Estimation of Materials and Labor Costs

Estimation is an important part of being a contractor, even though spending time doing so is often neglected unless it appears to be absolutely necessary. Even though estimating job projects is very time-consuming, it needs to be regularly done to gain new customers, keep work steady and increase sales and income. It's easy for contractors to feel that they are too busy with onsite work, ordering or picking up materials or loads of other 'essential' work-related things to take time out for estimates and related cost analysis. Time may seem to be better spent doing other things but there are several ways to effectively estimate quicker than you may think.

Purpose and Benefits of Cost Estimation

Estimating costs is essential in helping a contractor determine what to charge for a project and decide whether or not it is worthwhile to take on. Cost estimation is used to determine the scope of the job and associated financial income and expenses. If estimation is done in a haphazard fashion, the contractor may end up losing money or the client may pay too much. By going through the estimation process in a proper way, this can prevent financial loss as well as issues and frustration down the road once the project has begun.

Types of Estimation Methods

The most common way that most contractors do is to simply contact their subcontractors to get quotes on the project plans and hope that their estimated pricing is accurate. The other issue with this method is timeliness, hoping that the various quotes will be in a timely manner. This poses the risk of not hearing back soon enough and losing the bid for the project. Others may use a pencil and paper to handwrite the job estimation, including a list of materials and labor estimates. Again, it's important to take the time to make sure that the estimated number of hours for labor costs as well as the supplies, materials and equipment costs are as accurate as possible.

Unit Pricing Method

The Unit Price Method is especially useful to help increase the estimation speed and accuracy of estimates. Most likely you are already using this estimation method for some of your estimates but may want to use it more regularly.

For example, if you're a roofer, and you know you charge $3.00/SF for roofing, that's a **unit price.** Most contractors know what they charge clients but may not know their actual total costs.

If plans are printed and then a scale is used and a highlighter, digital software may be a worthwhile investment to increase speed and accuracy for measurements.

After we identify our Unit Pricing, we can then use that to figure out our Direct Labor costs and Material Costs. Next, we need to add all other costs including Submarkups if we're working with Subcontractors, Overhead, and these factors can be used to calculate expected Profit margins. Although, keep in mind that the initial quote you submit may later need to be adjusted if the client asks for a discount or to match another project quote.

That's another reason why using a digital electronic method is beneficial since you can easily make adjustments to the expenses and revenues you previously entered without having to create an entirely new hand-written estimate. Of course, the more estimate bids you submit, the great chance you have to secure new jobs and clients. You will also gain insight from the feedback you receive on whether your estimates are competitive or not.

You may also find it helpful to buy a cost database like the National Construction Estimator by RS Means or Craftsman-Books. A team of researchers and consultants at these companies compile pricing for thousands of projects within the construction industry and their pricing is updated frequently so you can count on it being up to date.

Their pricing rates will provide you with a good base of average costs and then you can adjust the pricing based on your local area and other differentiating factors.

For example, if a wall is 15' high, you may need to modify the labor costs and completion time of the project because it would require more time and a Scissor Lift will be needed.

Or, if you're a roofing contractor, you may typically add up the materials you'll need and notify your supplier to get the cost estimate. While you're waiting, you use your experience to take a guess at what the labor costs may actually be by jotting down: 4 guys at $20 p/hour x 3 days, etc. Using this method will leave you prone to miscalculations and to compensate for these errors, you may need to add a larger extra amount buffer cost to your quote. Depending on your license and the project, you may have to do these individual calculations repeatedly for every different type of walls, ceilings, posts, beams, etc.

Unit Pricing Actual Calculations

Instead of the examples given above, let's consider how to determine your actual unit prices so you will be able to bid quicker and more precise.

The following are 3 steps to creating your own actual unit pricing:

Step 1 – Take a sample item and calculate your total labor costs and material costs separately.

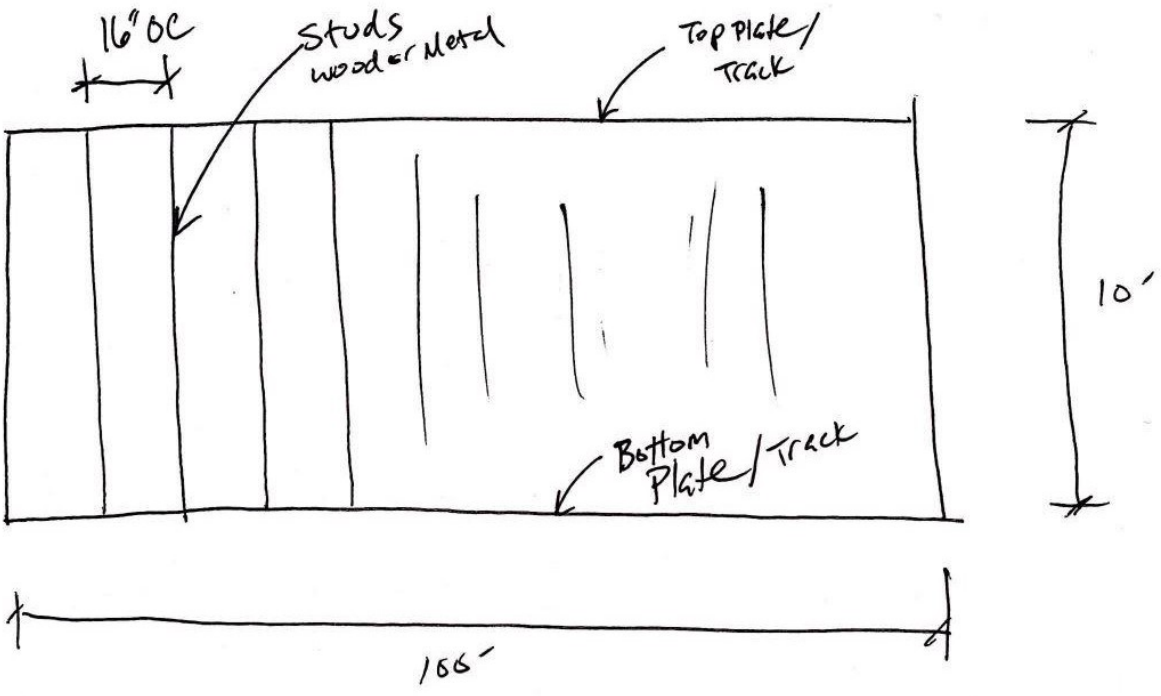
Step 2 – Divide the costs by total square footage of your sample. Here's the formula:

Labor Cost / Square Footage = Cost of Labor Per Square Feet

Step 3 – Add to your database

Step 4 – Repeat the process for Material

The following is an example of a sketch of a wall. In order to find out our actual unit cost (cost per square feet) for framing this wall, this is how we can do it.



Step 1 – Take a sample item and calculate your total labor costs and material costs separately.

In this example we have a wall that's 100 LF x 10' high with studs at 16" OC.

Labor Cost: 2 guys x 6 hrs x $30/Hr = $360.00

Materials:

-200 LF Track x $0.41/LF = $72.00

-76 Studs x 10' x $0.42/LF = $319.20

-Pins: 50 Pins x $0.08 EA = $4.00

-7/16” Screws: 304 Screws x $0.01 = $3.04

Total for Materials: $398.24 + 7% Sales Tax = $426.12

Total Direct Costs: $786.12

$786.12 / 1,000 SF = $0.79/SF

In the future we can know with confidence that to frame a wall will cost us $0.79/SF. We then add about 10 percent additional for waste and productivity. After estimated the entire project, we can add the duration and calculate things like Overhead, Equipment, Profit, etc. Finally, we will need to do this for each separate project task. You may only have a small list of items you have to calculate for if you’re a subcontractor. On the other hand, a general contractor will have quite an extensive list so that’s why it would make more to use a Cost Database as a more efficient and quicker way to determine unit pricing to save countless hours creating your own.

Square Foot Method

The Square Foot Method, sometimes referred to as the Budget Method is another cost estimation strategy.

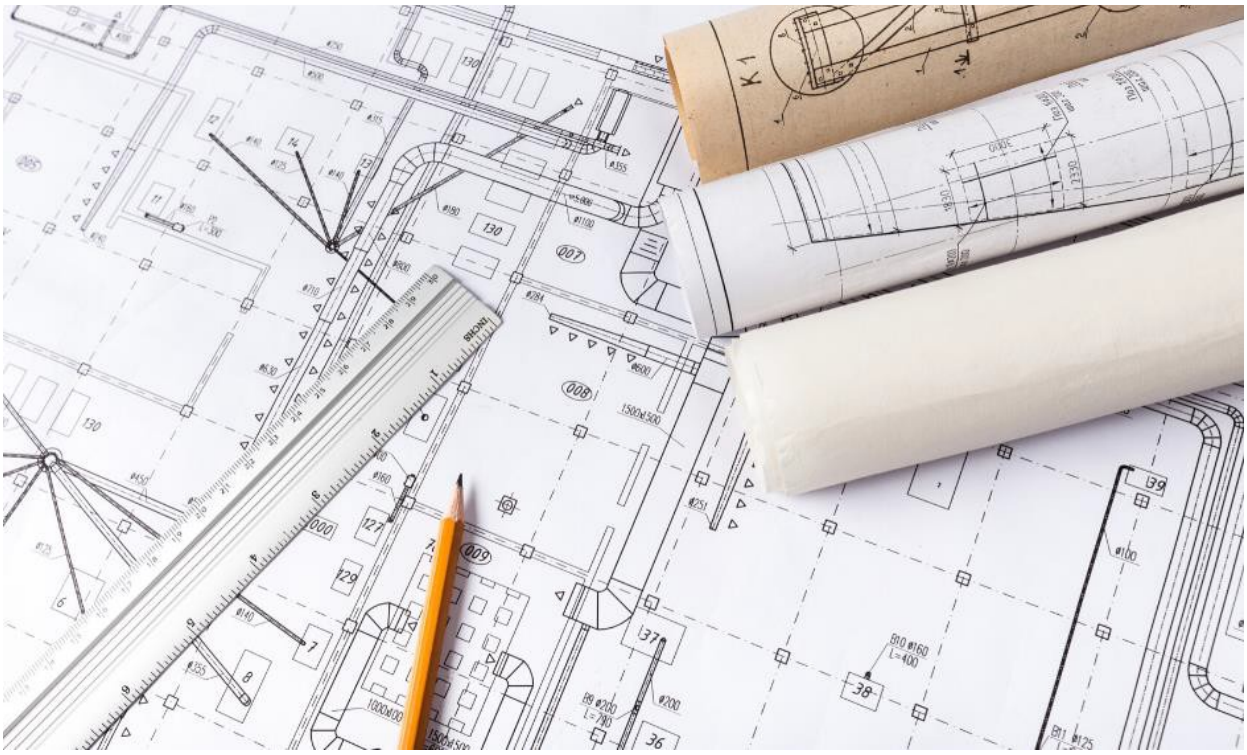
This method involves 2 specific purposes:

1. Prospecting Tool
2. Bidding Tool - Last Minute

Square Foot Method for Prospecting

At the beginning stage of projects, it is important to get your foot in the door while design concepts are being formulated, especially when architects are involved. Architects are typically focused on design so they don't have a good handle on associated costs.

If a General Contractor approaches an architect and offers to provide budget pricing for the architect's projects in the design phase for free, they will have a very good chance to land some new projects and expand their business and gain valuable referrals and recommendations.



Last Minute Quotes Using the Budget Method

A last-minute opportunity to submit a bid for a general contractor or architect may come but you cannot have enough time to prepare a detailed estimate. Keep in mind what was discussed earlier, that initial bid submissions are considered preliminary quotes because often discounts are requested or project specifications change. Due to this, a last minute bid can use a little higher pricing estimate since most likely further discussions will occur. This will provide an opportunity to submit your estimate and buy you some time to do a more thorough and accurate cost estimation analysis later. In this way, you don't lose your chance to submit a budget bid and then spend more time working on a more accurate final bid during the discussion period. Your goal with the initial preliminary bid is to get the client

or project manager interested in working with you. Statistics show that the average is getting 2-4 jobs out of every 16 bid estimates.

Using the Square Foot Method to Prepare a Budget Estimate

If you look at your historical data from the past few years, you can spend a few hours with your team and perform an analysis to determine your average costs per square foot.

Realtors use this type of analysis when they do a comparative market analysis to find comps when determining real estate property prices and offers.

When a buyer is interested in a particular property, a real estate agent looks up regional historical data and identifies comparable homes that have similar age and other features to estimate the property's value. Contractors in the construction-related industry can go through a similar process.

You can review your work history and make a list of all of your jobs and designate each a category type.

For example:

Name	Type	Contract Value	Size in SF	Cost per SF
20 Unit Apartments	Apartment	$3,200,000.00	18,400.00	$173.91
836 Riverside	Apartment	$4,160,000.00	32,240.00	$129.03
Rivera Residence	Residence	$644,070.00	3,500.00	$184.02
Sonnier-Tirado Residence	Residence	$864,135.00	4,500.00	$192.03
Bomin Chevrolet	Dealer	$6,510,000.00	41,440.00	$157.09
Intimissimi Store	Tenant Buildout	$209,475.00	1,500.00	$139.65
Rosetta Bakery	Tenant Buildout	$248,355.00	1,500.00	$165.57
Carnival Apartments	Apartment	$3,200,000.00	17,325.00	$184.70
Palm Beach Apartments	Apartment	$4,160,000.00	32,240.00	$129.03
Rivera Residence	Residence	$644,070.00	3,500.00	$184.02
Pine Residence	Residence	$864,135.00	4,500.00	$192.03
South Acura	Dealer	$3,255,000.00	20,720.00	$157.09
			Average Cost/SF	**$165.68**

The average across all of our projects is $165.68/SF in the above example. Remember that the more entries of projects you include, the more repetitions will be seen.

For example, the apartment building category can average between $130-170/SF depending on its build-out and finishes. The cost for the 20 Unit Apartment project was higher which was expected since it was a more luxury project.

In the future, if I am creating an estimated bid for an apartment building, I can refer to this past one as a sample base to determine a square foot cost closer to what its actual cost will end up.

As a rule of thumb, labor typically accounts for forty to fifty percent (40-50%) of the project cost. The remaining percentage is a combination of materials, equipment and supplies.

Using the above percentages as a reference, we know with a high level of assurance that about $82/sq. ft is labor, and $82 is in material, give or take a few dollars, if the total average cost per square foot is $165.58/sq ft.

However, always keep in mind that the main objective is to submit bids as quickly and accurately as possible but at the same time recognize that the price often is adjusted during the negotiation process.

Doubling Method

The more experience a contractor has, the easier it is to know how many hours a particular job may take so calculating associated labor costs may be fairly quick by simply multiplying the estimate number of hours or day by the per hour or daily rate. It's common to estimate a job by considering how many people working times how many days and then multiple that by the pay rate per person.

Since around half of the total costs is for labor, after we estimate our labor cost, we can simply double that and then add a buffer of ten percent more. For example, if the labor cost is $75 p/sq ft, we would double that and get $150 plus an additional 10 percent ($15) would end up with $165 p/sq ft.

Even when we are performing estimates, oftentimes we have to make pricing modifications depending on various factors including complexities, work environment, custom items, etc. All of these cannot be found in a cost database.

Even when we refer to a database to initially identify costs, we may still need to update these as we consider job difficulties, complexities, and any other things that may affect the speed of completing the job or potential increase in other related expenses. The scale of each of these cost related factors depends on the project's landscape, scope, setting and dimension.

It is important for contractors to realize that the client wants the best quality work for the lowest price and may become a loyal customer for future work as well as a wonderful source of word of mouth referrals and recommendations.

Most people recognize that unexpected costs known as contingencies may arise during a project so there should be an amount in the budget to account for these. Sometimes this may be included in a particular category or within each designated line item outlined in the scope. The contingency amount should take in account past experience of similar projects, the duration and potential for delays.

For example, the following are potential contingency categories:

- Changes in Plan Design
- Modifications of Timelines & Schedule
- Increase in Wages or Workers Needed
- Changes in Site Conditions
- Requirements imposed during construction by 3rd parties (ie. additional permits)

Contingent amounts not spent for construction can be released near the end of construction to the owner or to add additional project elements. The magnitude of each of these cost components depends on the nature, size and location of the project as well as the management organization, among many considerations. The owner is interested in achieving the lowest possible overall project cost that is consistent with its investment objectives.

Approaches to Cost Estimation

Cost estimating is one of the most important steps in project management. A cost estimate establishes the base line of the project cost at different stages of development of the project. A cost estimate at a given stage of project development represents a prediction provided by the cost engineer or estimator on the basis of

available data. According to the American Association of Cost Engineers, cost estimation or engineering is defined as that area of practice where experience is utilized in the application of techniques to the problem of cost estimation, cost control and profitability.

Virtually all cost estimation is performed according to one or some combination of the following basic approaches:

Production function. In microeconomics, the relationship between the output or goal of a process and the necessary resources is referred to as the production function. In the construction industry, the production function may be expressed by the relationship between the volume of contractor-related work and a factor of production such as labor or capital. A production function relates the amount or volume of output to the various inputs of labor, materials and equipment. Therefore, for a specified level of output, we may attempt to find a set of values for the input factors so as to minimize the production cost. The relationship between the size of a project (expressed in square feet) to the input labor (expressed in labor hours per square foot) is an example of a production function for construction contractors and tradesmen.

Unit costs for bill of quantities. A unit cost is assigned to each of the components or tasks as represented by the bill of quantities. The total cost is found by adding

all of the products of the quantities multiplied by the corresponding unit costs. The unit cost method is straightforward in principle but quite labor intensive in application. The initial step is to break down a process into a number of tasks. These tasks must be completed for the project. Once these tasks are defined and quantities representing these tasks are identified, a unit cost is assigned to each and then the total cost is determined by adding up the total costs in each task. The level of detail in organizing these will vary substantially from one estimate to another.

Allocation of joint costs. Allocations of cost from existing accounts may be used to develop a cost function of a task or project. The basic idea in this method is that each expenditure item can be assigned to particular characteristics of the task. Ideally, the allocation of joint costs should be directly related to the category of basic costs. In many instances, however, a connecting relationship between the task and the cost item cannot be identified or may not exist. For example, in some projects, the accounts for basic costs may be classified according to (1) labor, (2) materials, (3) tools and equipment, (4) supervision, and (5) general office overhead. These basic costs may then be allocated proportionally to various tasks which are subdivisions of a project.

