plates

1 gang brown	L1@0.05	Ea	1.21	1.99	3.20
1 gang ivory	L1@0.05	Ea	1.06	1.99	3.05
1 gang white	L1@0.05	Ea	1.21	1.99	3.20
2 gang brown	L1@0.10	Ea	2.66	3.98	6.64
2 gang ivory	L1@0.10	Ea	2.40	3.98	6.38

Jumbo duplex wiring device plates

1 gang brown	L1@0.05	Ea	1.21	1.99	3.20
1 gang ivory	L1@0.05	Ea	1.06	1.99	3.05
1 gang white	L1@0.05	Ea	1.21	1.99	3.20
2 gang brown	L1@0.10	Ea	2.66	3.98	6.64
2 gang ivory	L1@0.10	Ea	2.40	3.98	6.38

Jumbo combination switch and duplex receptacle plates

2 gang brown	L1@0.10	Ea	2.66	3.98	6.64
2 gang ivory	L1@0.10	Ea	2.40	3.98	6.38

Jumbo combination switch and blank wiring device plates

2 gang brown	L1@0.10	Ea	3.17	3.98	7.15
2 gang ivory	L1@0.10	Ea	3.17	3.98	7.15

Jumbo combination duplex and blank wiring device plates

2 gang brown	L1@0.10	Ea	2.78	3.98	6.76
2 gang ivory	L1@0.10	Ea	2.78	3.98	6.76

Jumbo blank wiring device plates

1 gang brown	L1@0.05	Ea	1.61	1.99	3.60
1 gang ivory	L1@0.05	Ea	1.45	1.99	3.44
2 gang brown	L1@0.10	Ea	3.22	3.98	7.20
2 gang ivory	L1@0.10	Ea	3.22	3.98	7.20

Use these figures to estimate the cost of switch and receptacle trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch and receptacle, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Jumbo decorator wiring device plates

1 gang brown	L1@0.05	Ea	1.32	1.99	3.31
1 gang ivory	L1@0.05	Ea	1.21	1.99	3.20
1 gang white	L1@0.05	Ea	1.32	1.99	3.31
2 gang brown	L1@0.10	Ea	2.67	3.98	6.65
2 gang ivory	L1@0.10	Ea	2.67	3.98	6.65
2 gang white	L1@0.10	Ea	2.67	3.98	6.65

Jumbo combination decorator and blank wiring device plates

2 gang brown	L1@0.10	Ea	3.17	3.98	7.15
2 gang ivory	L1@0.10	Ea	3.17	3.98	7.15
2 gang white	L1@0.10	Ea	3.17	3.98	7.15

Deep switch plates

1 gang brown	L1@0.05	Ea	.59	1.99	2.58
1 gang ivory	L1@0.05	Ea	.55	1.99	2.54
2 gang brown	L1@0.10	Ea	1.17	3.98	5.15
2 gang ivory	L1@0.10	Ea	1.05	3.98	5.03

Deep duplex receptacle plates

1 gang brown	L1@0.05	Ea	.55	1.99	2.54
1 gang ivory	L1@0.05	Ea	.55	1.99	2.54
2 gang brown	L1@0.10	Ea	1.29	3.98	5.27
2 gang ivory	L1@0.10	Ea	1.05	3.98	5.03

Deep combination switch and duplex receptacle plates

2 gang brown	L1@0.10	Ea	1.41	3.98	5.39
2 gang ivory	L1@0.10	Ea	1.27	3.98	5.25

Deep combination switch and blank wiring device plates

2 gang brown	L1@0.10	Ea	1.41	3.98	5.39
2 gang ivory	L1@0.10	Ea	1.27	3.98	5.25

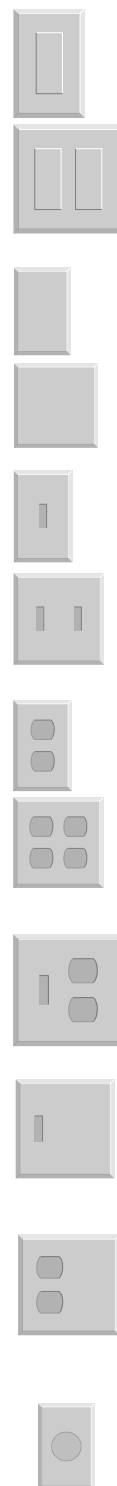
Deep combination duplex receptacle and blank wiring device plates

2 gang brown	L1@0.10	Ea	1.41	3.98	5.39
2 gang ivory	L1@0.10	Ea	1.27	3.98	5.25

15 amp size single receptacle plates

1 gang brass	L1@0.05	Ea	9.00	1.99	10.99
1 gang aluminum	L1@0.05	Ea	2.42	1.99	4.41
1 gang stainless 430	L1@0.05	Ea	1.91	1.99	3.90
1 gang stainless 302	L1@0.05	Ea	2.98	1.99	4.97

Use these figures to estimate the cost of switch and receptacle trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch and receptacle, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Use deep plates when the wall has been built out away from the outlet box and the screws from a standard plate won't reach the box. This is common in remodeling work when a wall has been covered with new paneling.



Wiring Device Plates

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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20 amp size single receptacle plates

1 gang brass	L1@0.05	Ea	9.01	1.99	11.00
1 gang stainless 430	L1@0.05	Ea	2.18	1.99	4.17
1 gang stainless 302	L1@0.05	Ea	2.18	1.99	4.17

30 amp size single receptacle plates

1 gang brass	L1@0.05	Ea	9.00	1.99	10.99
1 gang stainless 430	L1@0.05	Ea	2.46	1.99	4.45
1 gang stainless 302	L1@0.05	Ea	2.53	1.99	4.52

50 amp size single receptacle plates

2 gang brass	L1@0.10	Ea	10.90	3.98	14.88
2 gang stainless 430	L1@0.10	Ea	4.15	3.98	8.13

Weatherproof single receptacle plates

15A cast metal	L1@0.10	Ea	22.50	3.98	26.48
20A cast metal	L1@0.10	Ea	23.80	3.98	27.78

Weatherproof horizontal duplex receptacle plates with twin covers

1 gang cast metal	L1@0.10	Ea	20.10	3.98	24.08
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Use these figures to estimate the cost of switch and receptacle trim plates installed on outlet boxes under the conditions described on pages 5 and 6. Costs listed are for each plate installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for the outlet box, switch and receptacle, plaster ring, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be careful to select the right plate color and material. Special plates with non-standard configurations can be ordered for custom applications.

Section 6: Service Entrance Equipment

This section deals with the equipment that's located at the point where electrical service enters the building — hence the name service entrance equipment. It includes safety switches, circuit breakers, a meter socket for mounting the utility company's meter, perhaps a transformer, at least one panelboard for distribution to the various loads, and wireway. This gear may be housed in a single steel cabinet or it may consist of several components, each with a separate enclosure.

Service entrance gear is custom-designed for larger commercial and industrial buildings. The type, size and ampacity of the equipment depend on the power that's needed, of course, and on requirements imposed by the local inspection authority and the electrical utility. Both the inspector and the electric company have standards that must be met. Be sure the equipment you're pricing meets those standards.

Description of Service Entrance Equipment

Figure 6-1 shows service entrance equipment for a small home. Figures 6-2 and 6-3 show service entrance gear that might be used in commercial and larger industrial buildings.

Notice in Figures 6-1, 6-2 and 6-3 that all three installations have two main parts: the service section and the distribution section.

The **service section** connects to the utility company power feed and outputs power to the distribution section. It includes either a cable pull section where the feed is pulled into the service entrance cabinet from underground power lines, or conduit to a service entrance cap which receives lines from an overhead distribution system.

The main disconnect or circuit breaker is also located in the service section. It provides a quick and convenient way to cut off power to all circuits when necessary, or when an overload endangers the system. The NEC requires that each conductor entering the service entrance section have a readily accessible disconnect. Exceptions are made for very small installations.

Also in the service section will be the meter socket which receives the utility company's meter. The service side may include instrumentation such as a voltmeter or ammeter, a fire alarm breaker, and perhaps a transformer if needed to reduce distribution voltage to the voltage required by loads in the building.

The **distribution section** is usually mounted right beside the service section and is connected by a set of metal bars called **bus bars**. These bars carry power from the service section to the distribution section.

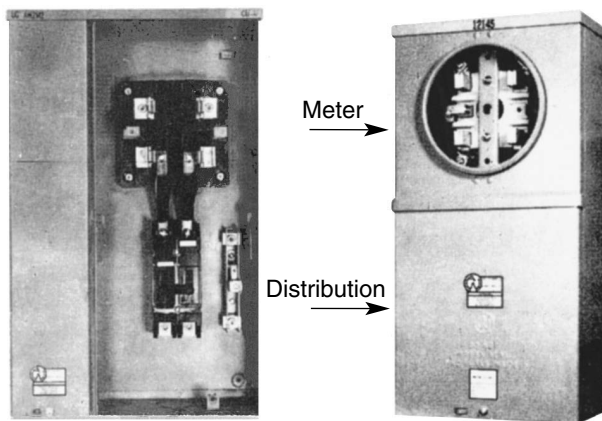
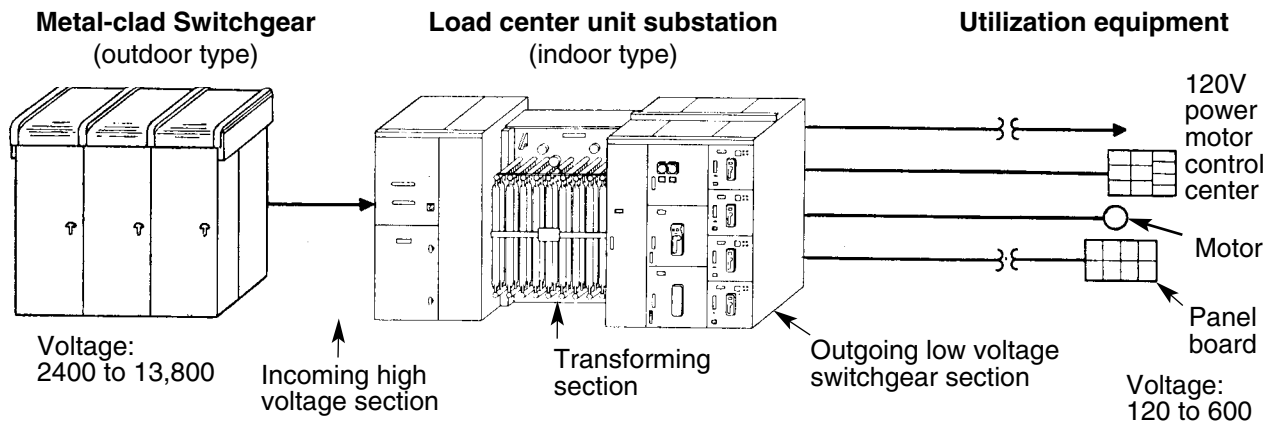


Figure 6-1
Residential Service Entrance Equipment



Figure 6-2
Multi-metering Center

Power Systems Equipment



"Express" switchboards

Specially selected offering from the Type FA-1 Switchboard line.
Dependable electrical system distribution for a variety of applications

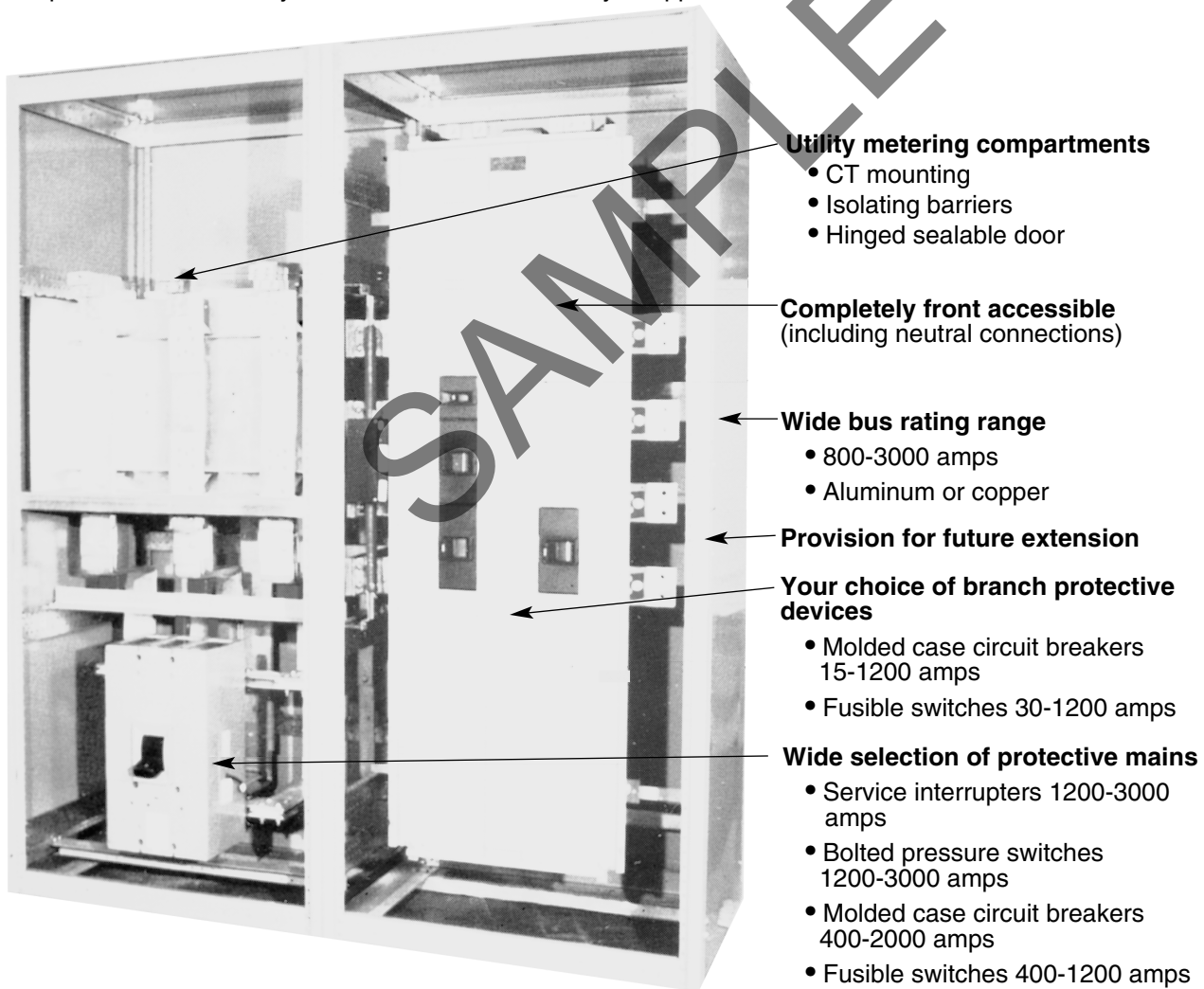


Figure 6-3
Power Systems Equipment

The purpose of the distribution section is to subdivide electrical power among the individual circuits, each of which is protected by a circuit breaker mounted in the distribution panel. The distribution section in a larger commercial building will include feeder breakers in addition to individual breakers for every circuit in the building's electrical system. If the building covers a large area or has electrical equipment like large motors or air conditioning units, the distribution section may include circuits that feed subpanels located in other parts of the building.

Service entrance equipment listed in this section is only representative of the many types of equipment that are available. But from what's listed here you can see the range of material prices and typical installation costs. Prices quoted for larger pieces of equipment are for the most competitively-priced units. Prices can vary widely. It's good practice to get several quotes.

Much of this equipment is custom-assembled to order. There will be only a few competitive suppliers in your area. But note that multiple units ordered at the same time can reduce costs 20 percent or more.

Safety Switches

Safety switches are also known as **disconnect switches and externally operated (EXO) devices**. A safety switch is a convenient way of shutting off electrical equipment in an emergency. For example, the NEC requires that a safety switch be installed at or near heavy machinery. In some cases the switch will be protected with a padlock so the power can't be shut off accidentally.

There are many types of safety switches. Some have specific applications. Others are appropriate for a wide range of uses. Ratings for safety switches are by amperage (30 amp, 60 amp, 100 amp, etc.), and by voltage (120 volt, 240 volt, 480 volt, etc.). Safety switches intended for use with electric motors are rated by motor horsepower. Safety switches are also classified as general duty, heavy duty, and by NEMA (National Electrical Manufacturer's Association) class. The most common classes are 1 (indoor), 3R (weatherproof), 4 and 4X (waterproof and dustproof), and 7 through 9 (for hazardous locations). Explosion-proof enclosures are also available.