Types of Construction Cost Estimates

Construction cost constitutes only a fraction, though a substantial fraction, of the total project cost. The required levels of accuracy of cost estimates vary at different stages of project development, ranging from ball park figures in the early stage to fairly reliable figures for budget control prior to beginning the project. Since design decisions made at the beginning stage of a project are more tentative than those made at a later stage, the cost estimates made at the earlier stage are expected to be less accurate. Generally, the accuracy of a cost estimate will reflect the information available at the time of estimation.

Cost estimates may be viewed from different perspectives because of different requirements. In spite of the many types of cost estimates used at different stages of a project, cost estimates can best be classified into three major categories according to their functions. A contractor cost estimate serves one of the three basic functions: design, bid and control. For establishing the financing of a project, either a design estimate or a bid estimate is used.

1. **Design Estimates.** For the owner or its designated design professionals, the types of cost estimates run parallel with the planning and design as follows:
    - Screening estimates (or order of magnitude estimates)
    - Preliminary estimates (or conceptual estimates)

- Detailed estimates (or definitive estimates)
- Estimates based on plans and specifications

For each of these different estimates, the amount of design information available typically increases.

2. **Bid Estimates.** For the contractor, a bid estimate submitted to the owner either for competitive bidding or negotiation consists of direct costs, plus a markup to cover general overhead and profits. The direct cost for bid estimates is usually derived from a combination of the following approaches.
    - Subcontractor quotes
    - Quantity
    - Construction procedures.

3. **Control Estimates.** For monitoring the project, a control estimate is derived from available information to establish:

    - Budget estimate for financing
    - Estimated cost and timeframe to completion

Bid Estimates

The contractor's bid estimates often reflect the desire of the contractor to secure the job as well as the estimating tools at its disposal. Some contractors have well

established cost estimating procedures while others do not. Since only the lowest bidder will be the winner of the contract in most bidding contests, any effort devoted to cost estimating is a loss to the contractor who is not a successful bidder. Consequently, the contractor may put in the least amount of possible effort for making a cost estimate if it believes that its chance of success is not high.

If a contractor intends to use subcontractors, it may solicit price quotes for various tasks to be subcontracted to specialty subcontractors. So, the general subcontractor will shift the burden of cost estimating to subcontractors. The contractor may want to assess the actual cost by considering the actual procedures to be used and the associated costs if the project is going to be different from typical designs. Therefore, items such as labor, material and equipment needed to perform various tasks may be used to determine the cost estimates.

Control Estimates

Both the owner and the contractor must adopt some base line for cost control during the project. For the owner, a *budget estimate* must be adopted early enough for planning financing. Consequently, the detailed estimate is often used as the budget estimate since it is sufficient definitive to reflect the project scope. As the work progresses, the budgeted cost may need to be updated. A revised estimated

cost may be necessary either because of change orders initiated by the owner or due to unexpected cost overruns or savings.

In summary, understanding how to come up with estimates of material and labor costs is very important for contractors. Initial estimates comprise a rough idea of what expected costs will be. Even though bids or quotes are often used interchangeably with estimates within the construction trades industry, they are actually considered to be more detailed and accurate. However, often it is better to provide an initial bid using one of the strategies covered previously and then adjustments can be made during the decision-making process. Referring to past work experience will help in creating a more precise unit price for various tasks and projects which can be used for future estimates and bids.

Business Ethics

Business ethics is a form of applied ethics that examines ethical rules and principles within a commercial context, the various moral or ethical problems that can arise in a business setting and any special duties or obligations that apply to persons who are engaged in commerce.

Business ethics can be both a normative and a descriptive discipline. As a corporate practice and career specialization, the field is primarily normative. In academia descriptive approaches are also taken. The range and quantity of business ethical issues reflects the degree to which business is perceived to be at odds with non-economic social values. Historically, interest in business ethics accelerated dramatically over the past 15 years, both within major corporations and within academia. For example, today most major corporate websites lay emphasis on commitment to promoting non-economic social values under a variety of headings (e.g. ethics codes, social responsibility charters). In some cases, corporations have redefined their core values in the light of business ethical considerations (e.g. BP's "beyond petroleum" environmental tilt).

Overview of issues in business ethics

General business ethics

- This part of business ethics overlaps with the philosophy of business, one of the aims of which is to determine the fundamental purposes of a company. If a company's main purpose is to maximize the returns to its shareholders, then it could be seen as unethical for a company to consider the interests and rights of anyone else.
- Corporate social responsibility or CSR: an umbrella term under which the ethical rights and duties existing between companies and society is debated.
- Issues regarding the moral rights and duties between a company and its shareholders: fiduciary responsibility, stakeholder concept v. shareholder concept.
- Ethical issues concerning relations between different companies: e.g. hostile take-overs, industrial espionage.
- Leadership issues: corporate governance.
- Political contributions made by corporations.
- Law reform, such as the ethical debate over introducing a crime of corporate manslaughter.
- The misuse of corporate ethics policies as marketing instruments.

Professional ethics

Professional ethics covers the myriad of practical ethical problems and phenomena which arise out of specific functional areas of companies or in relation to recognized business professions.

Ethics of finance and accounting

- Creative accounting, earnings management, misleading financial analysis.
- Insider trading, securities fraud, bucket shop, forex scams: concerns (criminal) manipulation of the financial markets.
- Executive compensation: concerns excessive payments made to corporate CEO's.
- Bribery, kickbacks, facilitation payments: while these may be in the (short-term) interests of the company and its shareholders, these practices may be anti-competitive or offend against the values of society.

Ethics of human resource management

The ethics of human resource management (HRM) covers those ethical issues arising around the employer-employee relationship, such as the rights and duties owed between employer and employee.

- Discrimination issues include discrimination on the bases of age (ageism), gender, race, religion, disabilities, weight and attractiveness. See also: affirmative action, sexual harassment.
- Issues surrounding the representation of employees and the democratization of the workplace: union busting, strike breaking.
- Issues affecting the privacy of the employee: workplace surveillance, drug testing. See also: privacy.
- Issues affecting the privacy of the *employer*: whistle-blowing.

- Issues relating to the fairness of the employment contract and the balance of power between employer and employee: slavery, indentured servitude, employment law.
- Occupational safety and health.

Ethics of sales and marketing

Marketing which goes beyond the mere provision of information about (and access to) a product may seek to manipulate our values and behavior. To some extent society regards this as acceptable, but where is the ethical line to be drawn? Marketing ethics overlaps strongly with media ethics, because marketing makes heavy use of media. However, media ethics is a much larger topic and extends outside business ethics.

- Pricing: price fixing, price discrimination, price skimming.
- Anti-competitive practices: these include but go beyond pricing tactics to cover issues such as manipulation of loyalty and supply chains.
- Specific marketing strategies: green wash, bait and switch, shill, viral marketing, spam (electronic), pyramid scheme, planned obsolescence.
- Content of advertisements: attack ads, subliminal messages, sex in advertising, products regarded as immoral or harmful
- Children and marketing: marketing in schools.
- Black markets, grey markets.

Ethics of production

This area of business ethics deals with the duties of a company to ensure that products and production processes do not cause harm. Some of the more acute dilemmas in this area

arise out of the fact that there is usually a degree of danger in any product or production process and it is difficult to define a degree of permissibility, or the degree of permissibility may depend on the changing state of preventative technologies or changing social perceptions of acceptable risk.

- Defective, addictive and inherently dangerous products and services (e.g. tobacco, alcohol, weapons, motor vehicles, chemical manufacturing, bungeejumping).
- Ethical relations between the company and the environment: pollution, environmental ethics, carbon emissions trading
- Ethical problems arising out of new technologies: genetically modified food, mobile phone radiation and health.
- Product testing ethics: animal rights and animal testing, use of economically disadvantaged groups (such as students) as test objects.

Ethics of intellectual property, knowledge and skills

Knowledge and skills are valuable but not easily "ownable" objects. Nor is it obvious who has the greater rights to an idea: the company who trained the employee or the employee themselves? The country in which the plant grew, or the company which discovered and developed the plant's medicinal potential? As a result, attempts to assert ownership and ethical disputes over ownership arise.

- Patent infringement, copyright infringement, trademark infringement.
- Misuse of the intellectual property systems to stifle competition: patent misuse, copyright misuse, patent troll, submarine patent.

- Even the notion of intellectual property itself has been criticized on ethical grounds: see intellectual property.
- Employee raiding: the practice of attracting key employees away from acompetitor to take unfair advantage of the knowledge or skills they may possess.
- The practice of employing all the most talented people in a specific field, regardless of need, in order to prevent any competitors employing them.
- Bioprospecting (ethical) and biopiracy (unethical).
- Business intelligence and industrial espionage.

International business ethics and ethics of economic systems

The issues here are grouped together because they involve a much wider, global view on business ethical matters.

International business ethics

While business ethics emerged as a field in the 1980s, international business ethics did not emerge until the 2000s, looking back on the international developments of that decade. Many new practical issues arose out of the international context of business. Theoretical issues such as cultural relativity of ethical values receive more emphasis in this field. Other, older issues can be grouped here as well. Issues and subfields include:

- The search for universal values as a basis for international commercial behavior.
- Comparison of business ethical traditions in different countries.

- Comparison of business ethical traditions from various religious perspectives.
- Ethical issues arising out of international business transactions; e.g. bioprospecting and biopiracy in the pharmaceutical industry; the fair trade movement; transfer pricing.
- Issues such as globalization and cultural imperialism.
- Varying global standards - e.g. the use of childlabor.
- The way in which multinationals take advantage of international differences, such as outsourcing production (e.g. clothes) and services (e.g. call centers) to low-wage countries.
- The permissibility of international commerce with pariah states.

Ethics of economic systems

This vaguely defined area, perhaps not part of but only related to business ethics, is where business ethicists venture into the fields of political economy and political philosophy, focusing on the rights and wrongs of various systems for the distribution of economic benefits. For example, the work of John Rawls is a notable contribution.

Theoretical issues in business ethics

Conflicting interests

Business ethics can be examined from various perspectives, including the perspective of the employee, the commercial enterprise, and society as a whole. Very often, situations arise in which there is conflict between one or more of the parties, such that serving the interest of one party is a detriment to the other(s). For example, a particular outcome might

be good for the employee, whereas, it would be bad for the company, society, or vice versa. Some ethicists (e.g., Henry Sidgwick) see the principal role of ethics as the harmonization and reconciliation of conflicting interests.

Ethical issues and approaches

Philosophers and others disagree about the purpose of a business in society. For example, some suggest that the principal purpose of a business is to maximize returns to its owners, or in the case of a publicly-traded concern, its shareholders. Thus, under this view, only those activities that increase profitability and shareholder value should be encouraged. Some believe that the only companies that are likely to survive in a competitive marketplace are those that place profit maximization above everything else. However, some point out that self interest would still require a business to obey the law and adhere to basic moral rules, because the consequences of failing to do so could be very costly in fines, loss of licensure, or company reputation. The economist Milton Friedman was a leading proponent of this view.

Other theorists contend that a business has moral duties that extend well beyond serving the interests of its owners or stockholders, and that these duties consist of more than simply obeying the law. They believe a business has moral responsibilities to so-called stakeholders, people who have an interest in the conduct of the business, which might include employees, customers, vendors, the local community, or even society as a whole. They would say that stakeholders have certain rights with regard to how the business operates, and some would even suggest that this even includes rights of governance.

Some theorists have adapted social contract theory to business, whereby companies become quasi-democratic associations, and employees and other stakeholders are given voice over a company's operations. This approach has become especially popular subsequent to the revival of contract theory in political philosophy, which is largely due to John Rawls' *A Theory of Justice*, and the advent of the consensus-oriented approach to solving business problems, an aspect of the "quality movement" that emerged. Professors Thomas Donaldson and Thomas Dunfee proposed a version of contract theory for business, which they call Integrative Social Contracts Theory. They posit that conflicting interests are best resolved by formulating a "fair agreement" between the parties, using a combination of i) macro-principles that all rational people would agree upon as universal principles, and, ii) micro-principles formulated by actual agreements among the interested parties. Critics say the proponents of contract theories miss a central point, namely, that a business is someone's property and not a mini-state or a means of distributing social justice.

Ethical issues can arise when companies must comply with multiple and sometimes conflicting legal or cultural standards, as in the case of multinational companies that operate in countries with varying practices. The question arises, for example, ought a company to obey the laws of its home country, or should it follow theless stringent laws of

the developing country in which it does business? To illustrate, United States law forbids companies from paying bribes either domestically or overseas; however, in other parts of the world, bribery is a customary, accepted way of doing business. Similar problems can occur with regard to child labor, employee safety, work hours, wages, discrimination, and environmental protection laws.

It is sometimes claimed that the Gresham's law of ethics applies in which bad ethical practices drive out good ethical practices. It is claimed that in a competitive business environment, those companies that survive are the ones that recognize that their only role is to maximize profits. On this view, the competitive system fosters a downward ethical spiral.

Business ethics in the field

Corporate ethics policies

As part of more comprehensive compliance and ethics programs, many companies have formulated internal policies pertaining to the ethical conduct of employees. These policies can be simple exhortations in broad, highly-generalized language (typically called a corporate ethics statement), or they can be more detailed policies, containing specific behavioral requirements (typically called corporate ethics codes). They are generally meant to identify the company's expectations of workers and to offer guidance on handling some of the more common ethical problems that might arise in the course of doing business. It is hoped that having such a policy will lead to greater ethical awareness, consistency in application, and the avoidance of ethical disasters.

An increasing number of companies also require employees to attend seminars regarding business conduct, which often include discussion of the company's policies, specific case studies, and legal requirements. Some companies even require their employees to sign agreements stating that they will abide by the company's rules of conduct.

Many companies are assessing the environmental factors that can lead employees to engage in unethical conduct.

Not everyone supports corporate policies that govern ethical conduct. Some claim that ethical problems are better dealt with by depending upon employees to use their own judgment.

Others believe that corporate ethics policies are primarily rooted in utilitarian concerns, and that they are mainly to limit the company's legal liability, or to curry public favor by giving the appearance of being a good corporate citizen. Ideally, the company will avoid a lawsuit because its employees will follow the rules. Should a lawsuit occur, the company can claim that the problem would not have arisen if the employee had only followed the code properly.

Sometimes there is disconnection between the company's code of ethics and the company's actual practices. Thus, whether or not such conduct is explicitly sanctioned by management, at worst, this makes the policy duplicitous, and, at best, it is merely a marketing tool.

To be successful, most ethicists would suggest that an ethics policy should be:

- Given the unequivocal support of top management, by both word and example.
- Explained in writing and orally, with periodic reinforcement.
- Doable ...something employees can both understand and perform.
- Monitored by top management, with routine inspections for compliance and improvement.
- Backed up by clearly stated consequences in the case of disobedience.
- Remain neutral and nonsexist.

Ethics officers

Ethics officers (sometimes called "compliance" or "business conduct officers") have been appointed formally by organizations. One of the catalysts for the creation of this new role was a series of fraud, corruption and abuse scandals that afflicted the U.S. defense industry at that time. This led to the creation of the Defense Industry Initiative (DII), a pan- industry initiative to promote and ensure ethical business practices. The DII set an early benchmark for ethics management in corporations. The Ethics & Compliance Officer Association (ECOA) -- originally the Ethics Officer Association (EOA) -- was founded at the Center for Business Ethics (at Bentley College, Waltham, MA) as a professional association for those responsible for managing organizations' efforts to achieve ethical best practices. The membership grew rapidly (the ECOA now has thousands of members) and was established as an independent organization.

Another critical factor in the decisions of companies to appoint ethics/compliance officers was the passing of the Federal Sentencing Guidelines for Organizations in 1991, which set standards that organizations (large or small, commercial and non-commercial) had to follow to obtain a reduction in sentence if they should be convicted of a federal offense. Although intended to assist judges with sentencing, the influence in helping to establish best practices has been far-reaching.

In the wake of numerous corporate scandals (affecting large corporations like Enron, WorldCom and Tyco), even small and medium-sized companies have begun to appoint ethics' officers. They often report to the Chief Executive Officer and are responsible for assessing the ethical implications of the company's activities, making recommendations regarding the company's ethical policies, and disseminating information to employees. They are particularly interested in uncovering or preventing unethical and illegal actions. This trend is partly due to the Sarbanes-Oxley Act in the United States, which was enacted in reaction to the above scandals. A related trend is the introduction of risk assessment officers that monitor how shareholders' investments might be affected by the company's decisions.

The effectiveness of ethics officers in the marketplace is not clear. If the appointment is made primarily as a reaction to legislative requirements, one might expect the efficacy to be minimal, at least, over the short term. In part, this is because ethical business practices result from a corporate culture that consistently places value on ethical behavior, a culture and climate that usually emanates from the top of the organization. The mere establishment

of a position to oversee ethics will most likely be insufficient to inculcate ethical behavior: a more systemic programmer with consistent support from general management will be necessary.

The foundation for ethical behavior goes well beyond corporate culture and the policies of any given company, for it also depends greatly upon an individual's early moral training, the other institutions that affect an individual, the competitive business environment the company is in and, indeed, society as a whole.

Religious views on business ethics

The historical and global importance of religious views on business ethics is sometimes underestimated in standard introductions to business ethics. Particularly in Asia and the Middle East, religious and cultural perspectives have a strong influence on the conduct of business and the creation of business values.

Examples include:

- Islamic banking, associated with the avoidance of charging interest on loans.
- Traditional Confucian disapproval of the profit-seeking motive.

Related disciplines

Business ethics should be distinguished from the philosophy of business, the branch of philosophy that deals with the philosophical, political, and ethical underpinnings of

business and economics. Business ethics operates on the premise, for example, that the ethical operation of a private business is possible -- those who dispute that premise, such as libertarian socialists, (who contend that "business ethics" is an oxymoron) do so by definition outside of the domain of business ethics proper.

The philosophy of business also deals with questions such as what, if any, are the social responsibilities of a business; business management theory; theories of individualism vs. collectivism; free will among participants in the marketplace; the role of self interest; invisible hand theories; the requirements of social justice; and natural rights, especially property rights, in relation to the business enterprise.

Business ethics is also related to **political economy,** which is economic analysis from political and historical perspectives. Political economy deals with the distributive consequences of economic actions. It asks who gains and who loses from economic activity, and is the resultant distribution fair or just, which are central ethical issues.

Marketing ethics

Marketing ethics is the area of applied ethics which deals with the moral principles behind the operation and regulation of marketing. Some areas of marketing ethics (ethics of advertising and promotion) overlap with media ethics.

Fundamental issues in marketing ethics

Frameworks of analysis for marketing ethics

Possible frameworks:

- Value-orientated framework, analyzing ethical problems on the basis of the values which they infringe (e.g. honesty, autonomy, privacy, transparency). An example of such an approach is the AMA Statement of Ethics.
- Stakeholder-orientated framework, analyzing ethical problems on the basis of which they affect (e.g. consumers, competitors, society as a whole).
- Process-orientated framework, analyzing ethical problems in terms of the categories used by marketing specialists (e.g. research, price, promotion, placement).

None of these frameworks allow, by themselves, a convenient and complete categorization of the great variety of issues in marketing ethics.

Power-based analysis

Contrary to popular impressions, not all marketing is adversarial, and not all marketing is stacked in favor of the marketer. In marketing, the relationship between producer/consumer or buyer/seller can be adversarial or cooperative. For an example of cooperative marketing, see relationship marketing.

If the marketing situation is adversarial, another dimension of difference emerges, describing the power balance between producer/consumer or buyer/seller. Power may be

concentrated with the producer (*caveat emptor*), but factors such as over-supply or legislation can shift the power towards the consumer (*caveat vendor*). Identifying where the power in the relationship lies and whether the power balance is relevant at all are important to understanding the background to an ethical dilemma in marketing ethics.

Is marketing inherently evil?

A popularize anti-marketing stance commonly discussed on the blogosphere and popular literature is that any kind of marketing is inherently evil. The position is based on the argument that marketing necessarily commits at least one of three wrongs:

- Damaging personal autonomy. The victim of marketing in this case is the intended buyer whose right to self-determination is infringed.
- Causing harm to competitors. Excessively fierce competition and unethical marketing tactics are especially associated with saturated markets.
- Manipulating social values. The victim in this case is society as a whole, or the environment as well. The argument is that marketing promotes consumerism and waste. See also: affluenza, ethical consumerism, anti-consumerism.

Specific issues in marketing ethics

Market research

Ethical danger points in market research include:

- Invasion of privacy.

- Stereotyping.

Stereotyping occurs because any analysis of real populations needs to make approximations and place individuals into groups. However if conducted irresponsibly, stereotyping can lead to a variety of ethical undesirable results. In the AMA Statement of Ethics, stereotyping is countered by the obligation to show respect ("acknowledge the basic human dignity of all stakeholders").

Market audience

Ethical danger points include:

- Targeting the vulnerable (e.g. children, the elderly).
- Excluding potential customers from the market: selective marketing is used to discourage demand from undesirable market sectors or disenfranchise them altogether.

Examples of **unethical market exclusion** or selective marketing are past industry attitudes to the gay, ethnic minority and obese ("plus-size") markets. Contrary to the popular myth that ethics and profits do not mix, the tapping of these markets has proved highly profitable. For example, 20% of US clothing sales are now plus-size. Another example is the selective marketing of health care, so that unprofitable sectors (i.e. the elderly) will not attempt to take benefits to which they are entitled. A further example of market exclusion is the pharmaceutical industry's exclusion of developing countries from AIDS drugs.

Examples of marketing which unethically targets the **elderly** include: living trusts, time share fraud, mass marketing fraud and others. The elderly hold a disproportionate amount of the world's wealth and are therefore the target of financial exploitation.

- In the case of **children**, the main products are unhealthy food, fashion ware and entertainment goods. Children are a lucrative market: "...children 12 and under spend more than $11 billion of their own money and influence family spending decisions worth another $165 billion", but are not capable of resisting or understanding marketing tactics at younger ages ("children don't understand persuasive intent until they are eight or nine years old"). At older ages competitive feelings towards other children are stronger than financial sense. The practice of extending children's marketing from television to the school ground is also controversial.

Other **vulnerable audiences** include emerging markets in **developing countries**, where the public may not be sufficiently aware of skilled marketing ploys transferred from developed countries, and where, conversely, marketers may not be aware how excessively powerful their tactics may be. See Nestle infant milk formula scandal. Another vulnerable group is **mentally unstable** consumers. The definition of vulnerability is also problematic: for example, when should indebtedness be seen as vulnerability and when should "cheap" loan providers be seen as loan sharks, unethically exploiting the economically disadvantaged?

Pricing ethics

Unethical pricing practices include:

- price fixing
- price skimming
- price discrimination
- variable pricing
- predatory pricing
- supra competitive pricing
- price war
- bid rigging
- dumping (pricing policy)

Ethics in advertising and promotion

Advertising Content

Ethical pitfalls in advertising and promotional content include:

- Issues over truth and honesty. In the 1940's and 1950's, tobacco used to be advertised as *promoting* health. Today an advertiser who fails to tell the truth not only offends against morality but also against the law. However, the law permits "puffery" (a legal term). The difference between mere puffery and fraud is a slippery slope: "The problem... is the slippery slope by which variations on puffery can descend fairly quickly tolies."
- Issues with violence, sex and profanity. Sexual innuendo is a mainstay of advertising content, and yet is also regarded as a form of sexual harassment.

Violence is an issue especially for children's advertising and advertising likely to be seen by children.

- Taste and controversy. The advertising of certain products may strongly offend some people while being in the interests of others. Examples include feminine hygiene products, hemorrhoid and constipation medication. The advertising of condoms has become acceptable in the interests of AIDS prevention but is nevertheless seen by some as promoting promiscuity. Some companies have actually marketed themselves on the basis of controversial advertising. Sony has also frequently attracted criticism for unethical content (portrayals of Jesus which infuriated religious groups; racial innuendo in marketing black and white versions of its PSP product; graffiti adverts in major US cities).
- Negative advertising techniques, such as attack ads. In negative advertising, the advertiser highlights the disadvantages of competitor products rather than the advantages of their own. The methods are most familiar from the political sphere: see negative campaigning.

Delivery channels

- Direct marketing is the most controversial of advertising channels, particularly when approaches are unsolicited. TV commercials and direct mail are common examples. Electronic spam and telemarketing push the borders of ethics and legality more strongly.
- Shills and astroturfers are examples of ways for delivering a marketing message under the guise of independent product reviews and endorsements, or creating

supposedly independent watchdog or review organizations. For example, fake reviews can be published on Amazon. Shills are primarily for message-delivery, but they can also be used to drive up prices in auctions, such as Ebay auctions.

Business ethics are just as important today as ever and employers, managers and employees alike all should take an active role in maintaining integrity, social responsibility and accountability in promoting ethical behaviors within the workplace, whether to customers, fellow employees or management.

Contracts

Contracts are used in virtually every industry and present in all types of business transactions, whether big or small, and can be both written or verbal agreements.

Definition of a Contract

A contract is a legally enforceable agreement between two or more parties with mutual obligations. Contract law is usually regulated by the state *Common Law*. However, there may be state-specific variations of precise court interpretations of a certain component of the Contract. The terminology in italics throughout this lesson signifies the official, universal legal terminology used throughout the United States. Before we study the formation of a contract, we will look at the types of contracts.

Types of Contracts

Implied Contract

An implied contract relies on the conduct of each party and shows that they agree. For example, Emily selects items from the salad bar from Michelle's local deli. This is a contract for the purchase and sale of the

salad ingredients.

Express Contract

In this type of contract, the agreement is either verbal or written. The terms are communicated using language. For example, Owen agrees to paint Tim's fence and Tim will pay him $100.

Unilateral Contract

A unilateral contract can be understood by the definition. One person undertakes an offer by carrying out a requested service. It is imperative that the terms plainly indicate that performance is required for the offer to be accepted. For example, Kyle tells Jeremy that he will pay Jeremy $300 to install his new hardwood flooring. Jeremy demonstrates his acceptance of the bid by the physical act of installing the flooring.

Bilateral Contract

This type of contract is demonstrated in our shelving scenario below. A company or an individual agrees to an offer by assuring to accomplish the requested act. It involves two parties carrying out the request. For example, Company D offers to purchase 100 office copiers from Company E for $3000. Company E promises to deliver the copiers to Company D.

Contract Formation

The formation of a contract usually occurs in three parts:

- considering the deal
- coming to an arrangement
- execution and enforcement

Considering the deal occurs when the parties contemplate the benefits and the risks of the pact while gaining trust or sometimes lack of trust for the other individual.

Mutual assent is the formal term for coming to an agreement. It is the second step in this formation process but is the first step in creating an agreement as you will understand in length in a following section. Mutual assent occurs when the parties agree either verbally or in writing to the terms presented by each party.

Finally, ***execution and enforcement*** are ongoing occurrences as the parties perform the mutually decided obligations per the contract. If one party neglects to adhere to the agreed terms, they are in *breach of contract*. A civil lawsuit may be necessary to recover damages or enforce the established contract.

In a *breach of contract*, meaning the promise or agreement is broken by one of the parties, the law furnishes remedies to the party who was harmed. These remedies vary according to the promise. A common remedy for breach of contract is monetary damages, but there are others depending upon the situation which will be discussed in a later section.

Contract Validity

There are four fundamental components required for a valid contract. These legally enforceable components are as follows: ***mutual assent***, conveyed by a legitimate *offer and acceptance*; ample deliberation, more commonly known as ***consideration***; ***capacity***; and ***legality***. A lawful alternative can be used to satisfy a fundamental component in some states such as using the terms: agreement, capacity, consideration, and intention as the four fundamental components.

Additionally, there are four potential solutions for *breach of contract* including: *general damages, reliance damages, consequential damages,* and *specific performance* which we will discuss in detail below.

Statute of Frauds

Before we continue with the validity of contracts, we will define Statute of Frauds and what it signifies in Contract Law. Throughout this lesson, you will learn that verbal contracts are valid and enforceable. However, there are certain agreements that must be written to be enforceable. These types are:

- *The sale or transfer of land*
- *Contracts that answer for the debt or duty of another individual*
- *Agreements made in consideration of marriage*
- *A contract which has terms that it cannot be completed in one year*
- *Certain contracts for the sale of goods worth more than $500, which is subject to the Uniform Commercial Code.*

Mutual Assent

In common law, mutual assent is typically reached through offer and acceptance, that is, when an offer is met

with an acceptance that is unqualified and that does not vary the offer's terms. Mutual assent is commonly known as a “meeting of the minds.” This signification that the parties agree on set terms is the first step in the contract process. Many courts rule that mutual assent creates an obligatory agreement, so it is an imperative first step in not only written agreements, but also verbal contracts. You will see in a moment the importance of this first step.

Offer and Acceptance

There are two key factors in mutual assent: *offer* and *acceptance*. The definition of an offer is a promise to perform or complete a matter for an item/incentive in return or not to perform or complete a matter for an item/incentive in return. To “sweeten the deal” as some may say, typically the item in return is valuable to the receiving party. Acceptance means that the other party agrees to execute the set conditions in the offer. The terms of both the offer and acceptance must be clear enough that a rational third party understands the conditions in case there would be later conflict. Real life situations can become convoluted. Sometimes the other party needs time to think about the offer or shop around if the contract involves merchandise. Conversely, the selling party may change their mind about parting with the item. Counteroffers may cause conflict and confusion about the terms of the contract.

Following are two scenarios regarding mutual assent. Later, we will look at real case laws regarding this matter, but for instructional purposes, these scenarios will give you a thorough understanding of the concept.

Scenario # 1: Kayla was searching for a used vehicle on Facebook Marketplace. She found one that met her budget and her needs, so she contacted the owner, Justin, to look at the vehicle. Kayla brought her mechanic friend, Jacob, and the vehicle checked out fine. Then, after a test drive, Kayla decided to offer Justin $7500 for the vehicle. Justin accepted the offer and signed the vehicle's title over to Kayla along with giving her the keys. Thus, Kayla and Justin came to a mutual assent on the parameters of the vehicle purchase: the purchase price and the delivering of the vehicle. It is a cut and dry process: offer and acceptance. However, let us look at another situation in which the offer and acceptance is not so clear.

Scenario #2: Jennifer and Shawn are friends who go to lunch every Friday. One Friday, Jennifer tells Shawn that she has always dreamed of owning a farm. Shawn being exhausted from all the extra week he had the past week on his farm jokingly tells Jennifer that he will sell his farm to her for only $50,000. He has no idea Jennifer has just received a large sum of money and can easily pay said price. Additionally, Shawn has a reputation of having a great sense of humor, so he does not think Jennifer is taking him seriously. They write out the terms of the contract on the back of a paper placemat provided by the restaurant and sign their names signifying an agreement to sell the farm.  The next week at lunch as Jennifer was excitedly sharing with Shawn the details of moving to the farm, Shawn was completely shocked that

Jennifer had been serious the week prior. He had no intention of selling. If Jennifer wanted to pursue the sale of the farm, she rightfully could as the contract, even written on the back of a paper placement, would be considered legally binding because of the mutual consent by both Shawn and Jennifer signing an agreement to the contract's terms. Shawn could be required to adhere to the contract if a court ruled that Jennifer had

satisfactory confidence that the contract was valid.

The above scenarios help to provide a clear understanding of the first process in contract law: mutual assent. Valid cases dealing with this topic occur in our court systems regularly, and to prove such, we will view an opinion by Justice Hand in the case *Hotchkiss v. National City Bank.* "A contract has, strictly speaking, nothing to do with the personal or individual intent of the parties. A contract is an obligation attached by the mere force of law to certain acts of the parties, usually words, which ordinarily accompany and represent a known intent…et sequ."

If, however, it were proved by twenty bishops that either party, when he used the words, intended something else than the usual meaning which the law imposes upon them, he would still be held, unless there were some mutual mistake, or something else of the sort." Hotchkiss v. National City Bank, D.C., 200 F. 287, 293.

Consideration

Consideration, or ample delibreration, must be present when making a legal contract. Without consideration,

a contract cannot exist. A word to summarize consideration is “benefit.” As mentioned previously, there must be an incentive for the party in return for his agreement. Consideration might be money, items, or a promise to do something or not to do something as mentioned above.

Contracts vs. Gifts

Keep in mind, statements such as: “I will give you my computer.” is not a contract becasuse the giving party would not receive any benefit in return for giving away a possession. The same concept applies to a service. If your friend offered to help you fix your lawn mower, but then did not show up to do the task, you could not enforce the offer because you were not giving a benefit in return. However, if you offered to give your friend your computer in exchange for their help fixing your lawn mower, a contract would exist.

Capacity

It is important that all parties understand the terms of a contract. Understanding in this sense is an ability to understand obligations under the agreement. There are typically two situations in which a person lacks *capacity*: individuals who are under the influence of drugs and alcohol affecting the understanding of the contract execution. This incapacity also applies if the other party is aware of the individual’s incapacity. The

second situation applies to minors. Children under the age of eighteen lack the capacity to be a part of a contract process unless it is for food and clothing or education including an apprenticeship or employment. The terms must profit the minor and be reasonable. Additionally, a person cannot be forced into a contract agreement. There cannot be any misrepresentation, fraud, or undue influence. If an individual lacking capacity has already entered into an agreement, typically it must be the incapacitated individual who must decide if they want to nullify the contract.

An example of case law in a capacity ruling is: *Franklin v. Francis*, 144 F.3d 429, 433 (6th Cir. 1998). The court ruled that first a determination of the capacity of an individual in question must be found. Then, the court would need to decide if the person in question is "suffering from a mental disease, disorder, or defect which may substantially affect his capacity." Further, in *Summerhouse Condo v. Majestic Savings 44 Colo. App. 495 (Colo. App. 1980)*, Judge Coyte opines:" …**a party's personal right to come into court, and should not be confused with the question of whether a party has an enforceable right of interest or is the real party in interest. Generally, capacity is conceived of as a procedural issue dealing with the personal qualifications of a party to litigate and typically is determined without regard to the particular claim or defense being asserted."** 6 C. Wright A. Miller, Federal Practice Procedure § 1559 (1971). This opinion summarizes what we have just learned regarding capacity in the legal realm.

Equally, it is important to mention that corporations can enter contracts through authorized employees, corporation officers, and their agents. Usually, anyone associated

with the corporation is not presumed personally liable for the corporation's obligations, which includes a breach of contract. Therefore, representatives of corporations have the capacity to enter a contract but are usually not individually responsible if a breach occurs.

Legality

Legality is another component required for a valid contract. We hear this term often in respect to contracts, and business transactions in general, but we will take a closer look at the definition and what is required in contract law. A good definition for legality is a legal agreement in which commitments are agreed upon by both parties and can be enforced by the law. Previously, we discussed *consideration* and how it is applicable to contract law. Some states deem the component of consideration an adequate substitute for legality. If a contract is broken, also know as a breach of contract, the parties can expect the law to enforce the damages.

In the case of Barnes v. Helfenbein, 548 P.2d 1014, 1021 (Okla. 1976) the judge ruled, "Courts are concerned only with the legality of the contract. The fairness or unfairness, folly or wisdom, or inequality of contracts are questions exclusively within the rights of the parties to adjust at the time the contract is made."

Breach of Contract Remedies

There are different remedies for breach of contract. Award of damages, restitution, recission, and specific performance are used in the courts of the United States. Specific performance and rescission do not fall in the magistrate courts' jurisdiction as they are equitable remedies. Typically, an award of damages is used in courts which have restricted jurisdiction.

Award of Damages

Actual Damages

Actual damages are also referred to as compensatory damages. As the term indicates, the nonbreaching party is compensated for the damages incurred due to the breach of contract. The amount awarded to the nonbreaching party is meant to cover the loss by the broken agreement. The party who kept the agreement could be awarded one of two types of damages: general damages or special damages.

General Damages

These damages are also referred to as “compensatory damages.” They are the most common type awarded for a contract breach. These damages deal directly with loss due to the broken arrangement of the contract. Awards for general damages must be established with logical certainty. There are no special pleadings with general damages cases. They simply need proven at a trial. General damages apply to broken contacts between companies, but they also apply to expenses and injuries resulting from accidents as well. Medical expenses and other damages from a motor vehicle accident is an example of compensatory damages. At times, a challenge is involved in a court awarding general damages as they are based on the individualized circumstances of the case.

Pecuniary damages is the term used for compensatory damages settled with money. These damages can be calculated, and money given to the injured party. The plaintiff can utilize several ways to assess the monetary value such as: expert witnesses, comparable costs, and other means. Pecuniary damages would cover the loss of an injured party due to medical expenses resulting from an accident as well.

Following is a scenario to better understand the concept of breach of contract between two companies and possible examples of how the general damages would be awarded.

Scenario #1: Store A delivered the incorrect shelving units to Store B. A few hours after the delivery, Store B discovered the error and insisted that Store A pick up the incorrect shelving and deliver the correct shelving. Store A would not pick up the shelving units and claimed they could not deliver the correct units because they were back ordered. Store B sued Store A for breach of contract and won the suit. In this scenario, the general damages could be a monetary refund Store B paid for the shelving units; plus, a reimbursement of any cost Store B sustained in sending back the incorrect shelving units to Store A; plus, a monetary amount could be awarded for any cost increase Store B experienced while purchasing the correct shelving units from another supplier.