Safety switches can be either fusible or non-fusible. The fusible type has a renewable fuse that can be changed to alter the overload protection characteristics of the circuit. A safety switch that isn't fused has no overload protection.

The engineer who designs the electrical system should identify the type and rating of each safety switch on the plans. But note that it's acceptable practice (but an unnecessary expense) to use oversize safety switches. For example, a 100A,

480V, 3-phase NEMA class 3R (weatherproof) safety switch can be installed inside a building to serve a machine with a 20A, 240V load. But it's much less expensive to use a switch that just meets rather than exceeds circuit requirements.

The fusible switches listed in this section are for cartridge fuses. Screw-in fuses can be used in some safety switches, but the cartridge type is much more common. Most suppliers carry cartridge fuses in these ranges. The fuse amperage ratings are as follows for the switch ratings indicated:

30A	fusible switches use fractional amp fuses to 30 amps
60A	fusible switches use 35 amp to 60 amp fuses
100A	fusible switches use 70 amp to 100 amp fuses
200A	fusible switches use 110 amp to 200 amp fuses
400A	fusible switches use 225 amp to 400 amp fuses
600A	fusible switches use 450 amp to 600 amp fuses
800A	fusible switches use 601 amp to 800 amp fuses
1200A	fusible switches use 1000 amp to 1200 amp fuses

The *National Electrical Code* lists several installation rules for safety switches. Some job specifications will include additional requirements for safety switches. For example, some specs require switches with interlocks that prevent opening the switch door or cover when the switch is in the "on" position. The specs might require that the switch have a block for connecting a neutral wire.

Circuit Breakers

Like safety switches, circuit breakers can be used to shut off the power to any circuit. Generally, a circuit breaker can be used anywhere a safety switch is required. But an automatic circuit breaker's most important function is to protect the system by opening when an overload is detected. Unlike a fuse, a breaker doesn't have to be replaced after tripping. Resetting the breaker restores power to the circuit.

Although non-automatic circuit breakers are available, automatic breakers with permanent trip settings are most common. They're rated by amperage capacity and voltage. They're also rated for maximum short-circuit interrupting capacity. The NEC dictates the type of circuit breaker to use for each application.

The most common use for circuit breakers is in loadcenters and panelboards. They can be either the plug-in or bolt-on type. Loadcenters use plug-in

breakers. Panelboards use bolt-on breakers that bolt directly to the panelboard bus and to the panel frame for support. The vast majority of our jobs use bolt-on. Most well-engineered jobs require bolt-on breakers. Use bolt-on for high A.I.C. interrupting capacities.

Circuit breakers are available with more than one pole. A single handle opens and closes contact between two or more conductors. But single-pole breakers can be ganged to protect each line. When that's done, the operating handles for all poles on a circuit should be tied together with a bar device. Usually these breakers are made from single-pole breakers riveted together to form a two- or three-pole device.

Circuit breakers can be either thermal, magnetic or a combination of the two. Thermal breakers react to changes in temperature, opening the circuit in response to extra heat from a short. Magnetic breakers react to changes in current flow. A sudden increase in current flow creates enough magnetic force to activate an armature, opening the circuit.

Thermal-magnetic breakers combine the best features of both types of breakers and are the type commonly used in panelboards and loadcenters. Magnetic breakers are generally used in special applications where the breaker must be unaffected by air temperature.

Meter Sockets

Meter sockets are usually installed by the contractor. The power company will usually install the actual kilowatt hour meter.

Be sure to install the right socket. Each type of socket has a certain number of jaws that make contact with the meter. The socket must match the meter the power company intends to use. That depends on the size of the service feed and the service voltage provided.

In some cases the meter will require a current transformer in the service section. The current transformer is connected to the meter base. Test blocks may also be required. Check with your local utility company before buying or installing the meter socket.

Multi-socket assemblies are required in multi-family residences. Usually all the meters will be located in the same panel for convenience. Your supplier will help you select the right meter panel. But it's your responsibility to get approval from the utility company for the panel selected.

Loadcenters and Panelboards

Loadcenters are electrical distribution panels that use **plug-in** circuit breakers. They're usually used in residential and light commercial buildings where the electrical loads are not heavy.

Loadcenters are enclosed in a sheet metal box which can be ordered for surface, flush or semi-flush mounting in a wall. The cover has knockouts where breakers are mounted. Most loadcenters come with a door to cover the breaker handles. Both indoor- and outdoor-rated loadcenters are available. Units can have as few as two single-pole spaces or as many as 42 single-pole spaces. Two- and three-pole plug-in breakers can also be inserted. Individual breakers can be sized up to 100 amps.

Panelboards are electrical distribution panels that use **bolt-on** circuit breakers. They're usually used in heavy commercial and industrial buildings where higher amperages are needed.

Panelboards are enclosed in a heavy gauge sheet metal box which can be ordered for surface or flush mounting on a wall. Panelboards have interiors like similar loadcenters except that the circuit breakers must be bolted to the interior bus system. An interior cover is placed over the circuit breakers and extends to the panel cover. The panel cover is made of heavy gauge sheet metal and usually has a door which covers the circuit-breaker handles. Two- and three-pole bolt-on breakers can be installed. The breakers can be sized up to 100 amps for lighting panels, and higher for power panels.

Panelboards are rated for total load, such as 100A, 225A, 400A, etc. The circuit breakers installed cannot exceed the panel rating. Single-width panelboards are limited to 42 circuits. If additional circuits are required, a double-width panelboard can be used.

Panelboards are usually custom-assembled at the factory to meet specific job requirements. Loadcenters are usually stock items. Your supplier probably offers a good selection of loadcenter housings and large quantities of the more common plug-in breakers that are inserted into the housing. When you order a loadcenter, they can pull the loadcenter housing from stock and furnish whatever breakers you will insert into the housing.

Wireway

Wireway is an enclosed metal channel with one hinged or removable side so wire can be laid, rather than pulled, into place. Indoor wireway may have either a screw cover or a hinged cover. Both interior and exterior wireways are available in several sizes and lengths.

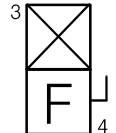
Wireway is useful in many situations. For example, it's used in service entrance equipment to enclose wire running between the various components. It can be installed in long rows for circuits, control or communications systems. Fittings are available for making turns up, down, right or left. Flange fittings allow connection to pull boxes and cabinets.

Combination AC Magnetic Three Pole Starters with Fusible Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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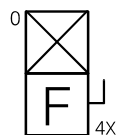
NEMA 4 combination three pole AC magnetic starters, fusible disconnect

Size 3	20 HP, 208V	L1@3.00	Ea	2,700.00	120.00	2,820.00
Size 3	25 HP, 208V	L1@3.00	Ea	2,870.00	120.00	2,990.00
Size 3	25 HP, 230V	L1@3.00	Ea	2,700.00	120.00	2,820.00
Size 3	30 HP, 230V	L1@3.00	Ea	2,920.00	120.00	3,040.00
Size 3	50 HP, 480V	L1@3.00	Ea	2,680.00	120.00	2,800.00
Size 4	40 HP, 208V	L1@4.00	Ea	5,110.00	159.00	5,269.00
Size 4	50 HP, 230V	L1@4.00	Ea	5,110.00	159.00	5,269.00
Size 4	100 HP, 480V	L1@4.00	Ea	5,150.00	159.00	5,309.00
Size 5	75 HP, 208V	L2@7.00	Ea	11,300.00	279.00	11,579.00
Size 5	100 HP, 230V	L2@7.00	Ea	11,300.00	279.00	11,579.00
Size 5	200 HP, 480V	L2@7.00	Ea	11,300.00	279.00	11,579.00
Size 6	150 HP, 208V	L2@10.0	Ea	29,700.00	398.00	30,098.00
Size 6	200 HP, 230V	L2@10.0	Ea	29,700.00	398.00	30,098.00
Size 6	400 HP, 480V	L2@10.0	Ea	29,700.00	398.00	30,098.00



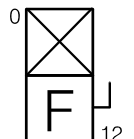
NEMA 4X combination three pole AC magnetic starters, fusible disconnect

Size 0	3 HP, 208V	L1@1.75	Ea	1,970.00	69.70	2,039.70
Size 0	3 HP, 230V	L1@1.75	Ea	1,970.00	69.70	2,039.70
Size 0	5 HP, 480V	L1@1.75	Ea	1,970.00	69.70	2,039.70
Size 1	5 HP, 208V	L1@1.75	Ea	2,060.00	69.70	2,129.70
Size 1	7.5 HP, 208V	L1@1.75	Ea	2,060.00	69.70	2,129.70
Size 1	5 HP, 230V	L1@1.75	Ea	1,050.00	69.70	1,119.70
Size 1	7.5 HP, 230V	L1@1.75	Ea	1,050.00	69.70	1,119.70
Size 1	10 HP, 480V	L1@1.75	Ea	1,050.00	69.70	1,119.70
Size 2	10 HP, 208V	L1@2.00	Ea	1,560.00	79.70	1,639.70
Size 2	15 HP, 230V	L1@2.00	Ea	1,560.00	79.70	1,639.70
Size 2	15 HP, 480V	L1@2.00	Ea	1,640.00	79.70	1,719.70
Size 2	25 HP, 480V	L1@2.00	Ea	1,640.00	79.70	1,719.70
Size 3	20 HP, 208V	L1@3.00	Ea	2,700.00	120.00	2,820.00
Size 3	25 HP, 230V	L1@3.00	Ea	2,920.00	120.00	3,040.00
Size 3	50 HP, 480V	L1@3.00	Ea	2,700.00	120.00	2,820.00



NEMA 12 combination three pole AC magnetic starters, fusible disconnect

Size 0	3 HP, 208V	L1@1.50	Ea	1,200.00	59.80	1,259.80
Size 0	3 HP, 230V	L1@1.50	Ea	1,200.00	59.80	1,259.80
Size 0	5 HP, 480V	L1@1.50	Ea	1,200.00	59.80	1,259.80



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for starters over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

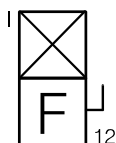
Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Fusible Disconnect and Overload Relays for Class R Fuses

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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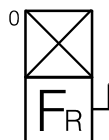
NEMA 12 combination three pole AC magnetic starters with fusible disconnect

Size 1	5 HP, 208V	L1@1.50	Ea	1,240.00	59.80	1,299.80
Size 1	7.5 HP, 208V	L1@1.50	Ea	1,260.00	59.80	1,319.80
Size 1	5 HP, 230V	L1@1.50	Ea	1,240.00	59.80	1,299.80
Size 1	7.5 HP, 230V	L1@1.50	Ea	1,260.00	59.80	1,319.80
Size 1	10 HP, 480V	L1@1.50	Ea	1,260.00	59.80	1,319.80
Size 2	10 HP, 208V	L1@2.00	Ea	1,920.00	79.70	1,999.70
Size 2	15 HP, 230V	L1@2.00	Ea	1,920.00	79.70	1,999.70
Size 2	15 HP, 480V	L1@2.00	Ea	1,920.00	79.70	1,999.70
Size 2	25 HP, 480V	L1@2.00	Ea	1,940.00	79.70	2,019.70
Size 3	20 HP, 208V	L1@3.00	Ea	3,060.00	120.00	3,180.00
Size 3	25 HP, 208V	L1@3.00	Ea	3,260.00	120.00	3,380.00
Size 3	25 HP, 230V	L1@3.00	Ea	3,060.00	120.00	3,180.00
Size 3	30 HP, 230V	L1@3.00	Ea	3,260.00	120.00	3,380.00
Size 3	50 HP, 480V	L1@3.00	Ea	3,110.00	120.00	3,230.00
Size 4	40 HP, 208V	L1@4.00	Ea	6,180.00	159.00	6,339.00
Size 4	50 HP, 230V	L1@4.00	Ea	6,180.00	159.00	6,339.00
Size 4	100 HP, 480V	L1@4.00	Ea	6,180.00	159.00	6,339.00
Size 5	75 HP, 208V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 5	100 HP, 230V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 5	200 HP, 480V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 6	150 HP, 208V	L2@10.0	Ea	32,500.00	398.00	32,898.00
Size 6	200 HP, 230V	L2@10.0	Ea	32,500.00	398.00	32,898.00
Size 6	400 HP, 480V	L2@10.0	Ea	32,500.00	398.00	32,898.00



NEMA 1 combination three pole AC magnetic starters with class R fuse disconnect

Size 0	3 HP, 208V	L1@1.25	Ea	979.00	49.80	1,028.80
Size 0	3 HP, 230V	L1@1.25	Ea	979.00	49.80	1,028.80
Size 0	5 HP, 480V	L1@1.25	Ea	998.00	49.80	1,047.80
Size 1	5 HP, 208V	L1@1.25	Ea	1,030.00	49.80	1,079.80
Size 1	7.5 HP, 208V	L1@1.25	Ea	1,050.00	49.80	1,099.80
Size 1	5 HP, 230V	L1@1.25	Ea	1,030.00	49.80	1,079.80
Size 1	7.5 HP, 230V	L1@1.25	Ea	1,050.00	49.80	1,099.80
Size 1	10 HP, 480V	L1@1.25	Ea	1,050.00	49.80	1,099.80
Size 2	10 HP, 208V	L1@1.50	Ea	1,600.00	59.80	1,659.80
Size 2	15 HP, 230V	L1@1.50	Ea	1,600.00	59.80	1,659.80
Size 2	15 HP, 480V	L1@1.50	Ea	1,610.00	59.80	1,669.80
Size 2	25 HP, 480V	L1@1.50	Ea	1,620.00	59.80	1,679.80
Size 3	20 HP, 208V	L1@2.00	Ea	2,660.00	79.70	2,739.70
Size 3	25 HP, 208V	L1@2.00	Ea	2,860.00	79.70	2,939.70



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

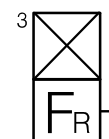
Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Fusible Disconnect and Overload Relays for Class R Fuses

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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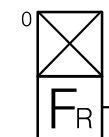
NEMA 1 combination three pole AC magnetic starters with class R fuse disconnect

Size 3	25 HP, 230V	L1@2.00	Ea	2,660.00	79.70	2,739.70
Size 3	30 HP, 230V	L1@2.00	Ea	2,860.00	79.70	2,939.70
Size 3	50 HP, 480V	L1@2.00	Ea	2,700.00	79.70	2,779.70
Size 4	40 HP, 208V	L1@3.00	Ea	5,010.00	120.00	5,130.00
Size 4	50 HP, 230V	L1@3.00	Ea	5,010.00	120.00	5,130.00
Size 4	100 HP, 480V	L1@3.00	Ea	5,050.00	120.00	5,170.00
Size 5	75 HP, 208V	L2@4.00	Ea	10,600.00	159.00	10,759.00
Size 5	100 HP, 230V	L2@4.00	Ea	10,600.00	159.00	10,759.00
Size 5	200 HP, 480V	L2@4.00	Ea	10,600.00	159.00	10,759.00
Size 6	150 HP, 208V	L2@8.00	Ea	29,500.00	319.00	29,819.00
Size 6	200 HP, 230V	L2@8.00	Ea	29,500.00	319.00	29,819.00
Size 6	400 HP, 480V	L2@8.00	Ea	29,500.00	319.00	29,819.00



NEMA 4 combination three pole AC magnetic starters with class R fuse disconnect

Size 0	3 HP, 208V	L1@1.50	Ea	1,930.00	59.80	1,989.80
Size 0	3 HP, 230V	L1@1.50	Ea	1,930.00	59.80	1,989.80
Size 0	5 HP, 480V	L1@1.50	Ea	1,950.00	59.80	2,009.80
Size 1	5 HP, 208V	L1@1.50	Ea	1,970.00	59.80	2,029.80
Size 1	7.5 HP, 208V	L1@1.50	Ea	2,000.00	59.80	2,059.80
Size 1	5 HP, 230V	L1@1.50	Ea	1,970.00	59.80	2,029.80
Size 1	7.5 HP, 230V	L1@1.50	Ea	2,000.00	59.80	2,059.80
Size 1	10 HP, 480V	L1@1.50	Ea	2,000.00	59.80	2,059.80
Size 2	10 HP, 208V	L1@2.00	Ea	3,020.00	79.70	3,099.70
Size 2	15 HP, 230V	L1@2.00	Ea	3,020.00	79.70	3,099.70
Size 2	15 HP, 480V	L1@2.00	Ea	3,050.00	79.70	3,129.70
Size 2	25 HP, 480V	L1@2.00	Ea	3,050.00	79.70	3,129.70
Size 3	20 HP, 208V	L1@3.00	Ea	5,180.00	120.00	5,300.00
Size 3	25 HP, 208V	L1@3.00	Ea	5,390.00	120.00	5,510.00
Size 3	25 HP, 230V	L1@3.00	Ea	5,180.00	120.00	5,300.00
Size 3	30 HP, 480V	L1@3.00	Ea	5,220.00	120.00	5,340.00
Size 4	40 HP, 208V	L1@4.00	Ea	8,230.00	159.00	8,389.00
Size 4	50 HP, 230V	L1@4.00	Ea	8,230.00	159.00	8,389.00
Size 4	100 HP, 480V	L1@4.00	Ea	8,290.00	159.00	8,449.00
Size 5	75 HP, 208V	L2@7.00	Ea	19,500.00	279.00	19,779.00
Size 5	100 HP, 230V	L2@7.00	Ea	19,500.00	279.00	19,779.00
Size 5	200 HP, 480V	L2@7.00	Ea	19,500.00	279.00	19,779.00
Size 6	150 HP, 208V	L2@10.0	Ea	38,200.00	398.00	38,598.00
Size 6	200 HP, 230V	L2@10.0	Ea	38,200.00	398.00	38,598.00
Size 6	400 HP, 480V	L2@10.0	Ea	38,200.00	398.00	38,598.00