Special Damages

Special damages are also referred to as *consequential damages.* When circumstances are unpredictable or there are special conditions, these damages will cover the loss sustained by the breach of contract. The losses are not direct losses, but they are caused by the breach of contract. To acquire damages for consequential damages, the nonbreaching party must substantiate that the unique circumstances were known by the breaching party when the contract was created. For example, if we continue to use the scenario above, if Store A knew that Store B needed the shelving units on Tuesday because the old shelving units would be taken down on Monday night, the consequential damages could include the damages awarded in the last scenario plus reimbursement for Store B's expense in renting shelving units until the correct units

arrived. Another possibility would be compensation for closing the store on Tuesday because the inventory was on the floor!

Punitive Damages

The last type of damages we will discuss are punitive damages, which are also called exemplary damages. While compensatory damages are meant to cover real loss, exemplary damages are intended to prevent others from mimicking an individual who has acted fraudulently, willfully, or maliciously. Basically, punitive damages make an example out of a wrongdoer and punish them for reckless behavior. They are awarded punitive damages as well as compensatory damages. In contract law, you will rarely deal with punitive damages, but knowing the definition if they are awarded in a breach gives a helpful advantage in your understanding and execution of contract law, specifically breach of contract since punitive damages can accompany compensatory damages.

What is Arbitration?

Arbitration is important to discuss because the popularity of using qualified arbitrators to hear a dispute and render a decision saves costs and overload of the courts when compared to litigation. In contract law, arbitration is widely used. Arbitration is one of quite a few ADR methods. (Alternative Dispute Resolution) Alternative Dispute Resolutions give parties other choices besides litigation. The parties who use arbitration to have a decision rendered from a controversy relies on an impartial third party who is designated by the individuals involved in the dispute. The parties agree in advance to submit to the decision of the arbitrator after both sides have been heard. The parties can still present evidence and testimonies as they would in court, and instead of a judge's rendering, an arbitrator's decision is final. This finality needs to be noted because an arbitrator's decision is not likely to be overturned as some cases in litigation will go through an appeal's process. The decision is *binding.* The courts back up the arbitrator's decision rationalizing that the parties knew the risks associated with arbitration before entering into an agreement.

Arbitration can be required or voluntary. Historically, it was voluntary and linked with contract law. Contracts are written including language the parties will use arbitration rather than litigation if a dispute arises. A chief example of arbitration in contracts is concerning labor unions. In official negotiations, employers and unions typically place an arbitration agreement in their contracts. These are known as *collective bargaining agreements.* With this agreement in place, the employee agrees to use an arbitrator to handle any grievances: job security, working conditions, wages, etc. In short, the employee is agreeing not

to sue the employer. In fact, as far back as 1991, the U.S. Supreme Court held that claims of age discrimination can be heard by an arbitrator. *Gilmer v. Inter-state/Johnson Lane Corp.,* 500 U.S. 20, 111 S. Ct. 1647, 114 L. Ed. 2d 26. Justice Byron R. White who was writing for the majority, concluded that "arbitration is as effective as a trial for resolving employment disputes." This decision caused several large employers to implement arbitration in employment claims.

It is the norm for employment contracts to contain an arbitration clause now. New hires expect it, and typically do not disagree with signing such a clause.

Many businesses who dispute a contract will hire an arbitrator to hear the case instead of taking the case to court. An example of a mandatory arbitration, which has significantly grown in popularity, is auto insurance claims. Minnesota, New York, and New Jersey are a few examples of states who have already implemented this process, and it is expected that more states will follow. In contract law, it is likely you will be exposed to some element of an arbitration process.

Arbitration has numerous advantages such as being quicker, easier, and cheaper. Additionally, arbitrators do not need to be an attorney. They can be a lawyer, but sometimes they are chosen for their knowledge of a business practice, etc. Also, arbitrators are not bound by legal precedent. They have more freedom in rendering decisions and are not required to give explanations to support their awards. Of course, because of this freedom, many individuals feel that the quality of justice is hindered, but arbitration hearings are

becoming much more formal, and some hearings resemble a complex litigation hearing.

Boilerplate

When lawyers refer to a *boilerplate* provision, they are referring to any standardized, "one size fits all" contract provision. However, attorneys also use the term in a narrower context to refer to certain provisions that appear at the end of the contract. Typically, these provisions tell the parties how to govern their relationship and administer the contract. Although often thought to be of secondary importance, these provisions have significant business and legal consequences. Attorneys use boilerplates regularly when creating a contract. Documents encompass *boilerplate language.* This language is deemed standard or generic. The language can be repeated in contracts of the same subject, which is a valuable time saver and generates consistency.

Because boilerplates are standard, anyone can search, download, and print a boilerplate contract for numerous situations. Access to electronic boilerplates is a huge step forward in contract law. It is a benefit to the public who are not familiar with legal terminology and want to enter a contract as they can use a standard boilerplate to fit their needs. Common boilerplates that can be found electronically are: Power of attorney designations; terms and conditions; medical consent; photography and media permission contracts used frequently for minors; and a host of other forms for various situations.

Negotiations

We have studied the types of contracts, the contract process, and breach of contract remedies. In most contract situations, negotiations are inevitable. There are those instances when you log on to a new website and see terms of services commonly called “click-agree” agreements. You skim through the terms, then click and proceed with your task. In contract law, taking the time to read and understand the terms is imperative. Then, if there are terms which need negotiated, clearly modify those terms so that the other party can

understand what you wish to change or negotiate.

There are some *non-negotiable* parts of a contract which are important to know:

- Location or *Jurisdiction*- For example, if you live in Texas, but work in Arizona, the contract created at your place of employment will be the jurisdiction settling the dispute.

- *Notice*- A contract will almost always include a *Notice* term. This contains information of who and where an individual can be reached in the event of changes. Always make certain the information is correct.

- *Assignment*- Typically a contract contains a clause that bans the assignment of the contract. If the negotiations are with a company, many times the other party can assign it without approval or notice from you, but you may not do the same. This sounds harsh, but from a business perspective, that company's brand creates agreements with hundreds of other companies and does not want the hassle of getting permission before assigning an agreement for purposes related to business. However, since the company is entering into a contract with you or your company specifically, they do not want you trading places with another company or individual.

There are conditions and terms that will directly affect your compensation, relationship with the other party, and extent of work. These are:

- *Intellectual Property*- Reading this provision will answer the question of: "Who owns it?" Also, what is the "it" in the contract. Social media, particularly blogs and vlogs, have made this an

important piece of negotiations. You must know if you are giving up rights to anything or if you use posts or images on your website, will you be in breach if they are copyrighted? Will the other party be able to use your images and posts without citing your name or providing a direct link to you? *Work for Hire*, is an official legal term which deals with Copyright and which terms and conditions must be me

ï *Non -Compete*- A non-compete clause is a provision that limits your ability to work for a competitor. You should pay attention to the location, length of time the clause is valid, and extent. For example, if you are the owner of a real estate company, you can include a non-compete clause in the relators' contracts stating that if they leave your company, they will not work for another real estate agency for a certain number of years within a designated mile radius. This clause protects you and the agency from the chance of the former broker taking clients to another firm. Perhaps the validity time needs negotiated, or the location needs shortened to a shorter radius. Likewise, if you are hired at a company concerned with competition, you may be asked to sign a non-compete clause. Review the language carefully. Non-competes are common in countless professions.

ï *Scope*- Define the extent of work you are willing to do. If you are drafting the contract for someone you are hiring, clearly define your expectations. Look for any vague clauses and modify to make them clearer. The more detailed the scope is defined, there is lesser room for miscommunication on job duties.

- *Compensation*- Compensation is typically expected to be negotiable. However, make certain the terms of compensation are written clearly. Does the compensation only include income? How will the compensation be reported for tax purposes? These are valid conditions in which can be negotiated.

- *Parties*- Who is liable for this contract? The term "party" or "parties" is often used in contract law because the term can be used for an individual (s) or a business. Sometimes you may work with an individual and be unaware that they are affiliated with a business. Make certain the contract is between the correct entity. Is the agreement with a person or a business? Ensure that the individual or company's address is in the contract. For jurisdiction purposes as mentioned above, include the state where the contract was created. Use the name of the company if it is a business or the name of the individual if you are entering into an agreement with a person. Understand the legal ramifications if you and your company are both listed on the contract. Negotiate the terms if needed. Also, the contract should include what type of business the company is so that you are not personally sued.

ï *Dispute Resolution*- Finally, as mentioned previously, there are different ways to solve a dispute if you are unable to work out the disagreement with the other party. As previously mentioned, more individuals and companies are using arbitration as the means for solving the issue. Arbitration and mediation are two alternative ways of resolving conflict if you prefer not to go through the court system. There are mixed viewpoints on *Alternative Dispute Resolution* programs. Decide which route is best for you and negotiate with the other party how a problem would be resolved if such arises.

Utlizitation of Contracts

Individuals enter into contract agreements regularly, sometimes unaware that their agreement is considered a contract as in the case of an implied contract. Despite your profession, education, or other socioeconimic factors, you will be exposed and involved in the contract process numerous times throughout your lifetime.

We have covered the basics of contract law to lay a foundational knowlege to implement these elements in decision making at different levels. These tools will be helpful in order to create a contract as well as understand how to enter into an agreement effectively. These terms and practices can be implemented in a work environment as well as personal affairs. If needed, you can execute the remedies of breach of contract and explore arbitration options. The components of negotiation have been presented in order to be aware of which portions of an agreement cannot be negotiated. Understanding the four elements which make a contract valid, knowing the definition of a boilerplate, how to access it and effectively executing other contractual strategies when entering into agreements, whether formally or informally will be an asset in avoiding common pitfalls and potential legal and costly ramications.

Tool Safety & Hazard Prevention for Contractors

Safety hazards related to hand and power tools are addressed in specific standards for the general industry, and the construction industry. The Occupational Safety and Health Administration (OSHA) standards for the construction industry describes in detail safety standards with regards to the use of hand and power tools.

Working with tools poses many benefits while at the same time increases exposure to hazards so it's important to consider ways to minimize the risk of injuries by using personal protective equipment (PPE) and through proper use of tools. In order to ensure a safe work environment.

However, it is very important for employees to be able to identify specific hazards that accompany various types of tools and understand precautionary measures that can be taken to mitigate risk of injury.

For hazard prevention resulting from the use of hand and power tools, there are some basic safety protocols that should be taken:

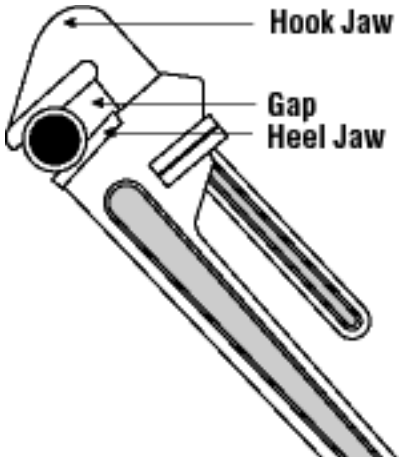
- Maintain tools with regular checks that they are in good condition
- Inspect every tool prior to use to ensure it is in good shape and not in need of repair
- Properly use the best tool for the specific task at hand
- Read the instructions provided by the manufacturer before using a tool and operate accordingly
- Personal Protective Equipment (PPE) should be used at all times

Hand Tools

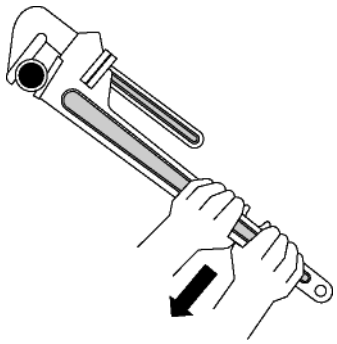
Wrenches, Cutters, Reamers, and Threaders

Pipe tools are made in various shapes and sizes and for many uses. Always use the correct tool for the job.

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles), when necessary.
- Select a pipe wrench with sufficient capacity and leverage to do the job.
- Use a pipe wrench to turn or hold a pipe. Never use a pipe wrench to bend, raise or lift a pipe.
- Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.



- Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
- Keep pipe wrench teeth clean and sharp.
- Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
- Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.



Things to Avoid Doing When Using Pipe Wrenches

- Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
- Do not use pipe wrenches on nuts and bolts.
- Do not use a pipe extender for extra leverage. Get a larger pipe wrench.

Safety Tips for Using Cutters, Reamers and Threaders

- Replace pipe cutter wheels which are nicked or otherwise damaged.
- Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
- Choose a cutting wheel suitable for cutting the type of pipe material required:
    - Thin wheel for cutting ordinary steel pipe.

    - Stout wheel for cutting cast iron.
    - Other wheels for cutting stainless steel, plastic and other materials.
- Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.
- Use a proper tap wrench (with a "T" handle) for turning a tap.
- Use lubricant or machine cutting fluid with metals other than cast iron.

Things to Avoid When Using a Pipe Tool

- Do not allow chips to clog the flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning - this may result in the tap breaking if you continue to apply pressure.
- Do not use a conventional adjustable wrench for turning a tap - it will cause uneven pressure on the tap that may cause it to break.
- Do not attempt to thread hardened steel. This can chip or damage the die.
- Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
- Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

Power Tools

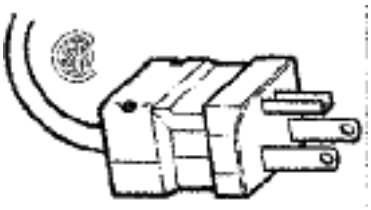
Inspection

- Inspect tools for any damage prior to each use.
- Check the handle and body casing of the tool for cracks or other damage.
- If the tool has auxiliary or double handles, check to see that they installed securely.
- Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- Check for damaged switches and ones with faulty trigger locks.
- If a tool is defective, remove it from service, and tag it clearly "Out of service for repair".
- Replace damaged equipment immediately – do not use defective tools "temporarily".
- Have tools repaired by a qualified person – do not attempt field repairs.

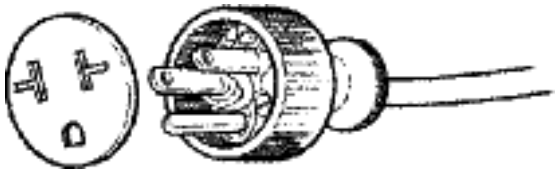
Guidelines for Using Power Tools

- Ensure that you have been properly trained to use the tool safely. Read the operator's manual before using the tool and operate the tool according to the manufacturer's instructions. Use only tested and approved tools.
- Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.

- Prevent shocks. Ensure that the tools are properly grounded using a three-prong plug, are double-insulated (and are labelled as such), or are powered by a low-voltage isolation transformer: this will protect users from an electrical shock.
- Check electric tools to ensure that a tool with a 3-prong plug has an approved 3-wire cord and is grounded. The three-prong plug should be plugged in a properly grounded 3-pole outlet. If an adapter must be used to accommodate a two-hole receptacle, the adapter wire must be attached to a known, functioning ground. NEVER remove the third, grounding prong from a plug.



- Replace open front plugs with dead front plugs. Dead front plugs are sealed and present less danger of shock or short circuit.



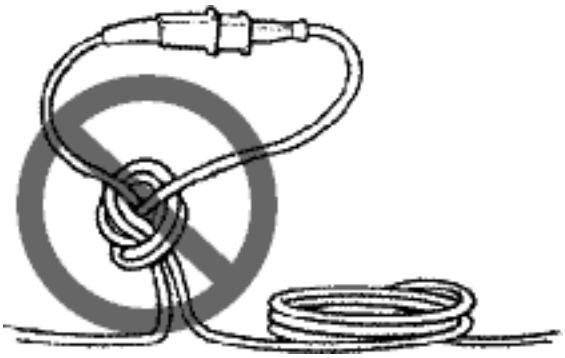
- Have a qualified electrician install a polarized outlet if the polarized, two-prong plug of a double-insulated tool does not fit in a two-hole receptacle. Double insulated tools use plugs having one prong that is visibly wider than the other.
- Test all tools for effective grounding with a continuity tester or a ground fault circuit interrupter (GFCI) before use.
- Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.
- Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.
- Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.
- Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting the battery and possibly cause sparks, fires or burns.

- Wear or use personal protective equipment (PPE) or clothing that is appropriate for the work you are doing; this may include items such as safety glasses or goggles, or a face shield (with safety glasses or goggles), hearing protection, dust mask, gloves, safety boots or shoes, or rubber boots.
- Switch off the tools before connecting them to a power supply.
- If a power cord feels more than comfortably warm or if a tool is sparking, have it checked by an electrician or other qualified person.
- Disconnect the power supply before making adjustments or changing accessories.
- Remove any wrenches and adjusting tools before turning on a tool.
- Inspect the cord for fraying or damage before each use. Tag defective tools clearly with an "Out of service" tag and replace immediately with a tool in good running order.
- During use, keep power cords clear of tools and the path that the tool will take.
- Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.
- Use only approved extension cords that have the proper wire size (gauge) for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.
- For outdoor work, use outdoor extension cords marked "W-A" or "W".
- Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
- Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.
- Pull the plug, not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug and cause electrical shock to the operator.
- Follow good housekeeping procedures – keep the work area free of clutter and debris that could be tripping or slipping hazards.
- Keep power cords away from heat, water, oil, sharp edges and moving parts. They can damage the insulation and cause a shock.
- Ensure that cutting tools, drill bits, etc. are kept sharp, clean and well maintained.
- Store tools in a dry, secure location when they are not being used.

Things to Avoid When Using Power Tools

- Do not wear gloves, loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection to prevent hair from getting caught in moving parts of equipment.
- Do not use a tool unless you have been trained to use it safely and know its limitations and hazards.
- Avoid accidental starting by ensuring the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.

- Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.
- Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.
- Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.
- Do not use electric tools in wet conditions or damp locations unless tool is connected to a ground fault circuit interrupter (GFCI).
- Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood of electric shock.
- Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.
- Do not plug several power cords into one outlet by using single-to-multiple outlet adapters or converters ("cube taps").
- Do not use light duty power cords.
- Stop using an electric power tool if you feel a tingle in your fingers. This is a warning that the tool is faulty and needs repair.
- Do not connect or splice extension cords together to make a longer connection: the resulting extension cord may not be able to provide sufficient current or power safely.
- Do not carry electrical tools by the power cord.
- Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.



- Never break off the third prong on a plug: replace broken 3-prong plugs and make sure the third prong is properly grounded.
- Never use extension cords as permanent wiring: use extension cords only as a temporary power supply to an area that does not have a power outlet.
- Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.

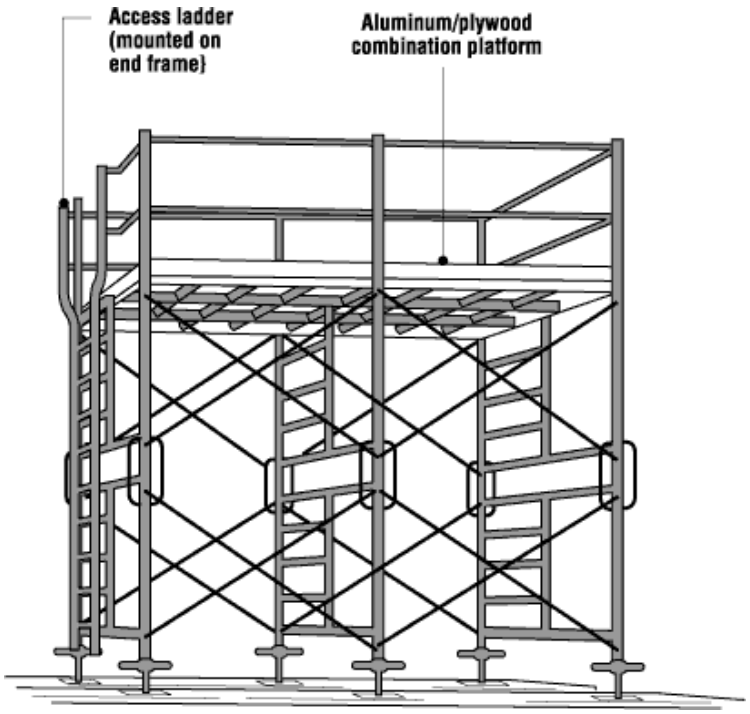
- Do not brush away sawdust, shavings or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.
- Do not operate tools in an area containing explosive vapors or gases.
- Do not clean tools with flammable or toxic solvents.
- Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.

Scaffold Use

Install, inspect, maintain and repair scaffolding in accordance with standards, regulations, and manufacturer's instructions.

Check the following before using scaffolding and inspect on an regular basis:

- the base is sound, level and adjusted,
- legs are plumb and all braces are in place,
- locking devices and ties are secured,
- cross members are level,
- planks are of the proper grade(s) of lumber and have no weak areas, deterioration, or cracks.
- planks, decks and guardrails are installed and secure,
- keep a log of inspections and related items or repairs.



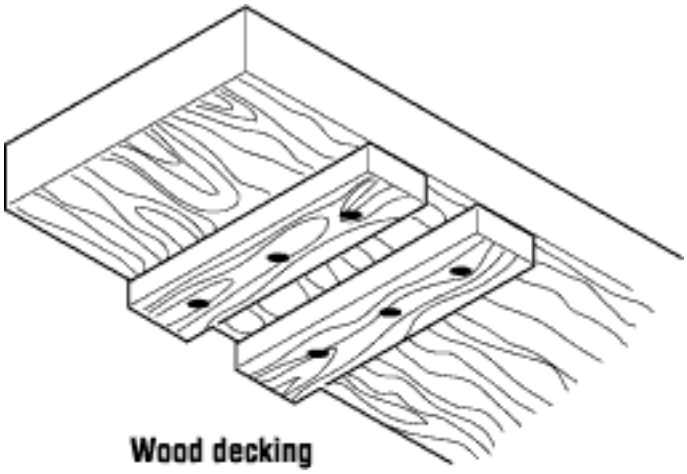
 Make sure all platforms above 2.4 meters (8 feet) are fully decked or at the height required by your jurisdiction.
 Use an access ladder, not the scaffold frame, unless it is specially designed to be climbed. Build a staircase if the scaffold will be used for a length of time.
 Build a rest platform for every 10 m (30 ft) in height beside the ladder.
 Remove snow and ice from scaffold platforms, ladders and access areas.
 Ensure that scaffold is securely attached to the building structure. Check requirements in the legislation applicable to your jurisdiction.
 Provide adequate ventilation for the work done inside the scaffold if the scaffold is completely hoarded. Note also that effects from winds increase when scaffolds are covered (hoarded).
 Make sure scaffold planks are in good condition and are cleated properly.
 Make sure the planks have an appropriate amount of overhang – too much and the planks may tip, and too little and the planks may slip off.
 Use all of the components required, including base plates, connections, braces, and securing devices (e.g., “banana” clips, “pig tails”, tie-ins, etc.)
 Protect all planked or working levels with proper guardrails, mid rails and toe boards along all open sides and at the ends of scaffold platforms.
 Replace any guardrails that were removed while hoisting materials. Wear fall protection until guardrails are reinstalled.

Things to Avoid When Using Scaffolding

- Do not use a scaffold without guardrails.
- Do not load in excess of its rated working load.
- Do not jump on planks or platforms.
- Do not force braces to fit. Level the scaffold until a proper fit can be made easily.
- Do not climb or stand on cross braces or guardrails.
- Do not work on scaffolds during storms or high winds.
- Do not use ladders or makeshift devices on top of scaffolds to increase height.
- Do not overload scaffold frames or platforms.
- Do not load in a way that affects its stability.
- Do not rest materials or equipment on guardrails.
- Do not try to repair bent or kinked frames. Throw them out.
- Do not work below a scaffold without head protection.
- Do not roll a scaffold while workers are on the platform.
- Do not use scaffolds near electrical wires.

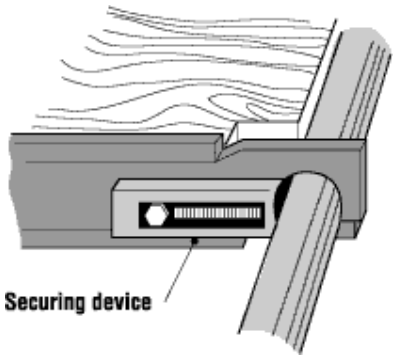
Scaffolding Decks

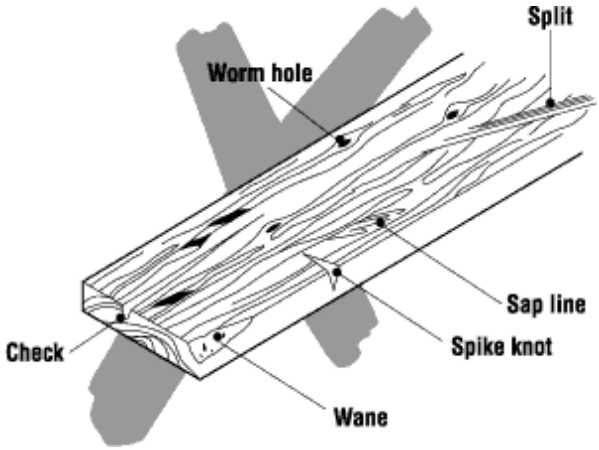
- Use wooden and metal decks according to job requirements, standards, occupational health and safety regulations and manufacturer's instructions.



Wood decking

- Only cleat planks at the ends to prevent lengthwise movement. Wiring down planks can also prevent movement, provided wire does not create a tripping hazard. Where planks overlap, rest the cleated end on the support. Do not use cleats elsewhere on the plank to prevent splitting.





- Make sure that adjoining planks are of uniform thickness for an even platform.
- Lay planks side by side across the full width of the scaffold.
- Check scaffold planks for large knots, worm holes, steeply sloping grain at the edges, spike knots, and splits. Splits wider than 10 mm (3/8 in), lengthwise closer than 75 mm (3 in.) to the edge of the plank, or lengthwise longer than ½ the length of the plank are not acceptable. Discard immediately any planks showing these or other defects.
- Check hooks and hardware of prefabricated platform units regularly for looseness, distortion and cracks. Damage can occur if the platforms are dropped or thrown.
- Clean ice, snow, oil and grease off planks. Platform decks should be slip-resistant and should not accumulate water.
- Inspect planks on a regular basis while on the scaffold. Weather, rot, and general use can deteriorate the planks.
- Do not jump on the planks to test their strength. Jumping can cause undetectable damage.

Working in **Awkward Positions**, or Performing **Awkward Manual Tasks**

Work-related musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, and nerves. Carpal tunnel syndrome, tendonitis, thoracic outlet syndrome, and tension neck syndrome are examples.

For the purpose of developing injury prevention strategies, many health and safety agencies include only disorders that develop gradually and are caused by the overuse of the above constituents of the musculoskeletal system. The traumatic injuries of the muscles, tendons and nerves due to accidents are not considered to be WMSDs or are considered separately.

This lesson will discuss those injuries resulting from overuse and those that develop over time. Work activities which are frequent and repetitive, or activities with awkward postures cause these disorders which may be painful during work or at rest.

Almost all work requires the use of the arms and hands. Therefore, most WMSD affect the hands, wrists, elbows, neck, and shoulders. Work using the legs can lead to WMSD of the legs, hips, ankles, and feet. Some back problems also result from repetitive activities.

Risk Factors

WMSDs arise from arm and hand movements such as bending, straightening, gripping, holding, twisting, clenching and reaching. These common movements are not particularly harmful in the ordinary activities of daily life. What makes them hazardous in work situations is the continual repetition, often in a forceful manner, and most of all, the speed of the movements and the lack of time for recovery between them. WMSDs are associated with work patterns that include:

- Fixed or constrained body positions.
- Continual repetition of movements.
- Force concentrated on small parts of the body, such as the hand or wrist.
- A pace of work that does not allow sufficient recovery between movements.

Generally, none of these factors acts separately to cause WMSD. WMSDs commonly occur as a result of a combination and interaction among them.

Heat, cold and vibration also contribute to the development of WMSD.

Muscle Injury

When muscles contract, they use chemical energy from sugars and produce by-products such as lactic acid which are removed by the blood. A muscle contraction that lasts a long time reduces the blood flow. Consequently, the substances produced by the muscles are not removed fast enough, and they accumulate in the muscles. The accumulation of these substances irritates muscles and causes pain. The severity of the pain depends on the duration of the muscle contractions and the amount of time between activities for the muscles to get rid of those irritating substances.

Tendon Injury

Tendons consist of numerous bundles of fibers that attach muscles to bones. Tendon disorders related to repetitive or frequent work activities and awkward postures occur in two major categories – tendons with sheaths (Fig. 1), found mainly in the hand and wrist; and tendons without sheaths (Fig. 2), generally found around the shoulder, elbow, and forearm.

The tendons of the hand are encased in sheaths through which the tendon slides.

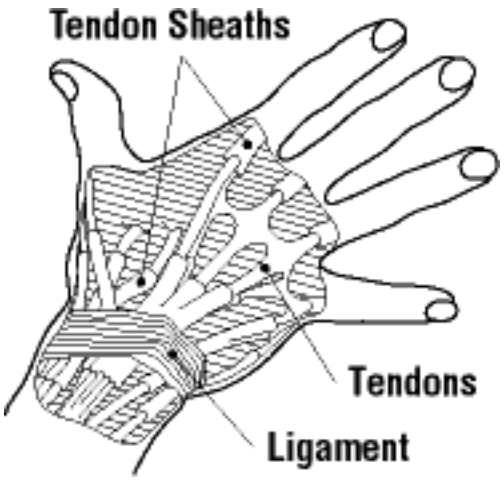


Figure 1 - Finger tendons and their sheaths

The inner walls of the sheaths contain cells that produce a slippery fluid to lubricate the tendon. With repetitive or excessive movement of the hand, the lubrication system may malfunction. It may not produce enough fluid, or it may produce a fluid with poor lubricating qualities. Failure of the lubricating system creates friction between the tendon and its sheath, causing inflammation and swelling of the tendon area. Repeated episodes of inflammation cause fibrous tissue to form. The fibrous tissue thickens the tendon sheath, and hinders tendon movement. Inflammation of the tendon sheath is known as tenosynovitis.

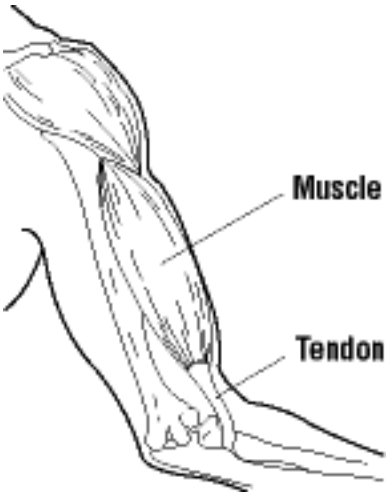


Figure 2 - Tendon, muscle, bone unit

When inflamed, a tendon sheath may swell up with lubricating fluid and cause a bump under the skin. This is referred to as a ganglion cyst.

Tendons without sheaths are vulnerable to repetitive motions and awkward postures. In fact, when a tendon is repeatedly tensed, some of its fibers can tear apart. The tendon becomes thickened and bumpy, causing inflammation. Tendonitis is the general term indicating inflammation of the tendon. In some cases, such as in the shoulder, tendons pass through a narrow space between bones. A sac called the bursa filled with lubricating fluid is inserted between the tendons and the bones as an anti-friction device. As the tendons become increasingly thickened and bumpy, the bursa is subject to a lot of friction and becomes inflamed. Inflammation of the bursa is known as bursitis.

Nerve Injury

Nerves carry signals from the brain to control activities of muscles. They also carry information about temperature, pain and touch from the body to the brain, and control bodily functions such as sweating and salivation. Nerves are surrounded by muscles, tendons, and ligaments. With repetitive motions and awkward postures, the tissues surrounding nerves become swollen, and squeeze or compress nerves (Fig. 3A, 3B).

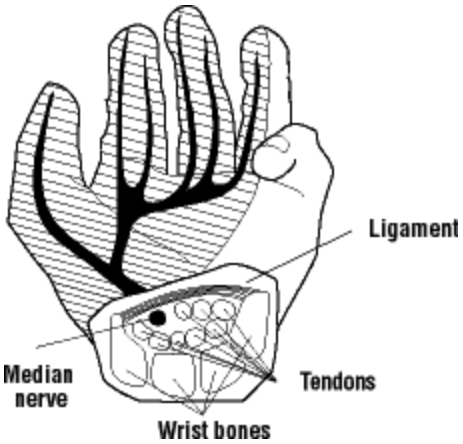


Figure 3A - Wrist in natural condition

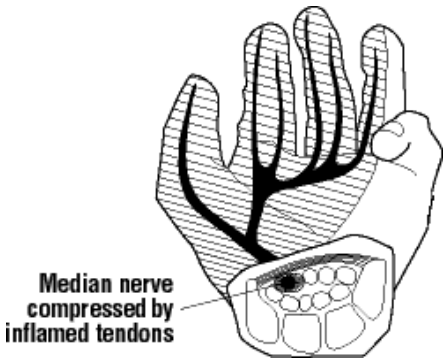


Figure 3B - Wrist showing symptoms of Carpal Tunnel Syndrome

Compression of a nerve causes muscle weakness, sensations of "pins and needles" and numbness. Dryness of skin, and poor circulation to the extremities, may also occur.

Symptoms

Pain is the most common symptom associated with WMSDs. In some cases there may be joint stiffness, muscle tightness, redness and swelling of the affected area. Some workers may also experience sensations of "pins and needles," numbness, skin colour changes, and decreased sweating of the hands.

WMSDs may progress in stages from mild to severe.

Early stage: Aching and tiredness of the affected limb occur during the work shift but disappear at night and during days off work. No reduction of work performance.

Intermediate stage: Aching and tiredness occur early in the work shift and persist at night. Reduced capacity for repetitive work.

Late stage: Aching, fatigue, and weakness persist at rest. Inability to sleep and to perform light duties.

Not everyone goes through these stages in the same way. In fact, it may be difficult to say exactly when one stage ends and the next begins. The first pain is a signal that the muscles and tendons should rest and recover. Otherwise, an injury can become longstanding, and sometimes, irreversible. The earlier people recognize symptoms, the quicker they should respond to them.

The table below outlines occupational risk factors and symptoms of the most common disorders of the upper body associated with WMSDs.

Identified disorders, occupational risk factors and symptoms		
Disorders	**Occupational risk factors**	**Symptoms**
Tendonitis/tenosynovitis	Repetitive wrist motions Repetitive shoulder motions Sustained hyper extension of arms Prolonged load on shoulders	Pain, weakness, swelling, burning sensation or dull ache over affected area
Epicondylitis (elbow tendonitis)	Repeated or forceful rotation of the forearm and bending of the wrist at the same time	Same symptoms as tendonitis
Carpal tunnel syndrome	Repetitive wrist motions	Pain, numbness, tingling, burning sensations, wasting of muscles at base of thumb, dry palm
DeQuervain's disease	Repetitive hand twisting and forceful gripping	Pain at the base of thumb
Thoracic outlet syndrome	Prolonged shoulder flexion Extending arms above shoulder height Carrying loads on the shoulder	Pain, numbness, swelling of the hands
Tension neck syndrome	Prolonged restricted posture	Pain

Treatment

The treatment of WMSDs involves several approaches including the following:

- Restriction of movement.
- Application of heat or cold.
- Exercise.
- Medication and surgery.

Restriction of Movement

The first approach to treatment of WMSDs is to avoid the activities causing the injury. This often requires work restrictions. In some cases, transfer to a different job should be considered. A splint can also be used to restrict movements or to immobilize the injured joint. However, the use of splints in occupational situations requires extreme caution. If used inappropriately, splints can cause more damage than good. Splints are usually used for two reasons: to mechanically support a joint where an excessive load on the joint is anticipated, or to restrict the movement of the injured joint.

In the occupational context, splints should not be used as a mechanical support for the joint. Instead, the job should be redesigned to avoid the extreme load on the worker's joint in the first place. To be effective, the use of splints to immobilize an affected joint also requires that the work activity that caused the injury be stopped or changed. If injurious work continues, then the worker is exposed to risk of injury to other joints that have to compensate for the one that is splinted.

Application of Heat or Cold

Applying heat or cold seems to relieve pain and may accelerate the repair process.

Cold reduces pain and swelling and is recommended for injuries and inflammations (tissues that are swollen, red, hot and inflamed). The use of ice it is not recommended in case of muscle pain (spasm) because cold temperature will contract the muscle even more. Application of ice on painful muscle is recommended only immediately after an injury occurred, and only for few days.

Heat is recommended for muscle pain relief. Heat increases the flow of blood which facilitates the elimination of lactic acid build up. It is not recommended for injuries with significant inflammation and swelling.

Exercise

Stretching is beneficial because it promotes circulation and reduces muscle tension. However, people suffering from WMSDs should consult a physical therapist before exercising. Stretching or exercise programs can aggravate the existing condition if not properly designed.

Medication and Surgery

Anti-inflammatory drugs can reduce pain and inflammation. The doctor may try more elaborate treatments or even surgery if all other approaches fail.