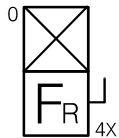
Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Fusible Disconnect and Overload Relays for Class R Fuses

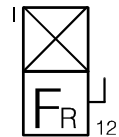
Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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NEMA 4X combination three pole AC magnetic starters with class R fuse disconnect



Size 0	3 HP, 208V	L1@1.75	Ea	2,200.00	69.70	2,269.70
Size 0	3 HP, 230V	L1@1.75	Ea	2,200.00	69.70	2,269.70
Size 0	5 HP, 480V	L1@1.75	Ea	2,200.00	69.70	2,269.70
Size 1	5 HP, 208V	L1@1.75	Ea	2,260.00	69.70	2,329.70
Size 1	7.5 HP, 230V	L1@1.75	Ea	2,260.00	69.70	2,329.70
Size 1	10 HP, 480V	L1@1.75	Ea	2,260.00	69.70	2,329.70
Size 2	10 HP, 208V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	15 HP, 230V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	15 HP, 480V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	25 HP, 480V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 3	20 HP, 208V	L1@3.00	Ea	5,690.00	120.00	5,810.00
Size 3	25 HP, 230V	L1@3.00	Ea	5,690.00	120.00	5,810.00
Size 3	50 HP, 480V	L1@3.00	Ea	5,740.00	120.00	5,860.00

NEMA 12 combination three pole AC magnetic starters with class R fuse disconnect



Size 0	3 HP, 208V	L1@1.50	Ea	1,220.00	59.80	1,279.80
Size 0	3 HP, 230V	L1@1.50	Ea	1,220.00	59.80	1,279.80
Size 0	5 HP, 480V	L1@1.50	Ea	1,240.00	59.80	1,299.80
Size 1	5 HP, 208V	L1@1.50	Ea	1,260.00	59.80	1,319.80
Size 1	7.5 HP, 208V	L1@1.50	Ea	1,270.00	59.80	1,329.80
Size 1	5 HP, 230V	L1@1.50	Ea	1,260.00	59.80	1,319.80
Size 1	7.5 HP, 230V	L1@1.50	Ea	1,270.00	59.80	1,329.80
Size 1	10 HP, 480V	L1@1.50	Ea	1,270.00	59.80	1,329.80
Size 2	10 HP, 208V	L1@2.00	Ea	1,930.00	79.70	2,009.70
Size 2	15 HP, 230V	L1@2.00	Ea	1,930.00	79.70	2,009.70
Size 2	15 HP, 480V	L1@2.00	Ea	1,940.00	79.70	2,019.70
Size 2	25 HP, 480V	L1@2.00	Ea	1,950.00	79.70	2,029.70
Size 3	20 HP, 208V	L1@3.00	Ea	3,080.00	120.00	3,200.00
Size 3	25 HP, 208V	L1@3.00	Ea	3,310.00	120.00	3,430.00
Size 3	25 HP, 230V	L1@3.00	Ea	3,080.00	120.00	3,200.00
Size 3	50 HP, 480V	L1@3.00	Ea	3,130.00	120.00	3,250.00
Size 4	40 HP, 208V	L1@4.00	Ea	6,230.00	159.00	6,389.00
Size 4	50 HP, 230V	L1@4.00	Ea	6,230.00	159.00	6,389.00
Size 4	100 HP, 480V	L1@4.00	Ea	6,230.00	159.00	6,389.00

Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician working at a labor cost of \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

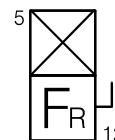
Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Fusible & Non-fusible Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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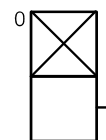
NEMA 12 combination three pole AC magnetic starters with class R fuse disconnect

Size 5	75 HP, 208V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 5	100 HP, 230V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 5	200 HP, 480V	L2@7.00	Ea	14,100.00	279.00	14,379.00
Size 6	150 HP, 208V	L2@10.0	Ea	32,800.00	398.00	33,198.00
Size 6	200 HP, 230V	L2@10.0	Ea	32,800.00	398.00	33,198.00
Size 6	400 HP, 480V	L2@10.0	Ea	32,800.00	398.00	33,198.00



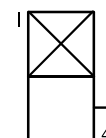
NEMA 1 combination three pole AC magnetic starters, oversized enclosure, non-fused

Size 0	3 HP, 208V	L1@1.30	Ea	1,500.00	51.80	1,551.80
Size 0	3 HP, 230V	L1@1.30	Ea	1,500.00	51.80	1,551.80
Size 0	5 HP, 480V	L1@1.30	Ea	1,500.00	51.80	1,551.80
Size 1	7.5 HP, 208V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 1	7.5 HP, 230V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 1	10 HP, 480V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 2	10 HP, 208V	L1@1.60	Ea	1,800.00	63.70	1,863.70
Size 2	15 HP, 230V	L1@1.60	Ea	1,800.00	63.70	1,863.70
Size 2	25 HP, 480V	L1@1.60	Ea	1,800.00	63.70	1,863.70



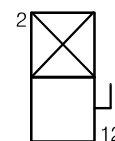
NEMA 4 combination three pole AC magnetic starters, oversized enclosure, non-fused

Size 0	3 HP, 208V	L1@1.60	Ea	2,600.00	63.70	2,663.70
Size 0	3 HP, 230V	L1@1.60	Ea	2,600.00	63.70	2,663.70
Size 0	5 HP, 480V	L1@1.60	Ea	2,600.00	63.70	2,663.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	2,660.00	63.70	2,723.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	2,660.00	63.70	2,723.70
Size 1	10 HP, 480V	L1@1.60	Ea	2,660.00	63.70	2,723.70
Size 2	10 HP, 208V	L1@2.10	Ea	3,720.00	83.70	3,803.70
Size 2	15 HP, 230V	L1@2.10	Ea	3,720.00	83.70	3,803.70
Size 2	25 HP, 480V	L1@2.10	Ea	3,720.00	83.70	3,803.70



NEMA 12 combination three pole AC magnetic starters, oversized enclosure, non-fused

Size 0	3 HP, 208V	L1@1.60	Ea	1,620.00	63.70	1,683.70
Size 0	3 HP, 230V	L1@1.60	Ea	1,620.00	63.70	1,683.70
Size 0	5 HP, 480V	L1@1.60	Ea	1,620.00	63.70	1,683.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 1	10 HP, 480V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 2	10 HP, 208V	L1@2.10	Ea	2,280.00	83.70	2,363.70
Size 2	15 HP, 230V	L1@2.10	Ea	2,280.00	83.70	2,363.70
Size 2	25 HP, 480V	L1@2.10	Ea	2,280.00	83.70	2,363.70



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

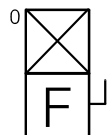
Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters in Oversized Enclosure with Fusible Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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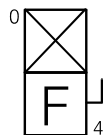
NEMA 1 combination three pole AC magnetic starters, oversized enclosure, fusible disconnect

Size 0	3 HP, 208V	L1@1.30	Ea	1,220.00	51.80	1,271.80
Size 0	3 HP, 230V	L1@1.30	Ea	1,220.00	51.80	1,271.80
Size 0	5 HP, 480V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 1	5 HP, 208V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 1	7.5 HP, 208V	L1@1.30	Ea	1,250.00	51.80	1,301.80
Size 1	5 HP, 230V	L1@1.30	Ea	1,240.00	51.80	1,291.80
Size 1	7.5 HP, 230V	L1@1.30	Ea	1,270.00	51.80	1,321.80
Size 1	10 HP, 480V	L1@1.30	Ea	1,270.00	51.80	1,321.80
Size 2	10 HP, 208V	L1@1.60	Ea	1,820.00	63.70	1,883.70
Size 2	15 HP, 230V	L1@1.60	Ea	1,750.00	63.70	1,813.70
Size 2	15 HP, 480V	L1@1.60	Ea	1,830.00	63.70	1,893.70
Size 2	25 HP, 480V	L1@1.60	Ea	1,840.00	63.70	1,903.70



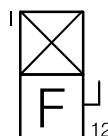
NEMA 4 combination three pole AC magnetic starters, oversized enclosure, fusible disconnect

Size 0	3 HP, 208V	L1@1.60	Ea	2,650.00	63.70	2,713.70
Size 0	3 HP, 230V	L1@1.60	Ea	2,650.00	63.70	2,713.70
Size 0	5 HP, 480V	L1@1.60	Ea	2,660.00	63.70	2,723.70
Size 1	5 HP, 208V	L1@1.60	Ea	2,680.00	63.70	2,743.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	2,710.00	63.70	2,773.70
Size 1	5 HP, 230V	L1@1.60	Ea	2,700.00	63.70	2,763.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	2,700.00	63.70	2,763.70
Size 1	10 HP, 480V	L1@1.60	Ea	2,700.00	63.70	2,763.70
Size 2	10 HP, 208V	L1@2.10	Ea	3,760.00	83.70	3,843.70
Size 2	15 HP, 230V	L1@2.10	Ea	3,760.00	83.70	3,843.70
Size 2	15 HP, 480V	L1@2.10	Ea	3,770.00	83.70	3,853.70
Size 2	25 HP, 480V	L1@2.10	Ea	3,780.00	83.70	3,863.70



NEMA 12 combination three pole AC magnetic starters, oversized enclosure, fusible disconnect

Size 0	3 HP, 208V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 0	3 HP, 230V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 0	5 HP, 480V	L1@1.60	Ea	1,650.00	63.70	1,713.70
Size 1	5 HP, 208V	L1@1.60	Ea	1,640.00	63.70	1,703.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	1,700.00	63.70	1,763.70
Size 1	5 HP, 230V	L1@1.60	Ea	1,660.00	63.70	1,723.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	1,700.00	63.70	1,763.70
Size 1	10 HP, 480V	L1@1.60	Ea	1,700.00	63.70	1,763.70



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor.

Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Fusible & Circuit Breaker Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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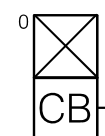
NEMA 12 combination three pole AC magnetic starters, oversized enclosure, fusible disconnect

Size 2	10 HP, 208V	L1@2.10	Ea	2,280.00	83.70	2,363.70
Size 2	15 HP, 230V	L1@2.10	Ea	2,280.00	83.70	2,363.70
Size 2	25 HP, 480V	L1@2.10	Ea	2,360.00	83.70	2,443.70



NEMA 1 combination three pole AC magnetic starters, circuit breaker disconnect

Size 0	3 HP, 208V	L1@1.25	Ea	1,280.00	49.80	1,329.80
Size 0	3 HP, 230V	L1@1.25	Ea	1,280.00	49.80	1,329.80
Size 0	5 HP, 480V	L1@1.25	Ea	1,280.00	49.80	1,329.80
Size 0	5 HP, 600V	L1@1.25	Ea	1,280.00	49.80	1,329.80
Size 1	7.5 HP, 208V	L1@1.25	Ea	1,350.00	49.80	1,399.80
Size 1	7.5 HP, 230V	L1@1.25	Ea	1,350.00	49.80	1,399.80
Size 1	10 HP, 480V	L1@1.25	Ea	1,350.00	49.80	1,399.80
Size 1	10 HP, 600V	L1@1.25	Ea	1,350.00	49.80	1,399.80
Size 2	10 HP, 208V	L1@1.50	Ea	1,870.00	59.80	1,929.80
Size 2	15 HP, 230V	L1@1.50	Ea	1,870.00	59.80	1,929.80
Size 2	25 HP, 480V	L1@1.50	Ea	1,870.00	59.80	1,929.80
Size 2	25 HP, 600V	L1@1.50	Ea	1,870.00	59.80	1,929.80
Size 3	25 HP, 208V	L1@2.00	Ea	2,710.00	79.70	2,789.70
Size 3	30 HP, 230V	L1@2.00	Ea	2,710.00	79.70	2,789.70
Size 3	50 HP, 480V	L1@2.00	Ea	2,710.00	79.70	2,789.70
Size 3	50 HP, 600V	L1@2.00	Ea	2,710.00	79.70	2,789.70
Size 4	40 HP, 208V	L1@3.00	Ea	5,890.00	120.00	6,010.00
Size 4	50 HP, 230V	L1@3.00	Ea	5,890.00	120.00	6,010.00
Size 4	100 HP, 480V	L1@3.00	Ea	5,890.00	120.00	6,010.00
Size 4	100 HP, 600V	L1@3.00	Ea	5,890.00	120.00	6,010.00
Size 5	75 HP, 208V	L2@4.00	Ea	13,800.00	159.00	13,959.00
Size 5	100 HP, 230V	L2@4.00	Ea	13,800.00	159.00	13,959.00
Size 5	200 HP, 480V	L2@4.00	Ea	13,800.00	159.00	13,959.00
Size 5	200 HP, 600V	L2@4.00	Ea	13,800.00	159.00	13,959.00
Size 6	150 HP, 208V	L2@8.00	Ea	29,500.00	319.00	29,819.00
Size 6	200 HP, 230V	L2@8.00	Ea	29,500.00	319.00	29,819.00
Size 6	400 HP, 480V	L2@8.00	Ea	29,500.00	319.00	29,819.00
Size 6	400 HP, 600V	L2@8.00	Ea	29,500.00	319.00	29,819.00



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor. Circuit breakers are either 22,000 or 100,000 amp interrupt capacity.

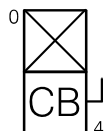
Fuses are on pages 283 to 305.

Combination AC Magnetic Three Pole Starters with Circuit Breaker Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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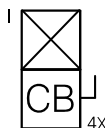
NEMA 4 combination three pole AC magnetic starters, C.B. disconnect and overload relays

Size 0	3 HP, 208V	L1@1.50	Ea	2,240.00	59.80	2,299.80
Size 0	3 HP, 230V	L1@1.50	Ea	2,240.00	59.80	2,299.80
Size 0	5 HP, 480V	L1@1.50	Ea	2,240.00	59.80	2,299.80
Size 0	5 HP, 600V	L1@1.50	Ea	2,240.00	59.80	2,299.80
Size 1	7.5 HP, 208V	L1@1.50	Ea	2,270.00	59.80	2,329.80
Size 1	7.5 HP, 230V	L1@1.50	Ea	2,270.00	59.80	2,329.80
Size 1	10 HP, 480V	L1@1.50	Ea	2,270.00	59.80	2,329.80
Size 1	10 HP, 600V	L1@1.50	Ea	2,270.00	59.80	2,329.80
Size 2	10 HP, 208V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	15 HP, 230V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	25 HP, 480V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 2	25 HP, 600V	L1@2.00	Ea	3,340.00	79.70	3,419.70
Size 3	25 HP, 208V	L1@3.00	Ea	5,230.00	120.00	5,350.00
Size 3	30 HP, 230V	L1@3.00	Ea	5,230.00	120.00	5,350.00
Size 3	50 HP, 480V	L1@3.00	Ea	5,230.00	120.00	5,350.00
Size 3	50 HP, 600V	L1@3.00	Ea	5,230.00	120.00	5,350.00
Size 4	40 HP, 208V	L1@4.00	Ea	9,100.00	159.00	9,259.00
Size 4	50 HP, 230V	L1@4.00	Ea	9,100.00	159.00	9,259.00
Size 4	100 HP, 480V	L1@4.00	Ea	9,100.00	159.00	9,259.00
Size 4	100 HP, 600V	L1@4.00	Ea	9,100.00	159.00	9,259.00
Size 5	75 HP, 208V	L2@7.00	Ea	22,600.00	279.00	22,879.00
Size 5	100 HP, 230V	L2@7.00	Ea	22,600.00	279.00	22,879.00
Size 5	200 HP, 480V	L2@7.00	Ea	22,600.00	279.00	22,879.00
Size 5	200 HP, 600V	L2@7.00	Ea	22,600.00	279.00	22,879.00
Size 6	150 HP, 208V	L2@10.0	Ea	34,200.00	398.00	34,598.00
Size 6	200 HP, 230V	L2@10.0	Ea	34,200.00	398.00	34,598.00
Size 6	400 HP, 480V	L2@10.0	Ea	34,200.00	398.00	34,598.00
Size 6	400 HP, 600V	L2@10.0	Ea	34,200.00	398.00	34,598.00



NEMA 4X combination three pole AC magnetic starters, C.B. disconnect and overload relays

Size 0	3 HP, 208V	L1@1.75	Ea	2,550.00	69.70	2,619.70
Size 0	3 HP, 230V	L1@1.75	Ea	2,550.00	69.70	2,619.70
Size 0	5 HP, 480V	L1@1.75	Ea	2,550.00	69.70	2,619.70
Size 0	5 HP, 600V	L1@1.75	Ea	2,550.00	69.70	2,619.70
Size 1	7.5 HP, 208V	L1@1.75	Ea	2,600.00	69.70	2,669.70
Size 1	7.5 HP, 230V	L1@1.75	Ea	2,600.00	69.70	2,669.70
Size 1	10 HP, 480V	L1@1.75	Ea	2,600.00	69.70	2,669.70
Size 1	10 HP, 600V	L1@1.75	Ea	2,600.00	69.70	2,669.70



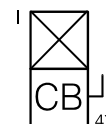
Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor. Circuit breakers are either 22,000 or 100,000 amp interrupt capacity.