Prevention

Hazards are best eliminated at the source; this is a fundamental principle of occupational health and safety. In the case of WMSDs, the prime source of hazard is the repetitiveness of work. Other components of work such as the applied force, fixed body positions, and the pace of work are also contributing factors. Therefore the main effort to protect workers from WMSDs should focus on avoiding repetitive patterns of work through job design which may include mechanization, job rotation, job enlargement and enrichment or teamwork. Where elimination of the repetitive patterns of work is not possible or practical, prevention strategies involving workplace layout, tool and equipment design, and work practices should be considered.

Job Design

Job Rotation

Job rotation is one possible approach. It requires workers to move between different tasks, at fixed or irregular periods of time. But it must be a rotation where workers do something completely different. Different tasks must engage different muscle groups in order to allow recovery for those already strained.

However, job rotation alone will not be effective in reducing WMSDs if not combined with the proper design of workstations. And it will not be effective while the high pace of work persists.

Job Enlargement and Enrichment

Another approach is job enlargement. This increases the variety of tasks built into the job. It breaks the monotony of the job and avoids overloading one part of the body. Job enrichment involves more autonomy and control for the worker.

Team Work

Team work can provide greater variety and more evenly distributed muscular work. The whole team is involved in the planning and allocation of the work. Each team member carries out a set of operations to complete the whole product, allowing the worker to alternate between tasks, hence, reducing the risk of WMSDs.

Workplace Design

The guiding principle in workplace design is to fit the workplace to the worker. Evaluation of the workplace can identify the source or sources of WMSD. Proper design of the workstation decreases the effort required of the worker to maintain a working position. Ideally, the workstation should be fully adjustable, providing a worker with the options to work in standing, sitting or sitting-standing positions, as well as fitting the worker's body size and shape. Detailed information about proper workplace design can be found in the OSH Answers documents Working in a Standing Position and Working in a Sitting Position.

Tools and Equipment Design

Proper design of tools and equipment significantly decreases the force needed to complete the task.

Providing the worker with the proper jigs or fixtures for tasks that require holding elements saves a lot of muscular effort in awkward positions.

Good tools, maintained carefully and where necessary frequently changed, can also save a lot of muscle strain. More information about hand tools and preventing WMSD resulting from their use can be found in the OSH Answers document Hand Tool Ergonomics.

Work Practices

A well-designed job, supported by a well-designed workplace and proper tools, allows the worker to avoid unnecessary motion of the neck, shoulders and upper limbs. However, the actual performance of the tasks depends on individuals.

Training should be provided for workers who are involved in jobs that include repetitive tasks. Workers need to know how to adjust workstations to fit the tasks and their individual needs. Training should also emphasize the importance of rest periods and teach how to take advantage of short periods of time between tasks to relax the muscles, and how to consciously control muscle tension throughout the whole work shift.

Increased communication and support together with an increased ability of the worker to control his job (where possible) are work practices that improve worker's satisfaction and have a positive impact on reducing the risk of WMSDs.

Slips, Trips and Falls

Both slips and trips result from some a kind of unintended or unexpected change in the contact between the feet and the ground or walking surface. This fact shows that good housekeeping, quality of walking surfaces (flooring), selection of proper footwear, and appropriate pace of walking are critical for preventing fall incidents.

Housekeeping

Good housekeeping is the first and the most important (fundamental) level of preventing falls due to slips and trips. It includes:

- cleaning all spills immediately
- marking spills and wet areas
- mopping or sweeping debris from floors
- removing obstacles from walkways and always keeping walkways free of clutter
- securing (tacking, taping, etc.) mats, rugs and carpets that do not lay flat

- always closing file cabinet or storage drawers
- covering cables that cross walkways
- keeping working areas and walkways well lit
- replacing used light bulbs and faulty switches

Without good housekeeping practices, any other preventive measures such as installation of sophisticated flooring, specialty footwear or training on techniques of walking and safe falling will never be fully effective.

For more information about effective housekeeping visit the OSH Answers document on Workplace Housekeeping - Basic Guide.

Flooring

Changing or modifying walking surfaces is the next level of preventing slip and trips. Recoating or replacing floors, installing mats, pressure-sensitive abrasive strips or abrasive-filled paint-on coating and metal or synthetic decking can further improve safety and reduce risk of falling. However, it is critical to remember that high-tech flooring requires good housekeeping as much as any other flooring. In addition, resilient, non-slippery flooring prevents or reduces foot fatigue and contributes to slip prevention measures.

Footwear

In workplaces where floors may be oily or wet or where workers spend considerable time outdoors, prevention of fall incidents should focus on selecting proper footwear. Since there is no footwear with anti-slip properties for every condition, consultation with manufacturers' is highly recommended.

Properly fitting footwear increases comfort and prevents fatigue which, in turn, improves safety for the employee. For more information on footwear visit the OSH Answers document on Safety Footwear.

Safety Precautions

You can reduce the risk of slipping on wet flooring by:

- taking your time and paying attention to where you are going
- adjusting your stride to a pace that is suitable for the walking surface and the tasks you are doing
- walking with the feet pointed slightly outward
- making wide turns at corners

You can reduce the risk of tripping by:

- keeping walking areas clear from clutter or obstructions
- keeping flooring in good condition
- always using installed light sources that provide sufficient light for your tasks
- using a flashlight if you enter a dark room where there is no light
- making sure that things you are carrying or pushing do not prevent you from seeing any obstructions, spills, etc.

Body Belts, Harnesses, and Lanyards

If you are at risk for falling three meters (10 feet) or more at your workplace, you should wear the appropriate fall protection equipment.

If fall protection is required, establish a complete fall protection program if one is not in place. The program should include educating and training workers, selecting and fitting the equipment for the task and the worker, and knowing how to inspect the equipment.

Fall Protective Equipment

- The wearer should inspect their equipment before each use.
- Keep a written record of the inspection.
- Replace defective equipment. If there is any doubt about the safety of the equipment, do not use it and ask your supervisor for help.
- Replace any equipment, including ropes, that have been involved in a fall. Do not use until you have asked your supervisor and/or checked with a competent person or the manufacturer.
- Every piece of fall arrest equipment should be inspected and certified at least yearly or more often by a trained and competent person. Keep written records of inspections and approvals.
- Use energy absorbers if the arresting forces of the lanyard alone can cause injury.
- Follow the manufacturer's instructions about:
    - the purpose of the device,
    - hazard warnings,
    - instructions and limitations on use,
    - the stretch distance of the harness,
    - instructions for fitting and adjusting,
    - recommendations for care (cleaning, maintenance, and storage) and inspection,
    - the purpose and function of the fall arrest indicator,
    - a warning if a fall occurs or inspection reveals an unsafe condition that the device be taken out of service until it has been determined safe for use or destroyed by a competent person, and
    - instructions for proper application, use, and connecting to full body harness of any evacuation device.
- Use the right equipment for the job.

Inspecting the Webbing

- Inspect the entire surface of webbing for damage. Beginning at one end, bend the webbing in an inverted "U." Holding the body side of the belt toward you, grasp the belt with your hands six to eight inches apart.
- Watch for frayed edges, broken fibers, pulled stitches, cuts or chemical damage. Broken webbing strands generally appear as tufts on the webbing surface.
- Replace according to manufacturers' guidelines.

Inspecting the Buckle

- Inspect for loose, distorted or broken grommets. Do not cut or punch additional holes in waist strap or strength members.
- Check belt without grommets for torn or elongated holes that could cause the buckle tongue to slip.
- Inspect the buckle for distortion and sharp edges. The outer and center bars must be straight. Carefully check corners and attachment points of the center bar. They should overlap the buckle frame and move freely back and forth in their sockets. The roller should turn freely on the frame.
- Check that rivets are tight and cannot be moved. The body side of the rivet base and outside rivet burr should be flat against the material. Make sure the rivets are not bent.
- Inspect for pitted or cracked rivets that show signs of chemical corrosion.

Inspecting the Rope

- Rotate the rope lanyard and inspect from end to end for fuzzy, worn, broken or cut fibers. Weakened areas have noticeable changes in the original rope diameter.
- Replace when the rope diameter is not uniform throughout, following a short break-in period.
- The older a rope is and the more use it gets, the more important testing and inspection become.

Forged Steel Traps (“D” Rings)

- Inspect hardware for cracks, dents, bends, rust, signs of deformation, or other defects. Replace the belt if the "D" ring is not at a 90 degree angle and does not move vertically independent of the body pad or "D" saddle.
- Make sure that any hardware is not cutting into or damaging the belt or harness.
- Inspect tool loops and belt sewing for broken or stretched loops.

- Check bag rings and knife snaps to see that they are secure and working properly. Check tool loop rivets. Check for thread separation or rotting, both inside and outside the body pad belt.
- Inspect snaps for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should be seated into the snap nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to close the keeper firmly.

Safety Strap Inspection

- Inspect for cut fibers or damaged stitches inch by inch by flexing the strap in an inverted "U." Note cuts, frayed areas or corrosion damage.
- Check friction buckle for slippage and sharp buckle edges.
- Replace when tongue buckle holes are excessively worn or elongated.

IRC Ch 2 Definitions Part 1

Section R201 General

R201.1 Scope

Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

R201.2 Interchangeability

Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

R201.3 Terms Defined in Other Codes

Where terms are not defined in this code such terms shall have the meanings ascribed in other code publications of the International Code Council.

R201.4 Terms Not Defined

Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

Section R202 Definitions

1. **ACCESSIBLE.** Signifies access that requires the removal of an access panel or similar removable obstruction.
2. **ACCESSIBLE, READILY.** Signifies access without the necessity for removing a panel or similar obstruction.
3. **[RB] ACCESSORY STRUCTURE.** A structure that is accessory to and incidental to that of the *dwelling*(*s*) and that is located on the same *lot*.
4. **[RB] ADDITION.** An extension or increase in floor area or height of a building or structure.
5. **[RB] ADHERED STONE OR MASONRY VENEER.** Stone or masonry veneer secured and supported through the adhesion of an *approved* bonding material applied to an *approved* backing.
6. **AIR ADMITTANCE VALVE.** A one-way valve designed to allow air into the plumbing drainage system where a negative pressure develops in the piping. This device shall close by gravity and seal the terminal under conditions of zero differential pressure (no flow conditions) and under positive internal pressure.
7. **AIR BARRIER.** See Section N1101.6 for definition applicable in Chapter 11.
8. **AIR BREAK (DRAINAGE SYSTEM).** An arrangement where a discharge pipe from a fixture, *appliance* or device drains indirectly into a receptor below the flood-level rim of the receptor and above the trap seal.
9. **AIR CIRCULATION, FORCED.** A means of providing space conditioning utilizing movement of air through ducts or plenums by mechanical means.
10. **AIR-CONDITIONING SYSTEM.** A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith.
11. **AIR GAP, DRAINAGE SYSTEM.** The unobstructed vertical distance through free atmosphere between the outlet of a waste pipe and the flood-level rim of the fixture or receptor into which it is discharging.
12. **AIR GAP, WATER-DISTRIBUTION SYSTEM.** The unobstructed vertical distance through free atmosphere between the lowest opening from a water supply discharge to the flood-level rim of a plumbing fixture.
13. **[RB] AIR-IMPERMEABLE INSULATION.** An insulation having an air permanence equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential as tested in accordance with ASTM E 2178 or E 283.

14. **[RB] ALTERATION.** Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.
15. **[RB] ALTERNATING TREAD DEVICE.** A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.
16. **[RB] ANCHORED STONE OR MASONRY VENEER.** Stone or masonry veneer secured with *approved* mechanical fasteners to an *approved* backing.
17. **ANCHORS.** See "Supports."
18. **ANTISIPHON.** A term applied to valves or mechanical devices that eliminate siphonage.
19. **APPLIANCE.** A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.
20. **[RB] APPROVED.** Acceptable to the *building official*.
21. **[RB] APPROVED AGENCY.** An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, where such agency has been *approved* by the building official.
22. **[RB] ASPECT RATIO.** The ratio of longest to shortest perpendicular dimensions, or for wall sections, the ratio of height to length.
23. **[RB] ATTIC.** The unfinished space between the ceiling assembly and the roof assembly.
24. **[RB] ATTIC, HABITABLE.** A finished or unfinished area, not considered a *story*, complying with all of the following requirements:
    1. The occupiable floor area is not less than 70 square feet (6.5 m^2), in accordance with Section R304.
    2. The occupiable floor area has a ceiling height in accordance with Section R305.
    3. The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below.
25. **BACKFLOW, DRAINAGE.** A reversal of flow in the drainage system.
26. **BACKFLOW PREVENTER.** A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply.
27. **BACKFLOW PREVENTER, REDUCED-PRESSURE-ZONE TYPE.** A backflow-prevention device consisting of two independently acting check valves, internally force loaded to a normally closed position and separated by an intermediate chamber (or zone) in which there is an automatic relief means of venting to atmosphere internally loaded to a normally open position between two tightly closing shutoff valves and with means for testing for tightness of the checks and opening of relief means.
28. **BACKFLOW, WATER DISTRIBUTION.** The flow of water or other liquids into the potable water-supply piping from any sources other than its intended source. Backsiphonage is one type of backflow.
29. **BACKPRESSURE.** Pressure created by any means in the water distribution system that by being in excess of the pressure in the water supply mains causes a potential backflow condition.
30. **BACKPRESSURE, LOW HEAD.** A pressure less than or equal to 4.33 psi (29.88 kPa) or the pressure exerted by a 10-foot (3048 mm) column of water.
31. **BACKSIPHONAGE.** The flowing back of used or contaminated water from piping into a potable water-supply pipe due to a negative pressure in such pipe.
32. **BACKWATER VALVE.** A device installed in a drain or pipe to prevent backflow of sewage.
33. **[RB] BASEMENT.** A *story* that is not a *story above grade plane*. (see "Story above grade plane").
34. **[RB] BASEMENT WALL.** The opaque portion of a wall that encloses one side of a *basement* and has an average below *grade* wall area that is 50 percent or more of the total opaque and nonopaque area of that enclosing side.
35. **[RB] BASIC WIND SPEED.** Three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1) as given in Figure R301.2(4)A.
36. **BATHROOM GROUP.** A group of fixtures, including or excluding a bidet, consisting of a water closet, lavatory, and bathtub or shower. Such fixtures are located together on the same floor level.

37. **BEND.** A drainage fitting, designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line (see "Elbow" and "Sweep").
38. **BOILER.** A self-contained *appliance* from which hot water is circulated for heating purposes and then returned to the boiler, and that operates at water pressures not exceeding 160 pounds per square inch gage (psig) (1102 kPa gauge) and at water temperatures not exceeding 250°F (121°C).
39. **[RB] BOND BEAM.** A horizontal grouted element within masonry in which reinforcement is embedded.
40. **[RB] BRACED WALL LINE.** A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.
41. **[RB] BRACED WALL LINE, CONTINUOUSLY SHEATHED.** A *braced wall line* with structural sheathing applied to all sheathable surfaces including the areas above and below openings.
42. **[RB] BRACED WALL PANEL.** A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel's length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its *braced wall line* in accordance with Section R602.10.1.
43. **BRANCH.** Any part of the piping system other than a riser, main or stack.
44. **BRANCH, FIXTURE.** See "Fixture branch, drainage."
45. **BRANCH, HORIZONTAL.** See "Horizontal branch, drainage."
46. **BRANCH INTERVAL.** A vertical measurement of distance, 8 feet (2438 mm) or more in *developed length*, between the connections of horizontal branches to a drainage stack. Measurements are taken down the stack from the highest horizontal branch connection.
47. **BRANCH, MAIN.** A water-distribution pipe that extends horizontally off a main or riser to convey water to branches or fixture groups.
48. **BRANCH, VENT.** A vent connecting two or more individual vents with a vent stack or stack vent.
49. **BTU/H.** The *listed* maximum capacity of an *appliance*, absorption unit or burner expressed in British thermal units input per hour.
50. **[RB] BUILDING.** Building shall mean any one- and two-family dwelling or portion thereof, including *townhouses*, that is used, or designed or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, and shall include *accessory structures* thereto.
51. **BUILDING DRAIN.** The lowest piping that collects the discharge from all other drainage piping inside the house and extends 30 inches (762 mm) in *developed length* of pipe, beyond the *exterior walls* and conveys the drainage to the *building sewer*.
52. **[RB] BUILDING, EXISTING.** Existing building is a building erected prior to the adoption of this code, or one for which a legal building *permit* has been issued.
53. **[RB] BUILDING-INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.
54. **[RB] BUILDING LINE.** The line established by law, beyond which a building shall not extend, except as specifically provided by law.
55. **[RB] BUILDING OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code.
56. **BUILDING SEWER.** That part of the drainage system that extends from the end of the *building drain* and conveys its discharge to a public sewer, private sewer, individual sewage-disposal system or other point of disposal.
57. **[RE] BUILDING THERMAL ENVELOPE.** The *basement walls*, *exterior walls*, floor, roof and any other building element that enclose *conditioned spaces*.
58. **[RB] BUILT-UP ROOF COVERING.** Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.
59. **[RB] CAP PLATE.** The top plate of the double top plates used in structural insulated panel (SIP) construction. The cap plate is cut to match the panel thickness such that it overlaps the wood structural panel facing on both sides.
60. **[RB] CEILING HEIGHT.** The clear vertical distance from the finished floor to the finished ceiling.