Combination AC Magnetic Three Pole Starters with Circuit Breaker Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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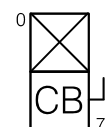
NEMA 4X combination three pole AC magnetic starters, C.B. disconnect and overload relays

Size 2	10 HP, 208V	L1@2.00	Ea	3,650.00	79.70	3,729.70
Size 2	15 HP, 230V	L1@2.00	Ea	3,650.00	79.70	3,729.70
Size 2	25 HP, 480V	L1@2.00	Ea	3,650.00	79.70	3,729.70
Size 2	25 HP, 600V	L1@2.00	Ea	3,650.00	79.70	3,729.70
Size 3	25 HP, 208V	L1@3.00	Ea	5,750.00	120.00	5,870.00
Size 3	30 HP, 230V	L1@3.00	Ea	5,750.00	120.00	5,870.00
Size 3	50 HP, 480V	L1@3.00	Ea	5,750.00	120.00	5,870.00
Size 3	50 HP, 600V	L1@3.00	Ea	5,750.00	120.00	5,870.00
Size 4	40 HP, 208V	L1@4.00	Ea	9,980.00	159.00	10,139.00
Size 4	50 HP, 230V	L1@4.00	Ea	9,980.00	159.00	10,139.00
Size 4	100 HP, 480V	L1@4.00	Ea	9,980.00	159.00	10,139.00
Size 4	100 HP, 600V	L1@4.00	Ea	9,980.00	159.00	10,139.00



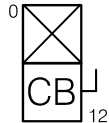
NEMA 7 & 9 combination three pole AC magnetic starters, C.B. disconnect and overload relays

Size 0	3 HP, 208V	L1@1.75	Ea	2,700.00	69.70	2,769.70
Size 0	3 HP, 230V	L1@1.75	Ea	2,700.00	69.70	2,769.70
Size 0	5 HP, 480V	L1@1.75	Ea	2,700.00	69.70	2,769.70
Size 0	5 HP, 600V	L1@1.75	Ea	2,700.00	69.70	2,769.70
Size 1	7.5 HP, 208V	L1@1.75	Ea	2,640.00	69.70	2,709.70
Size 1	7.5 HP, 230V	L1@1.75	Ea	2,740.00	69.70	2,809.70
Size 1	10 HP, 480V	L1@1.75	Ea	2,740.00	69.70	2,809.70
Size 1	10 HP, 600V	L1@1.75	Ea	2,740.00	69.70	2,809.70
Size 2	10 HP, 208V	L1@2.25	Ea	3,650.00	89.60	3,739.60
Size 2	15 HP, 230V	L1@2.25	Ea	3,650.00	89.60	3,739.60
Size 2	25 HP, 480V	L1@2.25	Ea	3,650.00	89.60	3,739.60
Size 2	25 HP, 600V	L1@2.25	Ea	3,650.00	89.60	3,739.60
Size 3	25 HP, 208V	L1@3.50	Ea	6,060.00	139.00	6,199.00
Size 3	30 HP, 230V	L1@3.50	Ea	6,060.00	139.00	6,199.00
Size 3	50 HP, 480V	L1@3.50	Ea	6,060.00	139.00	6,199.00
Size 3	50 HP, 600V	L1@3.50	Ea	6,060.00	139.00	6,199.00
Size 4	40 HP, 208V	L1@4.50	Ea	9,330.00	179.00	9,509.00
Size 4	50 HP, 230V	L1@4.50	Ea	9,330.00	179.00	9,509.00
Size 4	100 HP, 480V	L1@4.50	Ea	9,330.00	179.00	9,509.00
Size 4	100 HP, 600V	L1@4.50	Ea	9,330.00	179.00	9,509.00
Size 5	75 HP, 208V	L2@8.00	Ea	20,200.00	319.00	20,519.00
Size 5	100 HP, 230V	L2@8.00	Ea	20,200.00	319.00	20,519.00
Size 5	200 HP, 480V	L2@8.00	Ea	20,200.00	319.00	20,519.00
Size 5	200 HP, 600V	L2@8.00	Ea	20,200.00	319.00	20,519.00



Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor. Circuit breakers are either 22,000 or 100,000 amp interrupt capacity.

Combination AC Magnetic Three Pole Starters with Circuit Breaker Disconnect and Overload Relays



Material		Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
NEMA 12 combination three pole AC magnetic starters, C.B. disconnect and overload relays						
Size 0	3 HP, 208V	L1@1.60	Ea	1,530.00	63.70	1,593.70
Size 0	3 HP, 230V	L1@1.60	Ea	1,530.00	63.70	1,593.70
Size 0	5 HP, 480V	L1@1.60	Ea	1,530.00	63.70	1,593.70
Size 0	5 HP, 600V	L1@1.60	Ea	1,530.00	63.70	1,593.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	1,590.00	63.70	1,653.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	1,590.00	63.70	1,653.70
Size 1	10 HP, 480V	L1@1.60	Ea	1,590.00	63.70	1,653.70
Size 1	10 HP, 600V	L1@1.60	Ea	1,590.00	63.70	1,653.70
Size 2	10 HP, 208V	L1@2.10	Ea	2,210.00	83.70	2,293.70
Size 2	15 HP, 230V	L1@2.10	Ea	2,210.00	83.70	2,293.70
Size 2	25 HP, 480V	L1@2.10	Ea	2,210.00	83.70	2,293.70
Size 2	25 HP, 600V	L1@2.10	Ea	2,210.00	83.70	2,293.70
Size 3	25 HP, 208V	L1@3.25	Ea	3,140.00	129.00	3,269.00
Size 3	30 HP, 230V	L1@3.25	Ea	3,140.00	129.00	3,269.00
Size 3	50 HP, 480V	L1@3.25	Ea	3,140.00	129.00	3,269.00
Size 3	50 HP, 600V	L1@3.25	Ea	3,140.00	129.00	3,269.00
Size 4	40 HP, 208V	L1@4.50	Ea	7,090.00	179.00	7,269.00
Size 4	50 HP, 230V	L1@4.50	Ea	7,090.00	179.00	7,269.00
Size 4	100 HP, 480V	L1@4.50	Ea	7,090.00	179.00	7,269.00
Size 4	100 HP, 600V	L1@4.50	Ea	7,090.00	179.00	7,269.00
Size 5	75 HP, 208V	L2@8.50	Ea	15,900.00	339.00	16,239.00
Size 5	100 HP, 230V	L2@8.50	Ea	15,900.00	339.00	16,239.00
Size 5	200 HP, 480V	L2@8.50	Ea	15,900.00	339.00	16,239.00
Size 5	200 HP, 600V	L2@8.50	Ea	15,900.00	339.00	16,239.00
Size 6	150 HP, 208V	L2@12.5	Ea	32,000.00	498.00	32,498.00
Size 6	200 HP, 230V	L2@12.5	Ea	32,000.00	498.00	32,498.00
Size 6	400 HP, 480V	L2@12.5	Ea	32,000.00	498.00	32,498.00
Size 6	400 HP, 600V	L2@12.5	Ea	32,000.00	498.00	32,498.00

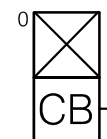
Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor. Circuit breakers are either 22,000 or 100,000 amp interrupt capacity.

Combination AC Magnetic Three Pole Starters in Oversized Enclosure with Circuit Breaker Disconnect and Overload Relays

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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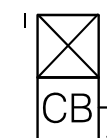
NEMA 1 combination three pole AC magnetic starters, oversized enclosure, C.B. disconnect

Size 0	3 HP, 208V	L1@1.30	Ea	1,540.00	51.80	1,591.80
Size 0	3 HP, 230V	L1@1.30	Ea	1,540.00	51.80	1,591.80
Size 0	5 HP, 480V	L1@1.30	Ea	1,540.00	51.80	1,591.80
Size 0	5 HP, 600V	L1@1.30	Ea	1,540.00	51.80	1,591.80
Size 1	7.5 HP, 208V	L1@1.30	Ea	1,610.00	51.80	1,661.80
Size 1	7.5 HP, 230V	L1@1.30	Ea	1,610.00	51.80	1,661.80
Size 1	10 HP, 480V	L1@1.30	Ea	1,610.00	51.80	1,661.80
Size 1	10 HP, 600V	L1@1.30	Ea	1,610.00	51.80	1,661.80
Size 2	10 HP, 208V	L1@1.60	Ea	2,120.00	63.70	2,183.70
Size 2	15 HP, 230V	L1@1.60	Ea	2,120.00	63.70	2,183.70
Size 2	25 HP, 480V	L1@1.60	Ea	2,120.00	63.70	2,183.70
Size 2	25 HP, 600V	L1@1.60	Ea	2,120.00	63.70	2,183.70



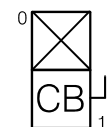
NEMA 4 combination three pole AC magnetic starters, oversized enclosure, C.B. disconnect

Size 0	3 HP, 208V	L1@1.60	Ea	2,960.00	63.70	3,023.70
Size 0	3 HP, 230V	L1@1.60	Ea	2,960.00	63.70	3,023.70
Size 0	5 HP, 480V	L1@1.60	Ea	2,960.00	63.70	3,023.70
Size 0	5 HP, 600V	L1@1.60	Ea	2,960.00	63.70	3,023.70
Size 1	7.5 HP, 208V	L1@1.60	Ea	3,000.00	63.70	3,063.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	3,000.00	63.70	3,063.70
Size 1	10 HP, 480V	L1@1.60	Ea	3,000.00	63.70	3,063.70
Size 1	10 HP, 600V	L1@1.60	Ea	3,000.00	63.70	3,063.70
Size 2	10 HP, 208V	L1@2.10	Ea	4,060.00	83.70	4,143.70
Size 2	15 HP, 230V	L1@2.10	Ea	4,060.00	83.70	4,143.70
Size 2	25 HP, 480V	L1@2.10	Ea	4,060.00	83.70	4,143.70
Size 2	25 HP, 600V	L1@2.10	Ea	4,060.00	83.70	4,143.70



NEMA 12 combination three pole AC magnetic starters, oversized enclosure, C.B. disconnect

Size 0	3 HP, 208V	L1@1.60	Ea	1,970.00	63.70	2,033.70
Size 0	3 HP, 230V	L1@1.60	Ea	1,970.00	63.70	2,033.70
Size 0	5 HP, 480V	L1@1.60	Ea	1,970.00	63.70	2,033.70
Size 0	5 HP, 600V	L1@1.60	Ea	1,970.00	63.70	2,033.70

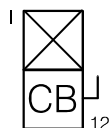


Use these figures to estimate the cost of combination starters installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each starter installed. The crew size is one electrician for starters up to size 4 and two electricians for over size 4. Cost per manhour is \$39.84. These costs include layout, material handling, and normal waste. Add for overload relay heater elements, sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: AC magnetic starters are non-reversing with three melting alloy overload relays for motor protection. The heating elements must be appropriate for the full load amp rating of the connected motor. Circuit breakers are either 22,000 or 100,000 amp interrupt capacity.

Motor Control Equipment

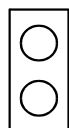
Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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NEMA 12 combination three pole AC magnetic starters in oversize enclosure with C.B. disconnect



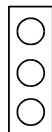
Size 1	7.5 HP, 208V	L1@1.60	Ea	2,000.00	63.70	2,063.70
Size 1	7.5 HP, 230V	L1@1.60	Ea	2,000.00	63.70	2,063.70
Size 1	10 HP, 480V	L1@1.60	Ea	2,000.00	63.70	2,063.70
Size 1	10 HP, 600V	L1@1.60	Ea	2,000.00	63.70	2,063.70
Size 2	10 HP, 208V	L1@2.10	Ea	2,630.00	83.70	2,713.70
Size 2	15 HP, 230V	L1@2.10	Ea	2,630.00	83.70	2,713.70
Size 2	25 HP, 480V	L1@2.10	Ea	2,630.00	83.70	2,713.70
Size 2	25 HP, 600V	L1@2.10	Ea	2,630.00	83.70	2,713.70

NEMA 1 two & three unit general purpose motor control stations



Stop-start	L1@0.40	Ea	79.40	15.90	95.30
Stop-start lockout stop	L1@0.40	Ea	90.50	15.90	106.40
Stop-start main. contact	L1@0.40	Ea	90.50	15.90	106.40
Forward-reverse	L1@0.40	Ea	90.50	15.90	106.40
Open-close	L1@0.40	Ea	90.50	15.90	106.40
Up-down	L1@0.40	Ea	90.50	15.90	106.40
On-off, main. contact	L1@0.40	Ea	90.50	15.90	106.40
Hand-auto main. contact	L1@0.40	Ea	90.50	15.90	106.40
Hand-off-auto	L1@0.50	Ea	102.00	19.90	121.90

NEMA 1 two & three unit heavy duty motor control stations



Stop-start	L1@0.50	Ea	204.00	19.90	223.90
Stop-start lockout stop	L1@0.50	Ea	204.00	19.90	223.90
Stop-start main. contact	L1@0.50	Ea	204.00	19.90	223.90
Forward-reverse	L1@0.50	Ea	204.00	19.90	223.90
Open-close	L1@0.50	Ea	204.00	19.90	223.90
Up-down	L1@0.50	Ea	204.00	19.90	223.90
On-off, main. contact	L1@0.50	Ea	204.00	19.90	223.90
Hand-auto main. contact	L1@0.50	Ea	237.00	19.90	256.90
Hand-off-auto	L1@0.60	Ea	250.00	23.90	273.90

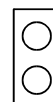
Use these figures to estimate the cost of combination starters and control stations installed in buildings under the conditions described on pages 5 and 6. Costs listed for control stations are for each station installed. The crew size is one electrician working at a labor cost of \$39.84 per manhour. These costs include the enclosure, layout, material handling, and normal waste. Add for sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be sure to select the right switch for the control sequence. Many other general purpose and heavy duty control stations are available when other combinations and features are required. Most units can be assembled into special configurations to meet specific needs.