61. **[RB] CEMENT PLASTER.** A mixture of portland or blended cement, portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other *approved* materials as specified in this code.
62. **[RB] CHIMNEY.** A primary vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning *appliance* to the outside atmosphere.
63. **CHIMNEY CONNECTOR.** A pipe that connects a fuel-burning *appliance* to a chimney.
64. **CHIMNEY TYPES.**
    1. **Residential-type appliance.** An *approved* chimney for removing the products of combustion from fuel-burning, residential-type *appliances* producing combustion gases not in excess of 1,000°F (538°C) under normal operating conditions, and capable of producing combustion gases of 1,400°F (760°C) during intermittent forces firing for periods up to 1 hour. All temperatures shall be measured at the *appliance* flue outlet. Residential-type *appliance* chimneys include masonry and factory-built types.
65. **CIRCUIT VENT.** A vent that connects to a horizontal drainage branch and vents two traps to not more than eight traps or trapped fixtures connected into a battery.
66. **CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.
67. **[RB] CLADDING.** The exterior materials that cover the surface of the building envelope that is directly loaded by the wind.
68. **CLEANOUT.** An accessible opening in the drainage system used for the removal of possible obstruction.
69. **[RE] CLIMATE ZONE.** A geographical region based on climatic criteria as specified in this code.
70. **[RB] CLOSET.** A small room or chamber used for storage.
71. **COLLECTION PIPE.** Unpressurized pipe used within the collection system that drains on-site nonpotable water or rainwater to a storage tank by gravity.
72. **COMBINATION WASTE AND VENT SYSTEM.** A specially designed system of waste piping embodying the horizontal wet venting of one or more sinks, lavatories or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.
73. **[RB] COMBUSTIBLE MATERIAL.** Any material not defined as noncombustible.
74. **COMBUSTION AIR.** The air provided to fuel-burning *equipment* including air for fuel combustion, draft hood dilution and ventilation of the *equipment* enclosure.
75. **[CE] COMMERCIAL, BUILDING.** See Section N1101.6.
76. **COMMON VENT.** A single pipe venting two trap arms within the same *branch interval*, either back-to-back or one above the other.
77. **CONDENSATE.** The liquid that separates from a gas due to a reduction in temperature; for example, water that condenses from flue gases and water that condenses from air circulating through the cooling coil in air conditioning *equipment*.
78. **CONDENSING APPLIANCE.** An *appliance* that condenses water generated by the burning of fuels.
79. **[RB] CONDITIONED AIR.** Air treated to control its temperature, relative humidity or quality.
80. **[RE] CONDITIONED AREA.** That area within a building provided with heating or cooling systems or *appliances* capable of maintaining, through design or heat loss or gain, 68°F (20°C) during the heating season or 80°F (27°C) during the cooling season, or has a fixed opening directly adjacent to a conditioned area.
81. **[RE] CONDITIONED FLOOR AREA.** The horizontal projection of the floors associated with the *conditioned space*.
82. **[RE] CONDITIONED SPACE.** An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings or where they contain uninsulated ducts, piping or other sources of heating or cooling.
83. **[RB] CONSTRUCTION DOCUMENTS.** Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*. Construction drawings shall be drawn to an appropriate scale.

84. **CONTAMINATION.** A high hazard or health hazard impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.
85. **[RE] CONTINUOUS INSULATION (ci).** Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.
86. **CONTINUOUS WASTE.** A drain from two or more similar adjacent fixtures connected to a single trap.
87. **CONTROL, LIMIT.** An automatic control responsive to changes in liquid flow or level, pressure, or temperature for limiting the operation of an *appliance*.
88. **CONTROL, PRIMARY SAFETY.** A safety control responsive directly to flame properties that senses the presence or absence of flame and, in event of ignition failure or unintentional flame extinguishment, automatically causes shutdown of mechanical *equipment*.
89. **CONVECTOR.** A system-incorporating heating element in an enclosure in which air enters an opening below the heating element, is heated and leaves the enclosure through an opening located above the heating element.
90. **CORE.** The lightweight middle section of a structural insulated panel, composed of foam plastic insulation that provides the link between the two facing shells.
91. **[RB] CORROSION RESISTANCE.** The ability of a material to withstand deterioration of its surface or its properties where exposed to its environment.
92. **[RB] COURT.** A space, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building.
93. **[RB] CRIPPLE WALL.** A framed wall extending from the top of the foundation to the underside of the floor framing of the first *story above grade plane*.
94. **CROSS CONNECTION.** Any connection between two otherwise separate piping systems that allows a flow from one system to the other.
95. **[RB] CROSS-LAMINATED TIMBER.** A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element.
96. **[RE] CURTAIN WALL.** See Section N1101.6 for definition applicable in Chapter 11.
97. **[RB] DALLE GLASS.** A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.
98. **DAMPER, VOLUME.** A device that will restrict, retard or direct the flow of air in any duct, or the products of combustion of heat-producing *equipment*, vent connector, vent or chimney.
99. **[RB] DEAD LOADS.** The weight of the materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding, and other similarly incorporated architectural and structural items, and fixed service *equipment*.
100. **[RB] DECORATIVE GLASS.** A carved, leaded or Dalle glass or glazing material with a purpose that is decorative or artistic, not functional; with coloring, texture or other design qualities or components that cannot be removed without destroying the glazing material; and with a surface, or assembly into which it is incorporated, that is divided into segments.
101. **[RE] DEMAND RECIRCULATION WATER SYSTEM.** See Section N1101.6 for definition applicable in Chapter 11.
102. **DESIGN PROFESSIONAL.** See "*Registered design professional*."
103. **DEVELOPED LENGTH.** The length of a pipeline measured along the center line of the pipe and fittings.
104. **DIAMETER.** Unless specifically stated, the term "diameter" is the nominal diameter as designated by the *approved* material standard.
105. **[RB] DIAPHRAGM.** A horizontal or nearly horizontal system acting to transmit lateral forces to the vertical resisting elements. Where the term "*diaphragm*" is used, it includes horizontal bracing systems.
106. **DILUTION AIR.** Air that enters a draft hood or draft regulator and mixes with flue gases.
107. **DIRECT SYSTEM.** A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

108. **DIRECT-VENT APPLIANCE.** A fuel-burning *appliance* with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.

109. **DRAFT.** The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of combustion through the gas passages of the *appliance* to the atmosphere.

    1. **Induced draft.** The pressure difference created by the action of a fan, blower or ejector, that is located between the *appliance* and the chimney or vent termination.
    2. **Natural draft.** The pressure difference created by a vent or chimney because of its height, and the temperature difference between the flue gases and the atmosphere.

110. **DRAFT HOOD.** A device built into an *appliance*, or a part of the vent connector from an *appliance*, that is designed to provide for the ready escape of the flue gases from the *appliance* in the event of no draft, backdraft or stoppage beyond the draft hood; prevent a backdraft from entering the *appliance*; and neutralize the effect of stack action of the chimney or gas vent on the operation of the *appliance*.

111. **DRAFT REGULATOR.** A device that functions to maintain a desired draft in the *appliance* by automatically reducing the draft to the desired value.

112. **[RB] DRAFT STOP.** A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

113. **DRAIN.** Any pipe that carries soil and water-borne wastes in a building drainage system.

114. **DRAIN-BACK SYSTEM.** A solar thermal system in which the fluid in the solar collector loop is drained from the collector into a holding tank under prescribed circumstances.

115. **DRAINAGE FITTING.** A pipe fitting designed to provide connections in the drainage system that have provisions for establishing the desired slope in the system. These fittings are made from a variety of both metals and plastics. The methods of coupling provide for required slope in the system.

116. **DUCT SYSTEM.** A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling *equipment* and *appliances*.

    For definition applicable in Chapter 11, see Section N1101.6.

117. **[RB] DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

118. **[RB] DWELLING UNIT.** A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

119. **DWV.** Abbreviated term for drain, waste and vent piping as used in common plumbing practice.

120. **EFFECTIVE OPENING.** The minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of diameter of a circle and if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

121. **ELBOW.** A pressure pipe fitting designed to provide an exact change in direction of a pipe run. An elbow provides a sharp turn in the flow path (see "Bend" and "Sweep").

122. **[RB] EMERGENCY ESCAPE AND RESCUE OPENING.** An operable exterior window, door or similar device that provides for a means of escape and access for rescue in the event of an emergency.

123. **[RB] ENGINEERED WOOD RIM BOARD.** A full-depth structural composite lumber, wood structural panel, structural glued laminated timber or prefabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for *diaphragm* sheathing, siding and exterior deck ledgers and provide lateral support at the ends of floor or roof joists or rafters.

124. **EQUIPMENT.** Piping, ducts, vents, control devices and other components of systems other than *appliances* that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

125. **EQUIVALENT LENGTH.** For determining friction losses in a piping system, the effect of a particular fitting equal to the friction loss through a straight piping length of the same nominal diameter.

126. **[RE] ERI REFERENCE DESIGN.** A version of the rated design that meets the minimum requirements of the 2006 *International Energy Conservation Code.*

127. **[RB] ESCARPMENT.** With respect to topographic wind effects, a cliff or steep slope generally separating two levels or gently sloping areas.

128. **ESSENTIALLY NONTOXIC TRANSFER FLUIDS.** Fluids having a Gosselin rating of 1, including propylene glycol; mineral oil; polydimethy oil oxane; hydrochlorofluorocarbon, chlorofluorocarbon and hydrofluorocarbon refrigerants; and FDA-approved boiler water additives for steam boilers.

129. **ESSENTIALLY TOXIC TRANSFER FLUIDS.** Soil, water or gray water and fluids having a Gosselin rating of 2 or more including ethylene glycol, hydrocarbon oils, ammonia refrigerants and hydrazine.

130. **EVAPORATIVE COOLER.** A device used for reducing air temperature by the process of evaporating water into an airstream.

131. **EXCESS AIR.** Air that passes through the combustion chamber and the *appliance* flue in excess of what is theoretically required for complete combustion.

132. **EXHAUST HOOD, FULL OPENING.** An exhaust hood with an opening not less than the diameter of the connecting vent.

133. **EXISTING INSTALLATIONS.** Any plumbing system regulated by this code that was legally installed prior to the effective date of this code, or for which a *permit* to install has been issued.

134. **[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS).** EIFS are nonstructural, nonload-bearing *exterior wall* cladding systems that consist of an insulation board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

135. **[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) WITH DRAINAGE.** An EIFS that incorporates a means of drainage applied over a water-resistive barrier.

136. **[RB] EXTERIOR WALL.** An above-*grade* wall that defines the exterior boundaries of a building. Includes between-floor spandrels, peripheral edges of floors, roof and *basement* knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and *basement walls* with an average below-*grade* wall area that is less than 50 percent of the total opaque and nonopaque area of that enclosing side.

137. **[RB] EXTERIOR WALL COVERING.** A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resistive barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, and fascias.

138. **[RB] FACING.** The wood structural panel facings that form the two outmost rigid layers of the structural insulated panel.

139. **FACTORY-BUILT CHIMNEY.** A *listed* and *labeled* chimney composed of factory-made components assembled in the field in accordance with the manufacturer's instructions and the conditions of the *listing*.

140. **FACTORY-MADE AIR DUCT.** A *listed and labeled* duct manufactured in a factory and assembled in the field in accordance with the manufacturer's instructions and conditions of the *listing*.

141. **[RE] FENESTRATION.** Skylights, roof windows, vertical windows (whether fixed or moveable); opaque doors; glazed doors; glass block; and combination opaque and glazed doors.

    For definition applicable in Chapter 11, see Section N1101.6.

142. **FIBER-CEMENT (BACKERBOARD, SIDING, SOFFIT, TRIM AND UNDERLAYMENT) PRODUCTS.** Manufactured thin section composites of hydraulic cementitious matrices and discrete nonasbestos fibers.

143. **FIREBLOCKING.** Building materials or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

144. **[RB] FIREPLACE.** An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a chimney, for use with solid fuels.

    1. **Factory-built fireplace.** A *listed* and *labeled* fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.
    2. **Masonry fireplace.** A field-constructed fireplace composed of *solid masonry* units, bricks, stones or concrete.

145. **FIREPLACE STOVE.** A free-standing, chimney-connected solid-fuel-burning heater designed to be operated with the fire chamber doors in either the open or closed position.

146. **[RB] FIREPLACE THROAT.** The opening between the top of the firebox and the smoke chamber.

147. **[RB] FIRE-RETARDANT-TREATED WOOD.** Pressure-treated lumber and plywood that exhibit reduced surface burning characteristics and resist propagation of fire.

1. **Other means during manufacture.** A process where the wood raw material is treated with a fire-retardant formulation while undergoing creation as a finished product.
2. **Pressure process.** A process for treating wood using an initial vacuum followed by the introduction of pressure above atmospheric.

148. **[RB] FIRE SEPARATION DISTANCE.** The distance measured from the building face to one of the following:

1. To the closest interior *lot line*.
2. To the centerline of a street, an alley or public way.
3. To an imaginary line between two buildings on the *lot*.

The distance shall be measured at a right angle from the face of the wall.

149. **FIXTURE.** See "Plumbing fixture."

150. **FIXTURE BRANCH, DRAINAGE.** A drain serving two or more fixtures that discharges into another portion of the drainage system.

151. **FIXTURE BRANCH, WATER-SUPPLY.** A water-supply pipe between the fixture supply and a main water-distribution pipe or fixture group main.

152. **FIXTURE DRAIN.** The drain from the trap of a fixture to the junction of that drain with any other drain pipe.

153. **FIXTURE FITTING.**

1. **Supply fitting.** A fitting that controls the volume or directional flow or both of water and that is either attached to or accessible from a fixture or is used with an open or atmospheric discharge.
2. **Waste fitting.** A combination of components that conveys the sanitary waste from the outlet of a fixture to the connection of the sanitary drainage system.

154. **FIXTURE GROUP, MAIN.** The main water-distribution pipe (or secondary branch) serving a plumbing fixture grouping such as a bath, kitchen or laundry area to which two or more individual fixture branch pipes are connected.

155. **FIXTURE SUPPLY.** The water-supply pipe connecting a fixture or fixture fitting to a fixture branch.

156. **FIXTURE UNIT, DRAINAGE (d.f.u.).** A measure of probable discharge into the drainage system by various types of plumbing fixtures, used to size DWV piping systems. The drainage fixture-unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation and on the average time between successive operations.

157. **FIXTURE UNIT, WATER-SUPPLY (w.s.f.u.).** A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures used to size water-piping systems. The water-supply fixture-unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation and on the average time between successive operations.

158. **[RB] FLAME SPREAD.** The propagation of flame over a surface.

159. **[RB] FLAME SPREAD INDEX.** A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E 84 or UL 723.

160. **FLEXIBLE AIR CONNECTOR.** A conduit for transferring air between an air duct or plenum and an air terminal unit, an air inlet or an air outlet. Such conduit is limited in its use, length and location.

161. **[RB] FLIGHT.** A continuous run of rectangular treads or winders or combination thereof from one landing to another.

162. **FLOOD-LEVEL RIM.** The edge of the receptor or fixture from which water overflows.

163. **FLOOR DRAIN.** A plumbing fixture for recess in the floor having a floor-level strainer intended for the purpose of the collection and disposal of waste water used in cleaning the floor and for the collection and disposal of accidental spillage to the floor.

164. **FLOOR FURNACE.** A self-contained furnace suspended from the floor of the space being heated, taking air for combustion from outside such space, and with means for lighting the *appliance* from such space.
165. **FLOW PRESSURE.** The static pressure reading in the water-supply pipe near the faucet or water outlet while the faucet or water outlet is open and flowing at capacity.
166. **FLUE.** See "Vent."
167. **FLUE, APPLIANCE.** The passages within an *appliance* through which combustion products pass from the combustion chamber to the flue collar.
168. **FLUE COLLAR.** The portion of a fuel-burning *appliance* designed for the attachment of a draft hood, vent connector or venting system.
169. **FLUE GASES.** Products of combustion plus excess air in *appliance* flues or heat exchangers.
170. **FLUSH VALVE.** A device located at the bottom of a flush tank that is operated to flush water closets.
171. **FLUSHOMETER TANK.** A device integrated within an air accumulator vessel that is designed to discharge a predetermined quantity of water to fixtures for flushing purposes.
172. **FLUSHOMETER VALVE.** A flushometer valve is a device that discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure.
173. **[RB] FOAM BACKER BOARD.** Foam plastic used in siding applications where the foam plastic is a component of the siding.
174. **[RB] FOAM PLASTIC INSULATION.** A plastic that is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of open or closed cells distributed throughout the plastic for thermal insulating or acoustic purposes and that has a density less than 20 pounds per cubic foot (320 kg/m^3) unless it is used as interior trim.
175. **[RB] FOAM PLASTIC INTERIOR TRIM.** Exposed foam plastic used as picture molds, chair rails, crown moldings, baseboards, handrails, ceiling beams, door trim and window trim and similar decorative or protective materials used in fixed applications.
176. **FUEL-PIPING SYSTEM.** All piping, tubing, valves and fittings used to connect fuel utilization *equipment* to the point of fuel delivery.
177. **FULLWAY VALVE.** A valve that in the full open position has an opening cross-sectional area that is not less than 85 percent of the cross-sectional area of the connecting pipe.
178. **FURNACE.** A vented heating *appliance* designed or arranged to discharge heated air into a *conditioned space* or through a duct or ducts.
179. **[RB] GLAZING AREA.** The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose *conditioned space*. Includes the area of glazed fenestration assemblies in walls bounding conditioned *basements*.
180. **[RB] GRADE.** The finished ground level adjoining the building at all *exterior walls*.
181. **[RB] GRADE FLOOR OPENING.** A window or other opening located such that the sill height of the opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening.
182. **GRADE, PIPING.** See "Slope."
183. **[RB] GRADE PLANE.** A reference plane representing the average of the finished ground level adjoining the building at all *exterior walls*. Where the finished ground level slopes away from the *exterior walls*, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet (1829 mm) from the building between the structure and a point 6 feet (1829 mm) from the building.
184. **GRAY WATER.** Waste discharged from lavatories, bathtubs, showers, clothes washers and laundry trays.
185. **GRIDDED WATER DISTRIBUTION SYSTEM.** A water distribution system where every water distribution pipe is interconnected so as to provide two or more paths to each fixture supply pipe.
186. **[RB] GROSS AREA OF EXTERIOR WALLS.** The normal projection of all *exterior walls*, including the area of all windows and doors installed therein.
187. **GROUND-SOURCE HEAT PUMP LOOP SYSTEM.** Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat

pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

188. **[RB] GUARD.** A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level.

189. **[RB] GUESTROOM.** Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

190. **[RB] GYPSUM BOARD.** The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum *veneer* plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Section R702.3 and Part IX of this code are types of gypsum board.

191. **[RB] GYPSUM PANEL PRODUCT.** The general name for a family of sheet products consisting essentially of gypsum.

192. **[RB] HABITABLE SPACE.** A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered *habitable spaces*.

193. **[RB] HANDRAIL.** A horizontal or sloping rail intended for grasping by the hand for guidance or support.

194. **HANGERS.** See "Supports."

195. **HAZARDOUS LOCATION.** Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances.

196. **HEAT PUMP.** An *appliance* having heating or heating and cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.

197. **[RE] HEATING DEGREE DAYS (HDD).** The sum, on an annual basis, of the difference between 65°F (18°C) and the mean temperature for each day as determined from "NOAA Annual Degree Days to Selected Bases Derived from the 1960-1990 Normals" or other weather data sources acceptable to the code official.

198. **[RB] HEIGHT, BUILDING.** The vertical distance from *grade plane* to the average height of the highest roof surface.

199. **[RB] HEIGHT, STORY.** The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost *story*, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

200. **[RE] HIGH-EFFICACY LAMPS.** See Section N1101.6 for definition applicable in Chapter 11.