Motor Control Stations

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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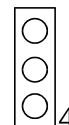
NEMA 1 general purpose flush mounted two & three unit motor control stations

Stop-start	L1@0.40	Ea	96.00	15.90	111.90
Stop-start lockout stop	L1@0.40	Ea	135.00	15.90	150.90
Stop-start main. contact	L1@0.40	Ea	135.00	15.90	150.90
Forward-reverse	L1@0.40	Ea	114.00	15.90	129.90
Open-close	L1@0.40	Ea	114.00	15.90	129.90
Up-down	L1@0.40	Ea	114.00	15.90	129.90
On-off	L1@0.40	Ea	114.00	15.90	129.90
On-off, main. contact	L1@0.40	Ea	134.00	15.90	149.90
Hand-auto, main. contact	L1@0.40	Ea	134.00	15.90	149.90
Hand-off auto	L1@0.60	Ea	290.00	23.90	313.90



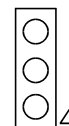
NEMA 4 general purpose two & three unit motor control stations

Stop-start	L1@0.50	Ea	198.00	19.90	217.90
Stop-start lockout stop	L1@0.50	Ea	198.00	19.90	217.90
Stop-start main. contact	L1@0.50	Ea	265.00	19.90	284.90
Forward-reverse	L1@0.50	Ea	232.00	19.90	251.90
Open-close	L1@0.50	Ea	232.00	19.90	251.90
Up-down	L1@0.50	Ea	232.00	19.90	251.90
On-off	L1@0.50	Ea	232.00	19.90	251.90
On-off, main. contact	L1@0.50	Ea	265.00	19.90	284.90
Hand-auto main. contact	L1@0.50	Ea	265.00	19.90	284.90
Stop-start main. contact	L1@0.60	Ea	265.00	23.90	288.90



NEMA 4 heavy duty two & three unit motor control stations

Stop-start	L1@0.60	Ea	198.00	23.90	221.90
Stop-start lockout stop	L1@0.60	Ea	198.00	23.90	221.90
Stop-start main. contact	L1@0.60	Ea	265.00	23.90	288.90
Forward-reverse	L1@0.60	Ea	232.00	23.90	255.90
Open-close	L1@0.60	Ea	232.00	23.90	255.90
Up-down	L1@0.60	Ea	232.00	23.90	255.90
On-off	L1@0.60	Ea	232.00	23.90	255.90
Jog	L1@0.60	Ea	232.00	23.90	255.90
Manual-auto	L1@0.60	Ea	232.00	23.90	255.90
Hand-off-auto	L1@0.75	Ea	265.00	29.90	294.90



Use these figures to estimate the cost of control stations installed in buildings under the conditions described on pages 5 and 6. Costs listed are for each station installed. The crew size is one electrician working at a labor cost of \$39.84 per manhour. These costs include the enclosure, layout, material handling, and normal waste. Add for sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit. Note: Be sure to select the right switch for the control sequence. Many other general purpose and heavy duty control stations are available when other combinations and features are required. Most units can be assembled into special configurations to meet specific needs.

Undercarpet Wiring Systems

Material	Craft@Hrs	Unit	Material Cost	Labor Cost	Installed Cost
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Transition junction boxes

Surface mounted	L1@0.30	Ea	227.00	12.00	239.00
Flush floor mounted	L1@0.50	Ea	222.00	19.90	241.90
Stud mounted	L1@0.35	Ea	71.40	13.90	85.30
Thin stud mounted	L1@0.35	Ea	63.70	13.90	77.60
Stud mounted, DLB	L1@0.35	Ea	95.30	13.90	109.20
Single terminal box	L1@0.30	Ea	56.40	12.00	68.40

Terminal blocks

Round to flat cable	L1@0.35	Ea	25.40	13.90	39.30
3-wire underflow duct	L1@0.35	Ea	29.60	13.90	43.50
3-wire insul. displace.	L1@0.25	Ea	54.30	9.96	64.26
5-wire insul. displace.	L1@0.30	Ea	77.60	12.00	89.60

Four way power intrafacer

Transition assembly	L1@0.25	Ea	86.50	9.96	96.46
Insulated ground transition assembly	L1@0.35	Ea	89.90	13.90	103.80

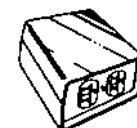


Five way power intrafacer

Transition assembly	L1@0.35	Ea	71.40	13.90	85.30
Insulated ground transition assembly	L1@0.40	Ea	78.20	15.90	94.10

Pedestals for power, less duplex receptacles

For one duplex outlet	L1@0.30	Ea	119.00	12.00	131.00
For two duplex outlets	L1@0.40	Ea	134.00	15.90	149.90



Pedestals

Communications	L1@0.30	Ea	57.40	12.00	69.40
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Use these figures to estimate the cost of undercarpet wiring systems installed in a building under the conditions described on pages 5 and 6. Costs listed are for each item installed. The crew is one electrician working at a labor cost of \$39.84 per manhour. These costs include layout, material handling, and normal waste. Add for sales tax, delivery, supervision, mobilization, demobilization, cleanup, overhead and profit.

Index

- 10,000 AIC bolt-on breakers..... 307
10,000 AIC DC breakers 314
10,000 amp interrupt capacity 306
120 volt fixtures 184, 188
120 volt smoke detectors..... 371
120/277 volt switches 219
14,000 AIC breakers..... 312
2" range expansion
PVC couplings 39
208 volt fixtures 184, 188
22,000 AIC DC breakers 314
240 volt fixtures 184, 188
240 volt safety switches..... 275-277
277 volt fixtures 184, 188
277 volt switches 224-228
3-0 boxes..... 120
3-position switches, maintain contact 219
3-wire receptacles 245
30 degree PVC sweeping elbows 43-44
30 degree Schedule 40 PVC elbows 37
30,000 AIC breakers..... 314-315
4 square surface covers 131
4 square switch rings 129
4-0 boxes..... 120
4-S boxes 120
4-way power intrafacer 541
4-wire locking single receptacles 254
45 degree elbows
GRS 49
IMC 52
PVC sweeping 44
Schedule 40 PVC 38
Type EB or DB..... 45
45 degree flex connectors
die cast 31
insulated throat 35-36
liquid-tight 35-36
malleable 31
480 volt fixtures 188, 192
5 degree bend couplings, P&C... 46
5-way power intrafacer 541
5-wire locking single receptacles 254
6 range expansion PVC couplings 40
60 Hz incandescent dimmers... 221
600 volt safety switches..... 278-281
90 degree elbows
aluminum rigid 58
die cast, EMT 27
GRS 49
IMC 53
PVC coated steel 78
PVC sweeping 44-45
Schedule 40 PVC 38
Schedule 80 PVC 38
Type EB or DB..... 46
90 degree malleable flex connectors 32
- A**
- Abandon plugs, duct..... 336
underfloor raceway 342
AC (armored cable) 88, 103
AC bolt-on breakers..... 312-313
AC breakers..... 306
AC grounded switches..... 223-224
AC horns..... 368
- AC magnetic contactors 390
starters..... 382
starters, three pole..... 400-403
starters, two pole 398-399
AC plug-on breakers..... 310-313
AC quiet switches..... 223-226
AC type cable 88
Access..... 8, 11, 16
Access boxes, precast concrete..... 373
Access, service entrance equipment..... 274
Accessories, floor box 156
Accuracy, estimating 7
Acrylic lens 176
ACSR (aluminum conductor steel reinforced)..... 108
neutral..... 111-112
wire 108-110
Adapters, duct 336
PVC 39
Adapters, cable
coaxial cable 537
subminiature D to modular jack 532
Additional costs 6
Adelphi..... 113
Adjustable bar hangers..... 129
Adjustable cast iron floor boxes 153
Adjustable flood light 164
Adjustable floor boxes and covers 153
Adjusting costs 6, 92, 222, 337
AF type wire..... 89
AFCI duplex receptacles 247
AIC (amp interrupt capacity)..... 307
Air alternator, hookup 379
Air compressor, hookup 379
Air handlers, hookup 379
Air-handling fixtures..... 178-179
Allowance for
experience 6
waste 5, 16
Allowances
vertical runs 16
wire pulling..... 91
Almond 108
Almond-XLP 109
Alternator, air, hookup 379
Aluminum
abandon plugs, underfloor raceway 342
blank body covers..... 64
bus duct 346-349
bushings 61-62
cable 107, 113
circuit breaker enclosures..... 316
conductor, bare 114
conductor, grounding..... 441
conduit 15
conduit assemblies..... 451-454
conduit bodies 65
elbows 58
feeder wire..... 14
flex conduit assemblies... 451-454
flex conduit bodies..... 65
frame fluorescent fixtures 177
housing exit fixtures..... 172
insulated ground bushings 62, 442
ladder cable tray 363
ladder tray..... 363
- light poles 196-198
locknuts 61
neutral..... 109, 111-112
nipples 58-61
one hole straps 76
reducing bushings 69-70
rigid conduit (ARC) 58
service drop wire 110-112
terminations 62
tray fittings 364
union 72
wire 90, 105-112
Aluminum/copper conversion 92
Aluminum rigid conduit (ARC) 58
bushings 61
locknuts 61
nipples 58-61
termination 62
American Wire Gauge system... 88
Ammeter 269
Ampacity..... 89, 90, 218
Anchors, expansion 86
Anti-oxidation material..... 91
Anti-short bushing..... 103
Apartment entry control 372
Appaloosa 111, 112
Appeal, inspector's decision 7
Apple 107
Apple-XLP 108
Appliance wire 96
Apricot 108
Apricot-XLP 109
Aquastats, hookup 379
ARC (aluminum rigid conduit)..... 58
ARC fault circuit interrupter 247
Architectural rectangular housing 189
Architectural square floods..... 189
Armored cable 88, 103
Arms, pole 197
Asbestos insulation..... 89
Assemblies
aluminum flex conduit..... 451-454
EMT conduit 447-450
galvanized rigid conduit... 463-466
handy box switches 467-470
PVC conduit..... 459-462
receptacle and handy boxes 508-509
receptacle and sectional boxes 510-513
receptacles, duplex..... 515, 517
receptacles, single..... 514, 516
sectional box switches... 471-486
steel flex conduit 455-458
switches, 1 and 2 gang.... 487-507
Troffer fluorescent 518
Assumptions, conduit tables..... 16
Asymmetric lens 188
AWG 88
AWM type wire 96
- B**
- Backcharges for cleanup..... 8
Backfill 420
Backhoes..... 420
Backup power..... 378
Ball aligners 157
Ballasts
exterior weatherproof potted.. 194
fluorescent 213-216
high intensity discharge..... 206-207, 209
- indoor enclosed 194
metal halide 207
remote 159
weatherproof potted..... 194
Baluns 533-534
Bar hangers 120, 129
Bare aluminum conductor..... 114
Bare copper ring..... 439
Bare copper wire 88, 102, 442
Base, steel raceway 426
Base type duct spacers 47
Base wage, electrician..... 5
Basis, material costs..... 5
Bat wings..... 158
Bathroom fixtures 164
Batteries
engine-generators 378
exit fixtures 172
Battery powered smoke detectors..... 371
Beacons..... 365, 369
Beam clamps..... 11
EMT conduit hanger 26
PVC coated 79-80
Beech 108
Beech-XLP 109
Bells 365, 367
Bending
conduit, number permitted..... 10
GRS 12
P&C duct 12
raceway 423
Bergen 113
Bid shopping..... 9
Bidding government work..... 9
Blade-type fuses..... 285-299
Blank duct 336-337
Blank plates 261-263
jumbo 267
Bliss 113
Bloomfield 113
BNC plug and jack..... 533
BNC plug connectors..... 535-536
Boiler control panels, hookup... 379
Boilers, hookup 379
Bollards..... 190
Bolt hangers, tomic..... 132
Bolt-on circuit breakers..... 272, 307
Bolt-on fuses..... 293
Bonding
connection 441
definitions 439-440
problems 441
Bonding conductor..... 11
Bonding jumpers..... 68
Boring 421
data logs 420
Box assemblies... 467-486, 508-513
Box covers
concrete 126
floor..... 154
galvanized cast..... 67
octagon..... 126
round 133-136
square 136
weatherproof..... 67
Box grounding clips 442
Box plugs, underfloor raceway 341
Box, steel channel system..... 432
Boxes..... 119
cast aluminum 143-145
fiberglass 133-139
floor..... 153-155

galvanized cast.....	66	solid direct burial.....	100-101	Cerapus.....	110, 112	grounded switches.....	224, 226
ganged.....	132	splicer.....	88	Chain pull receptacles.....	161	incandescent dimmers.....	229
handy.....	123	stranded direct burial.....	100	Chain trenchers.....	420	switches.....	224-227, 230-233
hinge cover pull.....	147-148	stranded service entrance.....	100	Chairs (duct supports).....	336	Commercial lighting.....	157
JIC wiring.....	150-151	telephone.....	525	Channel flat wire.....	432	Commercial specification grade	
junction.....	339	underground distribution.....	113	Channel strut, steel.....	87	switches.....	233
masonry.....	132	URD.....	113	Channel tray.....	358	Communications cable.....	521-527
NEMA.....	146-151	Cable adapter assemblies.....	434	Channel wire systems.....	424	coaxial.....	526-527
octagon.....	125-126	Cable connector savers.....	532	Checklist, service entrance		LAN.....	527
old work switch.....	142	Cable connectors.....	529-532	equipment.....	273	multi-conductor.....	523-525
outlet.....	119, 133-139	centerline clamp.....	532	Cherry.....	107	plugs.....	533
plastic.....	140-142	data cable connectors.....	532	Cherry-XLP.....	108	solid.....	521, 525
plug-in tap.....	345	field programmable.....	532	Chiller control panels,		stranded.....	521-525
pull.....	146-152	gender changer.....	532	hookup.....	379	telephone.....	525
raintight.....	148-150	subminiature D plug		Chiller, water, hookup.....	379	transceiver/drop.....	527
round.....	133-135, 140, 143, 153	kits.....	529-531	Chimes.....	365, 369	twinxial.....	526
square.....	127, 136, 140-141	subminiature		Chola.....	111, 112	Communications	
steel, overfloor raceway.....	427	D receptacles.....	529-531	Choosing a specialty.....	8	equipment.....	519-537
switch.....	123-124, 141-142	subminiature D straight		Chow.....	111	Communications duct.....	339
weatherproof.....	144-145	exit backshells.....	531	Circular fluorescent lamps.....	212	Compact fluorescent lamps.....	201
Boxes and rings, ganged.....	132	Cable contacts.....	528	Circuit breaker		Compliance with code.....	7
Brass		Cable cover, strain relief.....	533	disconnect, starters		Compression EMT connectors...	20
abandon plugs.....	342	Cable distribution systems.....	519	with.....	413-417	Compressor, hookup.....	379
carpet flanges.....	156	Cable fittings,		enclosures.....	315-316	Concealed conduit.....	16
plugs.....	156	communications.....	528-537	loadcenters.....	322-323	Conch.....	110, 112
Breakers, circuit.....	272, 306-307	Cable tray.....	358-364	panelboards.....	325-326	Concordia.....	113
meter centers.....	318-321	aluminum ladder.....	363	plug-in switches, bus		Concrete	
rating.....	271	layout.....	359	duct.....	356-357	access boxes.....	373
Brenau.....	113	louver opening.....	361	Circuit breakers.....	272, 306-307	octagon box covers.....	126
Bridge cranes, hookup.....	379	system for communications.....	519	meter centers.....	318-321	products, precast.....	375
Buckeye.....	108	Calculating material quantities...	13	rating.....	243	removal.....	421
Buckeye-XLP.....	109	Callbacks.....	8	Circuit control switches.....	218, 271	rings.....	126
Budget hoists, hookup.....	379	Canopy.....	157	Circuit tests.....	8	Conditions, working.....	6
Building frame as ground.....	439	light fixture.....	163	Clam.....	109, 111	Conductors.....	88
Building management		Capped elbows		Clamps		high voltage.....	88
systems.....	365	aluminum.....	65	conduit.....	77	Conduit	
Building wire, copper.....	92-96	galvanized.....	65	PVC coated.....	79-80	aluminum rigid (ARC).....	58
Built-in grounding.....	218	Caps		water pipe.....	438	bender.....	10
Burrs, removing.....	11	entrance.....	77	Class R fuses,		bends, number permitted.....	10
Bus bars.....	269	PVC.....	40	starters with.....	409-410	body covers.....	64
Bus duct.....	343-357	Carpet flanges.....	156	Clay conduit.....	15	clamps, rigid steel.....	77
aluminum.....	346-349	Carpet pan.....	335	Cleanup.....	8	EMT.....	17
circuit breakers.....	356	Cartridge fuses.....	271	Clear lens luminaires.....	190	EMT assemblies.....	447-450
copper.....	350-351	fast acting.....	304-305	Clear polycarbonate carpet		ENT.....	48
elbows.....	354	links.....	288-290	flanges.....	156	flex aluminum.....	451-454
feeder.....	346-347, 350-351	non-renewable.....	285-286	Clio.....	110, 112	flex steel.....	455-458
fittings.....	354	non-time delay 291, 293-294, 297		Clips		flexible.....	28
plug-in.....	352-353, 356	renewable.....	287, 289	earthquake.....	159	galvanized rigid (GRS).....	49
reducers.....	343	time delay.....	292, 295-296, 298-303	EMT.....	27	galvanized rigid	
switches.....	356	Cast aluminum boxes.....	143-145	safety.....	159	assemblies.....	463-466
Bushed nipples.....	71	covers.....	143-144	Clock hanger		gaskets.....	65
Bushings		gang extension rings.....	144-145	receptacles.....	218, 237	hubs.....	443
aluminum.....	61-62	gang weatherproof		Clocks.....	366	liquid-tight.....	33-34
insulated ground.....	54, 442	boxes.....	144-145	commercial grade.....	370	MC.....	52
plastic.....	54	round weatherproof boxes.....	143	Closed asymmetric lens.....	188	PVC.....	37
reducing.....	69	Cast boxes, galvanized.....	66	Coated conduit.....	13	PVC assemblies.....	459-462
Busway.....	343	covers.....	67	Coaxial cable adapters.....	537	PVC coated.....	78
Butternut.....	108	Cast iron floor boxes.....	153-155	coaxial communications		take-off.....	13
Butternut-XLP.....	109	rectangle.....	154-155	able.....	526-527	weight per 100'.....	18
Buzzers.....	365, 367	Cast metal		Coaxial plug.....	533	Conduit assemblies	
		conduit bodies.....	63	Cockle.....	110, 112	aluminum flex.....	451-454
		entrance elbows.....	63	Code, compliance with.....	7	EMT.....	447-450
		CD-ROM, installing.....	5	Codes, wire.....	88	ENT.....	48
		Ceiling fans.....	217	Collie.....	109, 111	GRS.....	463-466
		Ceiling fixtures		Color coded cable		PVC.....	459-462
		supporting.....	158	for undercarpet.....	540	steel flex.....	455-458
		wraparound.....	176	Colors		Conduit bodies	
		Ceiling mounted fixtures		lighting fixtures.....	159	aluminum.....	65
		incandescent light.....	161-163	wire.....	92	cast metal.....	63
		light with canopy.....	162-163	Combination		galvanized.....	63
		utility fixture.....	163	AC magnetic starters.....	404-418	PVC.....	41
		Ceiling spacers.....	157	clips, EMT to strut.....	26	PVC coated.....	81
		Cellular flooring.....	520	couplings.....	36	Conduit connectors	
		Cement asbestos duct.....	15	plates.....	261, 263-268	flex.....	29-31
		Cement, PVC.....	11	plates, jumbo.....	267	squeeze flexible.....	30
		Cenia.....	110, 112	socket & main breaker.....	317	Conduit cutter.....	10
		Centerline clamp cable		starters.....	404-417	Conduit, EMT,	
		connectors.....	532	starters, bus duct.....	357	assemblies.....	447-450
		Centrifugal switch.....	377	Commercial grade		Conduit flex assemblies.....	455-458
				clocks.....	370	Conduit hangers, EMT.....	26

C

Cabinet connectors

duct.....	336
underfloor raceway.....	341
Cabinets, signal.....	327
Cable.....	88-118
aluminum.....	107, 113
armored.....	103
communications.....	521-527
copper.....	100-104
high voltage.....	88
Local Area Network (LAN).....	527
non-metallic.....	100
power.....	104
safety.....	159
service entrance.....	101
single conductor.....	104

Conduit, PVC, assemblies.....	459-462	Conduit, rigid, assemblies.....	463-466	Conduit spacers.....	76	Conduit system, communications.....	519	Conduit tables, using.....	15	Condulets.....	12, 121	Connector lugs.....	118	Connectors.....	73, 115
communications cable.....	532	conduit.....	29	data.....	534	EMT.....	19-21	EMT conduit, set screw.....	447	ENT.....	48	flex.....	29	flexible metal conduit.....	11
insulated.....	115	RG/U cable.....	535-536	screw-on.....	115	self-stripping.....	115	split bolt.....	116	steel set screw.....	74	telephone cable.....	534	twinaxial cable.....	537
two bolt.....	117	two-way.....	116	wire.....	115-117	with spacers.....	117	Conservation of energy.....	157	Consistency on take-offs.....	15	Construction grade flex conduit.....	33	Contactors, magnetic.....	389-397
Contacts, communications cable.....	528	Continental lampholder.....	168-169	Control devices.....	383	Control panel, mechanical.....	380	Control stations.....	418-419	Convenience outlets.....	218	Converse.....	113	Conversion table, copper/aluminum.....	537
Convex glass lens.....	192	Conveyor control panels, hookup.....	379	Conveyors, hookup.....	379	Cooling towers, hookup.....	379	Copper building wire.....	89, 93-96, 442	bus duct.....	350-351	conductor lugs.....	118	connections, exothermic.....	445
flexible cords.....	96-99	ring as ground.....	439	service entrance cable.....	100	wire connector lugs.....	118	Copper-clad ground rods.....	444	Cords, flexible.....	89, 96-99	Corridor dome lights.....	370	Corridor fixtures, wraparound.....	176
Corrosive locations, conduit for.....	15	Cost multiplier.....	6	Cost tables, adjusting.....	92	Costena.....	111, 112	Costs, additional.....	6	Couplings.....	73	calculating quantity.....	13	duct.....	336
ENT.....	48	flex to EMT.....	32	flex to rigid.....	32	flexible conduit.....	32	GRS.....	51	malleable threadless.....	73-74	malleable three piece.....	72	P&C.....	45, 46
pricing.....	10	PVC coated.....	81	PVC coated steel.....	78	Type EB or DB.....	45	underfloor raceway.....	341	Cover markings, handholes.....	373	Cover mounted keyless fixtures.....	161	Cover types, handy box.....	119
Covers cast aluminum.....	143	conduit bodies.....	64	floor boxes.....	154-155	galvanized cast boxes.....	67	GFI.....	121	handy box.....	123	octagon box.....	126	outlet box.....	120, 128
precast concrete boxes.....	373	round.....	136, 144	square.....	136	steel raceway.....	426	surface, raised.....	130-131	Crew size.....	6	Crimp snap, hardware for.....	528-529	Criollo.....	110, 112
Cross, bus duct.....	354	Crown plugs, brass.....	156	Current limiting fuses.....	291-305	Cutter, conduit.....	10	Cutting concrete or masonry.....	16	GRS.....	12	oil.....	12	PVC.....	11
Cylinder lampholder.....	170	D		Damp locations, fluorescent fixtures for.....	176	Data cable connectors.....	532	Data connectors.....	534	DB P&C duct.....	12	DC breakers.....	309-310	DC horns.....	368
Deburring, raceway.....	423	Decorative ceiling fans.....	217	Decorator plates.....	263-264	jumbo.....	267	Decorator switches.....	229-233	Decorator track fixture.....	170	Deep switch plates.....	267	Deep-cut trim plates.....	221
Defects.....	8	Delivery costs, material.....	5	Demobilization.....	7	Detectors.....	371	Device plates.....	221	Devices, EXO.....	271	Dewatering.....	420	Die cast bushed nipples.....	71
compression EMT couplings.....	23	duplex flex connectors.....	29	EMT connectors.....	19-22	flex connectors.....	31	gasketed pulling elbows, EMT.....	27	insulated bushed nipples.....	71	insulated connectors.....	29, 30, 35	liquid-tight flex connectors.....	35
offset nipples.....	73	screw-in flex connectors.....	29	screw-in flex couplings.....	32	set screw EMT couplings.....	22	set screw flex couplings.....	32	squeeze flex connectors.....	29, 30	Diffusers.....	159	polycarbonate for utility light.....	164
Dimmer fluorescent fixtures.....	159	incandescent fixtures.....	229	Dimming switches.....	229	Disconnect switches.....	271	Distribution section.....	269	Distribution systems, overhead.....	433	Doberman.....	109, 111	Dolly, reel.....	92
Dome lights, corridor.....	370	Door openers.....	371	Door switch.....	371	Door trip, intrusion detector.....	371	Double conductor lugs.....	118	Double face exit fixtures.....	173	Double throw safety switches.....	282	Drilling, light standard foundation.....	421
Drive-on EMT couplings.....	22	Drop cord power.....	343	Dropouts ladder tray.....	364	louvered cable tray.....	362	Drum fixtures.....	165	Dry type transformers.....	332-334	Dual element plug fuses.....	283-284	Duct blank.....	336, 337
bus.....	346-353	coupling.....	336	elbows.....	336	end bells, P&C.....	47	feeder.....	336	heaters, hookup.....	379	lines.....	335	materials, underfloor.....	335
P&C.....	45	plugs, P&C.....	46	plugs, underfloor raceway.....	341	sections.....	337	staking.....	338	supports.....	336, 340	Duplex decorator receptacles.....	245	Duplex receptacles.....	239-243
commercial.....	239-241	assemblies.....	515, 517	grounded.....	240-243	hospital.....	240-243	receptacle plates.....	261-262	residential.....	239	specification.....	239, 241-243	underfloor raceway.....	342
Duplex service drop.....	109	Duplex switches.....	233-234	single pole.....	233-234	switch with grounding receptacle.....	239-246	three-way switches.....	233-234	E		Earthquake clips.....	159	Earthquake considerations.....	157
Earthwork.....	420	EB P&C duct.....	12	Edge-type beam clamps.....	80	Elbows aluminum.....	58	bus duct.....	354	duct.....	336	EMT.....	18	entrance.....	63
45 degree IMC.....	52	galvanized capped.....	65	galvanized rigid (GRS).....	49	intermediate metal (IMC).....	52	ladder tray.....	363	louvered cable tray.....	361	90 degree PVC coated.....	78	PVC.....	37, 43-45
Electrical metallic tubing.....	10, 17	Electrician base wage.....	5	Electrician defined.....	6	Electrode, driven.....	438	Elevators, hookup.....	379	Eleven circuit overhead distribution systems.....	434	Employer's labor burden.....	5	EMT clips.....	26-27
conduit.....	17	conduit assemblies.....	447-450	conduit fittings.....	18	conduit hangers.....	26	couplings.....	22	described.....	10	elbows.....	19, 27	fittings.....	10, 18
gasketed pulling elbows.....	27	hand benders.....	27	hangers.....	26	installation guidelines.....	11	malleable entrance caps.....	27	nail straps.....	24	90 degree die cast elbows.....	27	pulling elbows.....	27
split adapters.....	27	steel tube.....	10	straps.....	24	supporting.....	11	thin wall.....	10	to couplings.....	24	to strut combination clips.....	26	Enamel spray paint.....	429
Enclosed fixtures.....	183	Enclosed-gasketed fixtures.....	176	Enclosed indoor ballasts.....	194	Enclosures, circuit breaker.....	315-316	End bells installing.....	373	PVC.....	40	End caps ladder tray.....	363	louvered cable tray.....	361
End closures, bus duct.....	355	End-of-row cap.....	158	Energy conservation.....	157	Energy consumption monitoring.....	365	Energy saving lamps.....	208, 211-212	ENT conduit and fittings.....	48	Entrance cable.....	107	caps.....	77
elbows, cast metal.....	63	hubs, duct.....	336	lights.....	165	Entry control systems.....	366, 372	Entry release switch.....	372	EPR cable.....	104	Equipment grounding conductors.....	440	Equipment hookup.....	377, 379-381
Escutcheon.....	157	Estimating access boxes.....	374	accuracy.....	7	bus duct.....	345	cable tray.....	360	lighting fixtures.....	159	pitfalls.....	16	service equipment.....	273
Estimating Electrical Construction.....	9														

Estimating software, installing.....	5	service.....	442	Framed Troffer lay-in T-bar fixtures.....	177	spec grade receptacles.....	237
Evaporative coolers, hookup.....	379	steel channel system.....	432	Frequency generator.....	366	side-wired receptacles.....	237
Excavation.....	15, 420	steel overfloor raceway.....	429	Fringe benefits.....	5	switches.....	223-236
access box.....	373	steel raceway.....	431, 435	Full load amperage (FLA).....	378	switches, key operated.....	235
takeoff.....	420	steel surface raceway.....	426-428	Furnaces, hookup.....	379	Grounding	
Exhaust fans, hookup.....	379	two piece raceway assembly.....	430	Furring channels.....	158	built-in.....	218
Exit fixtures.....	171-173	underfloor duct.....	336	Fuse amperage, fusible switches.....	271	conductors.....	439
EXO devices.....	271	underfloor raceway.....	341	Fuses, cartridge current limiting.....	296-305	connection.....	441
Exothermic copper connections.....	445	wireway.....	330	fast acting.....	304-305	definitions.....	439-440
Exothermic weld.....	441	Five pole contactors.....	396-397	links.....	288-290	electrode conductors.....	439
Expandable bar hangers.....	126	Fixed-temperature detectors.....	366	non-renewable.....	285-286	jumper.....	442
Expanded metal tray.....	519	Fixture tests.....	8	non-time delay.....	291, 293-294, 297	locknuts.....	445
Expansion		Fixture whips.....	434	renewable.....	287, 289	problems.....	441
anchors.....	86	Fixture wire.....	88	time delay.....	292, 295-296, 298-303	receptacles.....	237-241
couplings.....	39-40	Fixtures		Fuses, plug.....	283-284	requirements.....	438-441
fittings.....	68	estimating.....	159	Fusible disconnect, starters with.....	406-418	Grullo.....	111, 112
joint, bus duct.....	355	exit.....	171-173	Fusible plug-in switches, bus duct.....	356	Guard	
Experience, allowance for.....	6	floodlights.....	185-189	Fusible switches.....	271	heat.....	167
Explosion proof horn sirens.....	368	fluorescent.....	174-180			lighting fixture.....	159
Exposed conduit.....	16	HID.....	181-194				
Exterior fixtures		incandescent.....	161-165				
entrance fixture.....	165	lighting.....	157-218				
floodlights.....	185, 187	track light.....	168-171				
walkway luminaires.....	191	FLA (full load amperage) rating.....	378				
Exterior weatherproof potted ballast.....	194	Flanged end, bus duct.....	354				
Externally operated devices (EXO).....	271	Flanges, carpet.....	156				
		Flashing beacons.....	369				
		Flat elbows, bus duct.....	354				
		Flat glass lens, HID fixtures.....	188, 191, 192				
		Flex conduit assemblies					
		aluminum.....	451-454				
		steel.....	455-458				
		Flexible conduit.....	28				
		cutting.....	11				
		liquid-tight.....	33-34				
		Flexible conduit connectors.....	29-32				
		liquid-tight.....	34-35				
		Flexible conduit couplings.....	32				
		Flexible cords.....	89, 91, 96-99				
		restrictions on use.....	90				
		Flexible metallic tubing.....	15				
		Floodlights					
		adjustable.....	164				
		exterior.....	187				
		heavy duty.....	185				
		without poles.....	186				
		Floor box					
		accessories.....	156				
		covers.....	155				
		Floor boxes.....	153-155				
		cast iron.....	154-155				
		outlet boxes, round.....	153				
		semi-adjustable.....	153-155				
		Floor mat.....	371				
		Flow switches, hookup.....	379				
		Fluorescent dimming switches.....	229				
		Fluorescent fixtures.....	174				
		aluminum frame.....	177				
		assemblies.....	518				
		ballasts.....	213-216				
		damp or wet locations.....	176				
		ganging.....	158				
		Fluorescent lamps.....	201, 210-212				
		Flush mounted					
		push buttons.....	370				
		screw cover boxes.....	146-147				
		starters.....	384-385				
		Flush plugs, brass.....	156				
		Flush starters.....	386				
		Foundations, light standards.....	421				
		Four circuit overhead distribution systems.....	433-434				
		Four lamp fluorescent fixtures.....	176				
		Four pole AC magnetic contactors.....	394-395				

Galvanized	
box covers.....	67
cable tray.....	361
capped elbows.....	65
cast boxes.....	66
conduit assemblies.....	463-466
conduit bodies.....	63
expansion fittings.....	68
messenger strand.....	114
trim plates.....	221
Galvanized rigid steel (GRS).....	12
conduit.....	49
conduit assemblies.....	463-466
couplings.....	51
elbows.....	49-51
hand benders.....	52
locknuts.....	54
nipples.....	55-57
terminations.....	52
Galvanized steel	
messenger strand.....	114
Ganged boxes and rings.....	132
Ganging fluorescent fixtures.....	158
Gasketed pulling elbows, EMT.....	27
Gaskets, conduit body.....	65
Gauge, wire.....	88
Gender changer, cable connector.....	532
General duty safety switches.....	275
General purpose control stations.....	418-419
Generators, standby.....	365
GFCI duplex receptacles.....	246
Government work, bidding.....	9
Ground	
bushing.....	62, 441, 442
clamp hub.....	438
megger.....	440
pipe.....	438
rod.....	438, 444
rod clamp.....	444
rod couplings.....	444
rod stud bolts.....	444
testing.....	440-441
Ground fault circuit interrupter (GFI) covers.....	121
definition.....	440
duplex receptacles.....	246
Grounded	
conductor.....	439
duplex receptacles.....	240-243

Hackney.....	111, 112
Hand benders	
EMT.....	27
GRS.....	52
Handholes.....	373, 375
Handy boxes.....	123
covers.....	123
description.....	119
receptacle assemblies.....	508-509
switch assemblies.....	467-470
Hanger spacing, cable tray.....	358
Hangers	
bar, adjustable.....	129
bolt, tomic.....	132
bus duct.....	345
EMT.....	26
fittings.....	86
ladder tray.....	364
louvered cable tray.....	362
Hard service cord.....	88
Harness, wire, overhead	
distribution systems.....	433
Hazardous conditions.....	119, 121
HDE contacts.....	528
Heat guard.....	167
Heat-recovery fixtures.....	178-179
Heavy duty	
control stations.....	418-419
EMT straps.....	25
floodlights.....	185
receptacles, spec grade.....	246
safety switches.....	276-281
spec grade switches.....	230
Hickory.....	108
Hickory-XLP.....	109
High amperage current, distributing.....	343
High bay lighting.....	425
High bay open reflector fixtures.....	182
High intensity discharge (HID) fixtures	
area lighting.....	188
floodlights.....	185-187, 189, 191
luminaires.....	184, 190-192
recessed.....	181-183
street lighting.....	194
walkway fixtures.....	190
wall fixtures.....	190
High intensity discharge (HID) lamps.....	204-207
ballasts.....	205-207, 209
core and coil.....	209
High output (HO) lamps.....	211
High-potential test.....	90
High pressure sodium	
ballasts.....	209
lamps.....	208
lights.....	186

High-tech building management systems	365
High time clause	16
High voltage wire and cable	88
splicing	90
Hinged cover wireway	329
Hinged pull boxes	147-151
Hinged square poles	196
Holes in concrete or masonry	16
Hollins	113
Hook stick	343
Hookup	
kitchen equipment	378, 380
mechanical equipment	378, 380
motor	379
standby generator	381
Horizontal elbows, underfloor raceway	341
Horizontal pole-mounted floodlights	186
Horn sirens	368
Horns	365, 368
Horsepower rated	
starters	386
switches	228-229
Hospital grade receptacles	237, 240-243, 246
Hot box	11
HP rated manual motor starters	388-389
Humidistat, hookup	379
Hunter	113

I

Ideal working temperature	6
Illuminated switch handles	219
Illustrations	
cable tray system, P-W	359
plug-in bus duct	344
power systems equipment	270
IMC (intermediate metal conduit)	
conduit	13, 52
couplings	53
elbows	52, 53
Incandescent	
dimmers	229
fixtures	161-165
lamps	200-203
Indent EMT couplings	22
Indenter tools	22
Indoor ballasts, enclosed	194
Industrial fixtures	
fluorescent	175
HID enclosed	183
Industrial-grade switches	225-229
Injection molded corridor fixtures	176
Insert caps	
duct	336
underfloor raceway	341
Inspections	7
Installation	
EMT	11
service entrance equipment	274
Insulated	
bushed nipples	71-72
bushing, underfloor raceway	342
crimp sleeves	115
EMT connectors	19-21
flex connectors	29-32
ground bushings	54, 62, 442
malleable set screw connectors	75
round bushings	54
sealtight connectors	34-36
set screw connectors	74
squeeze flex connectors	32
threadless connectors	73-75

Insulation	
asbestos	89
heavy	96
kit	540
thermoplastic	88
Types A and B	88
Insurance	5
Intermediate metal conduit (IMC)	52
couplings	53
elbows	52-53
running thread	53
Intermediate type spacers	47
Interrupt capacity	306
Intrusion detectors	366, 371
Ionization detectors	366
Isolated ground receptacles	237, 240, 242

J

Jack, reel	92
Jacking	421
Janthina	110, 112
JIC wiring boxes	150-151
Job shacks	7
Job site access, obstructed	8
Job size modifiers	16
Joiners	
fixtures, between	158
ladder tray	364
louvered cable tray	362
Journeyman electrician	6
Juilliard	113
Jumbo switch plates	
blank	267
combination	267
decorator	267
Jumper whips	434
Jumpers, bonding	68
Junction boxes	119, 335
one level	339-340
PVC	43
PVC coated	83-84
underfloor raceway	339-340

K

Key operated starters	385
Key operated switches	230, 234-235
Keyed RJ45 plug	533
Keyless receptacles	161
Keystone jacks	534
Kitchen equipment hookup	378
Knockouts, boxes	119

L

Labor costs	
adjusting	5, 337
burden	5
defined	5
productivity	7
Labor for installation	
lamps	158
service entrance equipment	273
underfloor duct	337
Ladder, access box	373
Ladder tray	358, 363
communications cable	519
fittings	363-364
Lampholders	168-171
Lamping labor, estimating	158
Lamps	
estimating	158
fluorescent	201, 210-212
halogen	202-203

HID	204-207
incandescent	200-203
LED	199-200, 203
mercury vapor	204
quartz	203
sodium	208
special voltage	201-203
standard voltage	200-203
tubular quartz	203
LAN (Local Area Network)	
cable	527
Large radius elbows (GRS)	50-51
Layout, cable tray	359
LED	199-200, 203
Lens	
clear	190
closed asymmetric	188
convex glass	192
flat	188, 192
prismatic	190
vandal-resistant	180
Leveling	
cable tray	358
duct	340
underfloor raceway	342
Light fixtures	157-218
bathroom	164
ceiling mounted	
incandescent	162
ceiling mounted	
with canopy	162-168
commercial	157
estimating	157, 159-160
exit lighting	171-173
finish color	159
floodlights	185-191
fluorescent	174-180
guards	159
HID	181-194
high bay	425
incandescent	161-167
mounting height	158
pricing services	159
retrofit	183
surface mounted	
incandescent	161
suspension system	158
track lights	168-171
Light poles	195-198
Light track, surface mounted	168
Lighted handle switches	229
Lighted knob incandescent dimmers	229
Lightning	438
Links, cartridge fuse	288-290
Linet	114
Liquid-tight	
flex conduit	15, 33-34
flex connectors	34-36
flex to rigid combination couplings	36
Listings, subcontractor	9
Loadcenters	272, 322-324
Local Area Network (LAN)	
cable	527
Locating duct inserts	337
Locking receptacle, steel channel system	432
Locking receptacles	219, 253-254
Locknuts	
aluminum	61
grounding	445
GRS	54
Lockup boxes	7
Louvered cable tray	361
fittings	361-362
Low bay open reflector fixtures	183
Low voltage protection, starters	388-389

Low-pressure sodium lamps	208
lights	186, 190
Lugs	
copper wire	118
solder type	118, 443
solderless type	118, 443
Luminaires	184, 190-192

M

Machine tool wiring	88
Magnetic	
breakers	272, 308-315
contactors	382, 389
detector	371
starters	382, 398
switches, window or door	366
Main breaker	324-326
Main lugs	324
Maintain-contact	
switches	234
Malamute	109, 111
Male conduit adapters, ENT	48
Male conduit unions, PVC coated	80
Male to female offset nipples	72
Malleable	
body covers, blank	64
bushed nipples	71
conduit spacers	76
connectors, insulated	30
connectors, insulated throat flex	34
connectors, liquid-tight flex	34
connectors, set screw	75
connectors, squeeze flex	30-32
connectors, threadless	73
couplings, flex to rigid	36
couplings, liquid-tight combination	36
couplings, set screw	74
couplings, threadless	73-74
couplings, three piece	72
entrance caps, EMT	27
offset nipples	72
reducing bushings	69
straps, EMT	25
straps, one hole	75
unions, three piece	72
Management systems, building	365
Mandrel, checking conduit with	15, 91
Manhattan	113
Manhole necking	376
Manholes	373, 375
Manhours	5-7
lighting fixtures	160
Manual motor starters	382, 384
Marion	113
Marker screw, underfloor raceway	341
Masonry box	121, 132
Mastic	373
Material	
costs defined	5
delivery	5
takeoff	9
waste	16
Maximum operating temperature, wire	88
MC cable	
89, 90, 103, 119, 120, 125	
MC connectors	103
MCC (motor control center)	383
MCM	88
Mechanical equipment hookup	378, 380

Megger, ground	440	magnetic starters	382	installation labor	122	Pipe adapters, underfloor	
Mercury switches	219	safety switches	271	number of wires allowed	121	raceway	341
Mercury vapor		Neritina	110, 112	sectional switch	123	Pipe inserts, underfloor	
ballasts	206	Neutral		size to use	122	raceway	341
floodlights	185-191	ACSR	111, 112	special	121	Pit excavation	422
HID fixtures	181-184	aluminum	109, 111-112	square	127	Pitfalls, estimating	16
lamps	204, 206	reduced	112	takeoff	121	Plaster	
luminaires	184, 192	Nipples		Outlet receptacles	237-242, 336	frames	158
street lights	193-194	aluminum	58-61	Overcurrent devices	438	ring	119, 121
Merlin	114	bushed	71	Overfloor raceway, steel		Plastic	
Messenger strand	114	GRS	55	boxes	427	blank covers	142
Metal conduit, flexible	11	offset	72	fittings	426	boxes	140-142
Metal halide		NM type cable	89, 98-100	raceway	424, 426	bushings	54
ballasts	207	Non-adjustable cast iron		Overhead costs	5	locking connectors	255-256
lamps	205, 207	floor boxes	153	Overhead distribution		locking plugs	257-258
floodlights	185-191	Non-fused disconnect,		systems	433	pull lines for conduit	
HID fixtures	181-184	starters	404-405, 411	Overhead door, hookup	380	assemblies	447-450
lamps	206	Non-fused safety switches	275	Overhead service,		spacers	47
luminaires	184, 192	Non-fusible switches	271	sockets for	317	switch rings	142
street lights	193-194	Non-metallic		Overload protection	271	Plate electrodes	439
Metal wireway,		cable	100	motors	377	Plates	260
communications	519	conduit, ENT	48	Overload relays		amp size	267-268
Metallic outlet boxes	441	conduit spacers	76	motor starters	385	blank	261-263
Metallic raceway, grounding	439	conduit, Type CN-P	34	starters with	388-389, 404-418	combination	261, 263-268
Meter centers	318-321	outlet boxes	121	Oversize plates	221	decorator	263-264
Meter sockets	272, 317	sheathed cable	89, 98-102	Oxidation	91	deep	267
Mobilization	7	Non-renewable fuses	285-286	Oyster	109, 111	jumbo	267
Modular couplers	534	Non-time delay				receptacle	261-262, 265-268
Modular keystone jacks	534	fuses	291, 293-294, 297			semi-jumbo	266
Modulating valves, hookup	380					switch	260-267
Mogul aluminum conduit						telephone	263
bodies	65					weatherproof	268
Moisture-resistant						Plug-in bus duct	
thermoplastic	88					aluminum	348-349
Momentary contact						copper	350-353
switches	235					units	356-357
Momentary control switch	382					Plug-in devices	
Monmouth	113					breakers, loadcenter	324
Monorail trolley, hookup	380					fittings	354-355
Montclair	113					switches	356-357
Motion detectors	366					Plug fuses	283-284
Motivating employees	7					Plugs	
Motor control center (MCC)	383					communications cable	533
Motor control equipment	382-419					duct	336
Motor control stations	418-419					PVC	40
Motor rotation, reversing	377					Plum	108
Motor starters, manual	384					Plum-XLP	109
Motorized valves, hookup	380					Plumber's perforated	
Motors	377					metal tape	11
hookup	379					Pneumatic switches, hookup	380
types	378					Pole mounted	
Mounting height, lighting						floodlights	186-187, 189
fixtures	158					Poles	186
Mouse	91					aluminum	196-198
MTW type wire	88, 95					steel	195-196
Multi-conductor						street light	195
communications cable	523-525					telephone-power	424, 436-437
Multi-gang masonry boxes	132					Polycarbonate diffuser	164
Multi-gang switch boxes	121					Polyvinyl chloride conduit	11
Multi-outlet strips, colors						Porcelain receptacles	161
available	424					Portunas	109, 111
Multi-outlet systems	424					Potted ballasts	194
Murex	109, 111					Power cable	104
Mustang	110, 112					Power cord connectors	249
						Power cord plugs	250-252
						Power cord receptacles	248-249
						Power duct	339
						Power groove lamps	212
						Power intrafacor	541
						Power systems equipment,	
						illustration	270
						Power taps,	
						steel channel system	432
						Power, temporary	6
						Pratt	113
						Precast concrete access	
						boxes	373-376
						Preheat lamps	210
						Pressure switches	366
						hookup	380

N

N type connectors for	
RG/U cable	536
Nassa	109, 111
National Electrical	
Code (NEC)	10, 88-89, 438
National Estimator, installing	5
Necking, manhole	376
NEMA	
cable tray	358
Class 1 pull boxes	146-148
Class 3R pull boxes	148-150

P

P&C	
couplings	46
duct	12, 45
elbows	45, 46
end bells	47
female adapters (FA)	46
fittings	46
plugs	46
Pace	113
Pad mount transformer	
slabs	374, 376
Paging systems	365
Paint, spray enamel	429
Palomino	111, 112
Paludina	110, 112
Pancake box	120
Panel or box adapter	
ladder tray	363
louvered cable tray	361
Panelboards	272, 324-327
circuit breaker	325-326
rating	272
Par38 lamp, lampholder for	168
Parachute	91
Parallel beam clamps	79
Partridge	114
Peach	108
Peach-XLP	109
Pear	107
Pear-XLP	108
Pecan	108
Pecan-XLP	109
Pedestals	541
Pedestals for power	541
Pekingese	109, 111
Percheron	110, 112
Periwinkle	110, 112
Permits, temporary power	7
Photo controls	259
Photocell controlled lights	188
Photoelectric switches	221
tungsten	223
Pigeon	114
Pignut	108
Pignut-XLP	109
Pigtail plug	533
Pilot switches	232
Pins, cable contacts	528
Pinto	110, 112

Prewired duplex	
receptacles	239-248
Prewired fixture housings ..	166-167
Prewired switches	223-232
Prices, adjusting	222
Pricing	
access boxes	374
wiring devices	221
Pricing service, lighting	
fixtures	159
Printing National Estimator	
instructions	5
Prismatic lens	
fixtures	181
luminaires	190
Productivity factors	7-8
Profit	5, 7
Public address systems	365
Pull boxes	
hinged	147-152
NEMA Class 1	146-148
NEMA Class 3R	148-150
raintight	148-150
Pull line for conduit	
assemblies	447-466
Pull rate	91
Pulley, wire	423
Pulling	
elbows, EMT	27
wire	91
Pump control panels, hookup ..	380
Push button stations	418-419
Push buttons, signal	366, 370-371
Push on-off dimmers	229
PVC	
bending	11
boxes	43
caps	40
conduit	37
conduit assemblies	459-462
conduit bodies	41-42
couplings, expansion	39-40
covers	43
described	11
elbows	37-38, 43
end bells	40
fittings	38
junction boxes	43
outlet boxes	121
plugs	40
reducing bushings	41
service entrance caps	42
PVC coated	
beam clamps	79-80
clamps	79-80
conduit	78
conduit bodies	81-82
conduit unions	80
couplings	81
couplings, steel	78
covers	82
fittings	78
junction boxes	83-84
sealing fittings	84-85
straps	79
U-bolts	80
PVC jacketed	
communications cable	521-525

Q

Quadruplex	111-112
service drop	110
Quail	114
Quality control	8
Quartz lamps	203
Quiet switches	223-227, 230
Quince	108
Quince-XLP	109

R

R14 lamp, lampholder for	169
R20 lamp	
continental lampholder	
for	168-169
decorator track fixture for	170
petite cylinder lampholder	
for	169
R30 lamp	
continental lampholder for	169
shielded universal	
lampholder for	168
stepped base lampholder for ..	171
R40 lamp	
continental lampholder for	169
shielded universal	
lampholder for	168
stepped base lampholder for ..	171
Raceway	
defined	10
fittings, underfloor	341
steel	431
surface	423-437
surface, steel	426
underfloor	335-342
Radio suppressors	159
Raintight meter centers	321
Raintight pull boxes	148-150
Raised box covers	131
Ramapo	113
Rapid-start lamps	210
Rate-of-rise detectors	366, 371
Raven	114
Receptacle and handy	
box assemblies	508-509
Receptacle and sectional	
box assemblies	510-513
Receptacle assemblies	508-517
duplex	515, 517
single	514, 516
Receptacle	
plates	261-262, 265-268
weatherproof	268
Receptacles 119, 237-249, 253-254	
duplex	239-243
single	237-238
Recessed fixtures	
door	181
fluorescent	177
HID	181-183
incandescent	166-167
Rechargeable batteries,	
exit fixtures	172
Rectangular floor box covers ..	155
Rectangular floor boxes	
cast iron	155
sheet metal	154
Red neon pilot switches	233
Reduced neutral	112
Reduced wall conduit, flex,	
aluminum or steel	28
Reducers, bus duct	343, 355
Reducing	
bushings	69-70
bushings, PVC	41
couplings, PVC coated	81
underfloor raceway	341
voltage drop	14
washers	70
Refrigeration, hookup	380
Regis	113
Reinforcing, overfloor	
raceway	424
Remote ballasts	159
Renewable cartridge	
fuses	287, 289
Rental equipment, earthwork ..	420
Residential switches	223
Restrictions	
conduit	11
use of armored cable	88

Retrofit fixtures, recessed	
HID	182-183
Retrofitting for	
communications	520
Reversing motor rotation	377
Reversing starters	388-389
RG/U cable, plug	
connectors for	535-536
Right angle beam clamps	79
Rigid conduit	49
aluminum	58
assemblies	463-466
elbows	49-50
terminations	52
Rigid steel	
conduit clamps	77
conduit, galvanized	49
couplings (IMC)	53
nipples	55-57
Rings	
gang extension	144-145
plastic switch	142
switch	129
RJ11 jack	533
RJ45 plug and jack	533
Roadway luminaires	193
Rock outcrop	420
Rockland	113
Rocky soil, excavation	420
Rod couplings	86
Rod, threaded	86
Roller/plunger detector	371
Romex	98-100
clamps	119
Rotary incandescent	
dimmers	229
Rotating beacons	369
Round	
box covers	136
cylinder lampholder	169
fiberglass boxes	133-136
fixtures, glass ceiling	162
fixtures, opal glass utility	165
fixtures, walkway	190
fixtures, white trim	166
flanges, carpet	156
floor box covers	154
floor outlet boxes	153
luminaires	191-192
poles	197-198
RSC (rigid steel conduit)	12
Runcina	110, 112
Running thread, steel	53

S

S type flexible cord	89, 96
Safety clips	159
Safety switches	271, 275-282
240 volt general duty	275
240 volt heavy duty	276-277
600 volt heavy duty	278-281
rating	271
Safety wire and cable	159
Sail switches, hookup	380
Sales tax	5
Sand encasement	15
Sand, excavation	420
Scaffold work	6
Scallops	110, 112
Schedule 40 PVC	
conduit	37
couplings	38, 39
elbows	38
Schedule 80 PVC	
conduit	37
elbows	38
Scheduling	6, 8
Screw cover boxes	
.....	146-147, 148-149

Screw cover wireway	328
Screw-in fuses	271
Screw terminals	533
SE-SER plastic jacket cable	107
Sealing fittings, PVC	
coated	84-85
Sectional box receptacle	
assemblies	510-513
Sectional box switch assemblies	
15 amp	471-478
20 amp	479-486
Sectional switch boxes	119, 124
Sections, duct	337
Self illuminating	
exit fixtures	173
Self-stripping connectors	115
Semi-adjustable floor boxes	
cast iron	153-155
sheet metal	153-154
Semi-flush mounted socket	317
Semi-jumbo switch plates	266
Service drop wire	110-111
Service entrance cable	88, 101
Service entrance caps, PVC	42
Service entrance	
equipment	269-334
checklist	273
Service fittings	342
Service section	269
Set screw connectors, steel	74
Set screw couplings	
malleable	74
steel EMT	23
Setter	111
SEU cable	89, 101
SEU type wire	107
Seven circuit overhead	
distribution systems	434
Sheet metal	
floor boxes	153-154
hinged cover pull boxes ..	147-148
JIC wiring	150-151
panels for JIC enclosures	152
raintight screw cover	
pull boxes	148-149
raintight hinge cover	
pull boxes	149-150
screw cover pull boxes ..	146-149
tray, communications	519
Shepherd	111
Shielded cable	104
Shielded universal	
lampholder	168
Shopping subcontractor bids	9
Shoring	420
Short-circuit interrupting	
capacity	271
Show Me video, viewing	5
Side or back wiring,	
switches	223-232
Side-mounted single-lamp	
fixtures	174
Side-wired receptacles	237-245
Side-wired switches	223-232
Side/back wired	
receptacles	237-245
Side/back wired	
switches	225, 227-230
Signal	
cabinets	327
systems	365-372
terminal cabinets	327
transformers	366, 370
Silent switches	219
Silicon-bronze conduit	15
Single conductor cable	104
Single decorator receptacles ..	244
Single face exit fixtures	171, 173
Single gang	
switch boxes	137-138, 141
switch rings	129-130

Single pole
space, breakers in 307
switches 223-229, 230-235
Single receptacles
..... 237-238, 241-242
assemblies 514, 516
plates 261, 265, 267-268
underfloor raceway 342
Single stroke
bells 367
chimes 369
Single-lamp strip fixtures 174
Sirens 365, 367
horns 368
Sizes
outlet box 119, 122
wire 88
SJ type flexible cord 89, 96-97
SJO type flexible cord 97-98
Slab, transformer 374, 376
Sleeves 115
Slide control dimmers 229
Slimline lamps 211
Smart buildings 365
Smoke detectors 366, 371
SO type flexible cord 89, 97
Soapstone duct 15
Sockets 318-321
cable contacts 528
meter 269, 317
Sodium lamps 208
Solder cup contacts 528
Solder type lugs 118
Solderless type lugs 118
Solenoid valves, hookup 380
Steel armored cable 103
Solid communications
cable 521, 525
Solid direct burial cable 100
Solid wire 88, 93-94, 108
Spacers 76
ceiling 157
conduit 76
connectors 117
plastic 47
Spaniel 109, 111
Sparate 114
Spare key switches 235
Sparrow 114
Special outlet boxes 121
Special support material 158
Special voltage lamps 201-203
Specialty switches 229-233
Specialty, choosing 8
Specification grade
receptacles 240-241, 243, 246
switches 230
Spherical lampholder 170
Splice connectors,
telephone cable 534
Split adapters, EMT 27
Split bolt connectors 116
Spray paint, enamel 429
Square
boxes 120, 127
exterior walkway luminaires... 191
fiberglass boxes 136
glass fixtures 161
luminaires 192
opal glass utility drum
fixture 166
outlet boxes 127
poles, hinged 196
switch rings 129-130
tapered steel poles 196
walkway fixtures 190
white glass light fixture 166
Square base aluminum light
poles 198

Squeeze flexible conduit
connectors 30-32
Stainless steel raceway 431
Staking duct 338
Standard colors, wiring
devices 218
Standard switches 218
Standard voltage lamps 200-203
Standard wall
GRS conduit 49
steel conduit, flex 28
Standby electrical generators 365
Standby engine-generators 378
hookup 381
Standpipes, underfloor
raceway 342
Starter/circuit breaker,
bus duct 357
Starter/fusible switch,
bus duct 357
Starters
combination 404-417
magnetic 398
motor 384
motor, manual 384
with stainless steel covers 384
Station wire connectors 540
Stations, control 418-419
Stats, outside air, hookup 380
Steel
boxes, overfloor raceway 427
conduit blank body covers 64
conduit, rigid 49
flex conduit assemblies 455-458
hex nuts 86
messenger strand 114
poles 195
raceway base 426
raceway cover 426
raceway fittings 431, 435
reducing bushings 69
reducing washers 70
running thread 53
set screw connectors 74
straps 75-76
surface raceway 426
Steel channel, overhead
distribution, fittings 432
Steel channel (strut) & fittings 87
Steel compression EMT
connectors 21
couplings 23
Steel fittings
overfloor raceway 426, 429
surface raceway 427-428
Steel frame fluorescent
fixtures 177
Steel tube EMT 10
Stem 157
Stephens 113
Stepped base lampholders 171
STO type flexible cord 89, 99
Straight couplings, P&C 45
Strain relief cable cover 533
Stranded cable
armored 103
communications 521-525
direct burial 100-101
service entrance 100
Stranded wire 88, 93-95, 108-109
Straps 75-76
malleable 75
PVC coated 79
steel, one hole 75
supporting 11
Street light poles 195
Street luminaires 193
Stress cone 88
Strip fixtures 174
Strombus 110, 112

Subcontractor listings 9
Subgrade conditions 420
Sub-panels 271
Suffolk 111, 112
Sump pumps, hookup 380
Super metalarc lights 186
Supervision 6
Support material, special 158
Supporting straps 11
Supports
cable tray 358
duct 340
GRS 12
Surface cabling 519
Surface covers 131
Surface metal raceway
assemblies 431
Surface mounted
breaker enclosures 315-316
buzzers 367
fluorescent fixtures 174
incandescent fixtures 161
push buttons 370
screw cover boxes 146-147
single circuit light track 168
Surface raceway 423-437
communications 519
fittings 427
Suspension system, lighting 158
Swan 114
Swanate 114
Sweetbriar 113
Switch assemblies 467-507
handy box 467-470
one and two gang 487-507
sectional box 471-486
Switch boxes 123-125
fiberglass 137-139
four gang 139, 142
single gang 137-138, 141-142
three gang 139, 142
two gang 138, 141
Switch control schemes 220
Switch handles,
illuminated 225, 229, 232
Switch legs 92
Switch plates 260-267
deep 267
jumbo 267
semi-jumbo 266
Switch ring 119, 121, 129
Switchboard connections,
bus duct 345
Switches 223-236
bus duct 356
commercial 224-227, 230-233
disconnect 269
entry release 372
grounded 223-236
handy box assemblies 467-470
industrial 225-229
key operated 230, 234-235
momentary control 382
one gang assemblies 487-489
quiet 223-227, 230
residential 223
safety 271, 275-282
sectional box assemblies 471-486
side or back wiring 223-232
specialty 229-233
time release 372
two gang assemblies 489-507
Switching whips 434
System engineering,
channel wiring 425

rapid-start 210
slimline 211
T17 preheat lamps 212
T9 circular fluorescent lamps 212
Taft 113
Takeoff 9
cable tray 360
conduit 13
consistency 15
excavation 420
lighting fixtures 157, 160
motor control equipment 382
outlet boxes 121
underfloor duct 337
wire 92
wiring devices 218
work sheet 14
Tamper-resistant (TR), cost
adjustment for 239-242, 244-246
Tandem breakers 307
Tap & splice adapter 540
Tap boxes, bus duct 355
Tapered poles 196
Taxes 5
T-bar fixtures 177
Tee
bus duct 354
ladder tray 363
louvered cable tray 361
Telephone
plates 263
terminal cabinets 327
Telephone cable 525
connectors 534
fittings 534
Telephone-communications
pole 436-437
Telephone-power
poles 424, 436-437
Temperature
detectors 371
operating for wire 88
Temporary electrical service 7
Temporary power 6
Terminal blocks 541
Terminal cabinets 327
Terminations
aluminum 62
GRS 52
rigid conduit 52
Terrier 111
Test blocks 318
Testing, service entrance
equipment 273
TF type wire 88
TFF type wire 88
TFFN type wire 89, 96
THC connector for RG/U
cable 536
Thermal circuit breakers 272
Thermal magnetic
breakers 272, 308-315
Thermoplastic insulation 88
THHN type wire 88, 93, 94, 105
Thin wall EMT 10
Threaded hubs, boxes 66
Threaded rod, steel 86
Threading
wire 91
GRS 12
Threadless connectors 73
Three conductor lugs 118
Three gang boxes
floor 154-155
switch 142
Three lamp fluorescent
fixtures 175
Three phase circuit 92
Three pole
contactors 391-393
starters 400-404

T
T12 lamps
high output 211-212
preheat 210

T

Three-position switches.....	234-235	Two pole		Universal		appliance	96
Three-way switches.....	232-233	contactors	389-391	arrows	171-172	bare copper, weight	102
Through boxes.....	121	starters	398-399	lampholder	168	codes	88
Thumper	90	Two screw flex connectors	31	Uplight	175	colors	92
THW type wire	88, 93, 105	Two speed starters.....	388-389	URD type cable	113	connectors	115-117
THWN type wire	88	Two-way connectors.....	116	USE type wire.....	88	conversion table	537
Time delay fuses		Type 1 and 2 duct.....	335	USE, RHH-RHW		copper.....	93-104
plug.....	284	Type A insulation	88	type wire	95, 106	high voltage	88
cartridge...292, 295-296, 298-303		Type B insulation	88	Utility		lugs	118
Time switches.....	236	Type C PVC conduit bodies	41	boxes	373	pulley	423
Timed release switch.....	372	Type CN-P liquid-tight flex		drum fixture.....	165	pulling	91-92
Timers.....	236	non-metallic conduit.....	34	fixture.....	163-164	safety	159
Toggle bolts	86	Type DB P&C duct with				service drop	110-111
Toggle switches.....	223	coupling	45			sizes	88
Tomic bolt hangers	132	Type E PVC conduit bodies.....	41	V		sleeves	115
Tools		Type EB or DB couplings	45	Vacuum, fishing	91	solid	92-94, 108
EMT hand benders	27	Type EB P&C duct with		Valves, 3-way, hookup	380	stranded.....	92-96, 105, 108-109
GRS hand benders	52	coupling	45	Vandal-resistant lens	180	takeoff	14, 92
indenter.....	22	Type EF flex steel conduit	33	Vassar	113	threading.....	90
steel channel system	432	Type FA female PVC adapters....	39	Ventilated door fixtures.....	181	weatherproof.....	107
steel raceway.....	429	Type FS PVC boxes	43	Vertical elbows, underfloor		XLP	108
Top shield tape	540	Type HC liquid-tight		raceway	341		
Track lighting and		extra flex conduit	34	Vertical runs, allowances for.....	16	Wire and conduit	
fixtures	168-171	Type LB conduit bodies	63	Video cameras.....	365	assemblies.....	447-518
Traffic covers	373	Type LB PVC conduit		Voice & data cable.....	540	Wire lugs.....	118
Transceiver/drop		bodies	41-42	Volatility of costs.....	5	Wire nuts.....	115
shielded cable.....	527	Type LL conduit bodies	63	Voltmeter	317	Wireway	272, 328-329
Transformer slabs.....	374, 376	Type LL PVC conduit bodies.....	42	Voluta	110, 112		
Transformers	273, 332-334	Type LR conduit bodies	63			Wiring device plates	260-268
signal	366, 370	Type LR PVC conduit bodies	42			Wiring devices	119, 218-268
Transite duct.....	15	Type LT flex steel conduit	33			standard colors	218
Transition boxes	540	Type OR liquid-tight flex				Wiring harness	
Transition junction boxes.....	541	conduit	33			overhead distribution	
Transition partitions	540	Type SLB entrance elbows.....	63			systems	434
Transition section,		Type T conduit bodies,				two piece steel raceway	434
bus duct.....	343	PVC coated	82			Wiring instructions, motors	377
Trapeze bar	345	Type T PVC conduit bodies.....	42			Work area enclosed fixtures	183
Trapeze hangers	12	Type TA terminal PVC				Work sheet, sample.....	14
Tray, cable	358	adapters.....	39			Working conditions,	
Trenching.....	15, 420	Type TB conduit bodies, PVC				adjusting for.....	6
Trim plates		coated.....	82			Working temperature, ideal	6
wiring device	260-268	Type UA liquid-tight flex				Wraparound	
Triplex service		conduit.....	33			fluorescent fixtures	176
drop	109-110, 112-113	Type X conduit bodies	63			glass bathroom fixtures	164
Troffer lay-in T-bar fixtures	177	PVC coated	82			Wrought iron pipe	15
Troffer fluorescent						Wye connectors, underfloor	
assemblies.....	518	U				raceway	342
Trough tray	358	U-bolts, PVC coated	80			Wye couplings, underfloor	
Tubular quartz lamps.....	203	U-ground receptacles	247			raceway	342
Twinaxial communications		UF cable	89, 100			Wyes, duct.....	336
cable	526	Ufer ground system	438, 439				
Twinaxial plug.....	533	UL label	10			X	
Twist-lock receptacles	219	Undercarpet wiring				XHHW type wire	88, 94, 106
Twisted pair cable.....	521-523	systems	538-541			XLP	
fittings	529-537	Underfloor duct				cable	90, 104
Two bolt connectors	117	fittings	336			duplex	111
Two circuit		materials	335			quadruplex.....	112
overhead distribution		Underfloor raceway				triplex	111-112
systems	433	communications.....	519			wire	106, 108-109
surface raceway	430	fittings	341				
Two gang		materials	335			Z	
floor boxes	154-155	Underground				Zurara	110, 112
switch assemblies.....	489-507	branch circuit cable.....	88				
switch boxes	138, 141	distribution cable.....	113				
switch rings	129-130	feeder cable	88				
Two hole steel EMT straps	25	service entrance cable.....	88				
Two lamp		service, sockets for.....	317				
fluorescent fixtures	176	Underwriter's Laboratories	10				
strip fixtures	174	Uninsulated crimp sleeves.....	115				
Two phase conductors	113	Unions					
Two piece steel raceway	426	conduit, PVC coated.....	80				
assembly	429	malleable 3 piece.....	72				
base	426	Unit heaters, hookup	380				
fittings	430						
sizes	423						
steel channel system	433						