201. **HIGH-TEMPERATURE (H.T.) CHIMNEY.** A high temperature chimney complying with the requirements of UL 103. A Type H.T. chimney is identifiable by the markings "Type H.T." on each chimney pipe section.

202. **[RB] HILL.** With respect to topographic wind effects, a land surface characterized by strong relief in any horizontal direction.

203. **[RB] HISTORIC BUILDING.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

204. **HORIZONTAL BRANCH, DRAINAGE.** A drain pipe extending laterally from a soil or waste stack or *building drain*, that receives the discharge from one or more *fixture drains*.

205. **HORIZONTAL PIPE.** Any pipe or fitting that makes an angle of less than 45 degrees (0.79 rad) with the horizontal.

206. **HOT WATER.** Water at a temperature greater than or equal to 110°F (43°C).

207. **[RB] HURRICANE-PRONE REGIONS.** Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed, V_{ult}, is greater than 115 miles per hour (51 m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands and America Samoa.

208. **HYDROGEN-GENERATING APPLIANCE.** A self-contained package or factory-matched packages of integrated systems for generating gaseous hydrogen. Hydrogen-generating *appliances* utilize electrolysis, reformation, chemical or other processes to generate hydrogen.

209. **IGNITION SOURCE.** A flame, spark or hot surface capable of igniting flammable vapors or fumes. Such sources include *appliance* burners, burner ignitions and electrical switching devices.

210. **INDIRECT SYSTEM.** A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.
211. **INDIRECT WASTE PIPE.** A waste pipe that discharges into the drainage system through an *air gap* into a trap, fixture or receptor.
212. **INDIVIDUAL SEWAGE DISPOSAL SYSTEM.** A system for disposal of sewage by means of a septic tank or mechanical treatment, designed for use apart from a public sewer to serve a single establishment or building.
213. **INDIVIDUAL VENT.** A pipe installed to vent a single *fixture drain* that connects with the vent system above or terminates independently outside the building.
214. **INDIVIDUAL WATER SUPPLY.** A supply other than an approved public water supply that serves one or more families.
215. **[RB] INSULATED SIDING.** A type of continuous insulation, with manufacturer-installed insulating material as an integral part of the cladding product, having a minimum *R*-value of R-2.
216. **[RB] INSULATED VINYL SIDING.** A vinyl cladding product, with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a thermal resistance of not less than R-2.
217. **[RB] INSULATING CONCRETE FORM (ICF).** A concrete forming system using stay-in-place forms of rigid foam plastic insulation, a hybrid of cement and foam insulation, a hybrid of cement and wood chips, or other insulating material for constructing cast-in-place concrete walls.

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Section R202 Definitions Part 2

[RE] INSULATING SHEATHING. An insulating board having a thermal resistance of not less than R-2 of the core material.

1. For definition applicable in Chapter 11, see Section N1101.6.
2. **[RB] JURISDICTION.** The governmental unit that has adopted this code under due legislative authority.
3. **[RB] KITCHEN.** Kitchen shall mean an area used, or designated to be used, for the preparation of food.
4. **[RB] LABEL.** An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an *approved agency* and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved agency*. (See also "Manufacturer's designation" and "Mark.")
5. **[RB] LABELED.** *Equipment*, materials or products to which have been affixed a *label*, seal, symbol or other identifying *mark* of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the *labeled* items and whose labeling indicates either that the *equipment*, material or product meets identified standards or has been tested and found suitable for a specified purpose.
6. **[RB] LIGHT-FRAME CONSTRUCTION.** A type of construction with vertical and horizontal structural elements that are primarily formed by a system of repetitive wood or cold-formed steel framing members.
7. **[RB] LISTED.** *Equipment*, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of *listed equipment* or materials or periodic evaluation of services and whose listing states either that the *equipment*, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.
8. **[RB] LIVE LOADS.** Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.
9. **LIVING SPACE.** Space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.
10. **LOCAL EXHAUST.** An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a dwelling.
11. **[RB] LODGING HOUSE.** A one-family dwelling where one or more occupants are primarily permanent in nature, and rent is paid for guestrooms.
12. **[RB] LOT.** A portion or parcel of land considered as a unit.
13. **[RB] LOT LINE.** A line dividing one *lot* from another, or from a street or any public place.
14. **MACERATING TOILET SYSTEMS.** A system comprised of a sump with macerating pump and with connections for a water closet and other plumbing fixtures, that is designed to accept, grind and pump wastes to an *approved* point of discharge.
15. **MAIN.** The principal pipe artery to which branches may be connected.
16. **MAIN SEWER.** See "Public sewer."
17. **MANIFOLD WATER DISTRIBUTION SYSTEMS.** A fabricated piping arrangement in which a large supply main is fitted with multiple branches in close proximity in which water is distributed separately to fixtures from each branch.
18. **[RB] MANUFACTURED HOME.** *Manufactured home* means a structure, transportable in one or more sections, that in the traveling mode is 8 body feet (2438 body mm) or more in width or 40 body feet (12 192 body mm) or more in length, or, where erected on site, is 320 square feet (30 m^2) or more, and that is built on a permanent chassis and designed to be used as a *dwelling* with or without a permanent foundation where connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems

contained therein; except that such term shall include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the secretary (HUD) and complies with the standards established under this title. For mobile homes built prior to June 15, 1976, a *label* certifying compliance to the Standard for Mobile Homes, NFPA 501, in effect at the time of manufacture is required. For the purpose of these provisions, a mobile home shall be considered to be a *manufactured home*.

19. **[RB] MANUFACTURER'S DESIGNATION.** An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also "Mark" and "Label.")
20. **[RB] MANUFACTURER'S INSTALLATION INSTRUCTIONS.** Printed instructions included with *equipment* as part of the conditions of their *listing* and *labeling*.
21. **[RB] MARK.** An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also "Manufacturer's designation" and "Label.")
22. **[RB] MASONRY CHIMNEY.** A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.
23. **[RB] MASONRY HEATER.** A masonry heater is a solid fuel burning heating *appliance* constructed predominantly of concrete or solid masonry having a mass of not less than 1,100 pounds (500 kg), excluding the chimney and foundation. It is designed to absorb and store a substantial portion of heat from a fire built in the firebox by routing exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes not less than one 180-degree (3.14-rad) change in flow direction before entering the chimney and that deliver heat by radiation through the masonry surface of the heater.
24. **[RB] MASONRY, SOLID.** Masonry consisting of solid masonry units laid contiguously with the joints between the units filled with mortar.
25. **[RB] MASONRY UNIT.** Brick, tile, stone, architectural cast stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *International Building Code*.
    1. **Clay.** A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.
    2. **Concrete.** A building unit or block larger in size than 12 inches by 4 inches by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.
    3. **Glass.** Nonload-bearing masonry composed of glass units bonded by mortar.
    4. **Hollow.** A masonry unit with a net cross-sectional area in any plane parallel to the loadbearing surface that is less than 75 percent of its gross cross-sectional area measured in the same plane.
    5. **Solid.** A masonry unit with a net cross-sectional area in every plane parallel to the loadbearing surface that is 75 percent or more of its cross-sectional area measured in the same plane.
26. **[RE] MASS WALL.** Masonry or concrete walls having a mass greater than or equal to 30 pounds per square foot (146 kg/m^2), solid wood walls having a mass greater than or equal to 20 pounds per square foot (98 kg/m^2), and any other walls having a heat capacity greater than or equal to 6 Btu/ft^2 • °F [123 J/(m^2 • K)].
27. **[RB] MEAN ROOF HEIGHT.** The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees (0.18 rad).
28. **MECHANICAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced draft portion under nonpositive static pressure or a forced draft portion under positive static pressure.
    1. **Forced-draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static pressure.
    2. **Induced draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.
    3. **Power venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.
29. **MECHANICAL EXHAUST SYSTEM.** A system for removing air from a room or space by mechanical means.
30. **MECHANICAL JOINT.**

1. A connection between pipes, fittings or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat-fused.
2. A general form of gas- or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.

31. **MECHANICAL SYSTEM.** A system specifically addressed and regulated in this code and composed of components, devices, *appliances* and *equipment*.
32. **[RB] METAL ROOF PANEL.** An interlocking metal sheet having an installed weather exposure of not less than 3 square feet (0.28 m^2) per sheet.
33. **[RB] METAL ROOF SHINGLE**. An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.28 m^2) per sheet.
34. **[RB] MEZZANINE.** An intermediate level or levels between the floor and ceiling of any *story*.
35. **[RB] MODIFIED BITUMEN ROOF COVERING.** One or more layers of polymer modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an *approved* ballast layer.
36. **[RB] MULTIPLE STATION SMOKE ALARM.** Two or more single station alarm devices that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate.
37. **[RB] NAILABLE SUBSTRATE.** A product or material such as framing, sheathing or furring, composed of wood or wood-based materials, or other materials and fasteners providing equivalent fastener withdrawal resistance.
38. **NATURAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
39. **[RB] NATURALLY DURABLE WOOD.** The heartwood of the following species with the exception that an occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which it occurs is heartwood.
    1. **Decay resistant.** Redwood, cedar, black locust and black walnut.
    2. **Termite resistant.** Alaska yellow cedar, redwood, Eastern red cedar and Western red cedar including all sapwood of Western red cedar.
40. **[RB] NONCOMBUSTIBLE MATERIAL.** Materials that pass the test procedure for defining noncombustibility of elementary materials set forth in ASTM E 136.
41. **[RB] NOSING.** The leading edge of treads of stairs and of landings at the top of stairway flights.
42. **[RB] OCCUPIED SPACE.** The total area of all buildings or structures on any *lot* or parcel of ground projected on a horizontal plane, excluding permitted projections as allowed by this code.
43. **OFFSET.** A combination of fittings that makes two changes in direction, bringing one section of the pipe out of line and into a line parallel with the other section.
44. **ON-SITE NONPOTABLE WATER REUSE SYSTEMS.** Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated on site, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.
45. **[RB] OWNER.** Any person, agent, firm or corporation having a legal or equitable interest in the property.
46. **[RB] PAN FLASHING.** Corrosion-resistant flashing at the base of an opening that is integrated into the building exterior wall to direct water to the exterior and is premanufactured, fabricated, formed or applied at the job site.
47. **[RB] PANEL THICKNESS.** Thickness of core plus two layers of structural wood panel facings.
48. **PELLET FUEL-BURNING APPLIANCE.** A closed combustion, vented *appliance* equipped with a fuel feed mechanism for burning processed pellets of solid fuel of a specified size and composition.
49. **PELLET VENT.** A vent *listed* and *labeled* for use with a *listed* pellet fuel-burning *appliance*.
50. **[RB] PERFORMANCE CATEGORY.** A designation of wood structural panels as related to the panel performance used in Chapters 4, 5, 6 and 8.
51. **[RB] PERMIT.** An official document or certificate issued by the authority having jurisdiction that authorizes performance of a specified activity.

52. **[RB] PERSON.** An individual, heirs, executors, administrators or assigns, and a firm, partnership or corporation, its or their successors or assigns, or the agent of any of the aforesaid.
53. **[RB] PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power where exposed to sunlight.
54. **[RB] PHOTOVOLTAIC PANEL.** A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.
55. **[RB] PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels that convert solar radiation into electricity, including rack support systems.
56. **[RB] PHOTOVOLTAIC SHINGLES.** A *roof covering* that resembles shingles and that incorporates photovoltaic modules.
57. **PITCH.** See "Slope."
58. **[RB] PLASTIC COMPOSITE.** A generic designation that refers to wood-plastic composites and plastic lumber.
59. **[RB] PLATFORM CONSTRUCTION.** A method of construction by which floor framing bears on load bearing walls that are not continuous through the *story* levels or floor framing.
60. **PLENUM.** A chamber that forms part of an air-circulation system other than the *occupied space* being conditioned.
61. **PLUMBING.** For the purpose of this code, plumbing refers to those installations, repairs, maintenance and *alterations* regulated by Chapters 25 through 33.
62. **PLUMBING APPLIANCE.** An energized household *appliance* with plumbing connections, such as a dishwasher, food waste disposer, clothes washer or water heater.
63. **PLUMBING APPURTENANCE.** A device or assembly that is an adjunct to the basic plumbing system and does not demand additional water supply or add any discharge load to the system. It is presumed that it performs some useful function in the operation, maintenance, servicing, economy or safety of the plumbing system. Examples include filters, relief valves and aerators.
64. **PLUMBING FIXTURE.** A receptacle or device that is connected to a water supply system or discharges to a drainage system or both. Such receptacles or devices require a supply of water; or discharge liquid waste or liquid-borne solid waste; or require a supply of water and discharge waste to a drainage system.
65. **PLUMBING SYSTEMS.** Includes the water distribution pipes; plumbing fixtures and traps; water-treating or water-using *equipment*; soil, waste and vent pipes; and building drains; in addition to their respective connections, devices and appurtenances within a structure or premises; and the water service, building sewer and building storm sewer serving such structure or premises.
66. **POLLUTION.** A low-hazard or non-health hazard impairment of the quality of the potable water to a degree that does not create a hazard to the public health and that does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use.
67. **[RB] POLYPROPYLENE SIDING.** A shaped material, made principally from polypropylene homopolymer, or copolymer, that in some cases contains fillers or reinforcements, that is used to clad *exterior walls* or buildings.
68. **PORTABLE-FUEL-CELL APPLIANCE.** A fuel cell generator of electricity that is not fixed in place. A portable-fuel-cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.
69. **[RB] POSITIVE ROOF DRAINAGE.** The drainage condition in which consideration has been made for the loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.
70. **POTABLE WATER.** Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in bacteriological and chemical quality to the requirements of the public health authority having jurisdiction.
71. **[RB] PRECAST CONCRETE.** A structural concrete element cast elsewhere than its final position in the structure.
72. **[RB] PRECAST CONCRETE FOUNDATION WALLS.** Pre-engineered, precast concrete wall panels that are designed to withstand specified stresses and used to build below-*grade* foundations.
73. **PRESSURE-RELIEF VALVE.** A pressure-actuated valve held closed by a spring or other means and designed to automatically relieve pressure at the pressure at which it is set.

74. **PUBLIC SEWER.** A common sewer directly controlled by public authority.
75. **PUBLIC WATER MAIN.** A water-supply pipe for public use controlled by public authority.
76. **[RB] PUBLIC WAY.** Any street, alley or other parcel of land open to the outside air leading to a public street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and that has a clear width and height of not less than 10 feet (3048 mm).
77. **PURGE.** To clear of air, gas or other foreign substances.
78. **QUICK-CLOSING VALVE.** A valve or faucet that closes automatically where released manually or controlled by mechanical means for fast-action closing.
79. **[RE] *R*-VALUE, THERMAL RESISTANCE.** The inverse of the time rate of heat flow through a *building thermal envelope* element from one of its bounding surfaces to the other for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot ft^2 \cdot °F/Btu$).
80. **[RB] RAMP.** A walking surface that has a running slope steeper than 1 unit vertical in 20 units horizontal (5-percent slope).
81. **[RE] RATED DESIGN.** A description of the proposed *building,* used to determine the energy rating index.
82. **RECEPTOR.** A fixture or device that receives the discharge from indirect waste pipes.
83. **RECLAIMED WATER.** Nonpotable water that has been derived from the treatment of waste water by a facility or system licensed or permitted to produce water meeting the *jurisdiction's* water requirements for its intended uses. Also known as "Recycled Water."
84. **[RE] REFLECTIVE DUCT INSULATION.** A thermal insulation assembly consisting of one or more surfaces that have an emittance of 0.1 or less, and that bound an enclosed air space or spaces.
85. **REFRIGERANT.** A substance used to produce refrigeration by its expansion or evaporation.
86. **REFRIGERANT COMPRESSOR.** A specific machine, with or without accessories, for compressing a given refrigerant vapor.
87. **REFRIGERATING SYSTEM.** A combination of interconnected parts forming a closed circuit in which refrigerant is circulated for the purpose of extracting, then rejecting, heat. A direct refrigerating system is one in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. An indirect refrigerating system is one in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated.
88. **[RB] REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.
89. **RELIEF VALVE, VACUUM.** A device to prevent excessive buildup of vacuum in a pressure vessel.
90. **[RB] REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.
91. For definition applicable in Chapter 11, see Section N1101.6.
92. **[RB] REROOFING.** The process of recovering or replacing an existing roof covering. See "Roof recover."
93. For definition applicable in Chapter 11, see Section N1101.6.
94. **RETURN AIR.** Air removed from an *approved conditioned space* or location and recirculated or exhausted.
95. **[RB] RIDGE.** With respect to topographic wind effects, an elongated crest of a hill characterized by strong relief in two directions.
96. **[RB] RISER.**
    1. The vertical component of a step or stair.
    2. A water pipe that extends vertically one full *story* or more to convey water to branches or to a group of fixtures.
97. **[RB] ROOF ASSEMBLY.** A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder, and roof covering.
98. **[RB] ROOF COVERING.** The covering applied to the roof deck for weather resistance, fire classification or appearance.
99. **ROOF COVERING SYSTEM.** See "Roof assembly."

100. **[RB] ROOF DECK.** The flat or sloped surface not including its supporting members or vertical supports.
101. **[RB] ROOF RECOVER.** The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.
102. For definition applicable in Chapter 11, see Section N1101.6.
103. **[RB] ROOF REPAIR.** Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

For definition applicable in Chapter 11, see Section N1101.6.
104. **[RB] ROOF REPLACEMENT.** The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.
105. **[RB] ROOFTOP STRUCTURE.** An enclosed structure on or above the roof of any part of a building.
106. **ROOM HEATER.** A freestanding heating *appliance* installed in the space being heated and not connected to ducts.
107. **ROUGH-IN.** The installation of the parts of the plumbing system that must be completed prior to the installation of fixtures. This includes DWV, water supply and built-in fixture supports.
108. **[RB] RUNNING BOND.** The placement of masonry units such that head joints in successive courses are horizontally offset not less than one-quarter the unit length.
109. **SANITARY SEWER.** A sewer that carries sewage and excludes storm, surface and groundwater.
110. **SCUPPER.** An opening in a wall or parapet that allows water to drain from a roof.
111. **[RB] SEISMIC DESIGN CATEGORY (SDC).** A classification assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the site.
112. **SEPTIC TANK.** A water-tight receptor that receives the discharge of a building sanitary drainage system and is constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint or perforated piping or a seepage pit.
113. **SEWAGE.** Any liquid waste containing animal matter, vegetable matter or other impurity in suspension or solution.
114. **SEWAGE PUMP**. A permanently installed mechanical device for removing sewage or liquid waste from a sump.
115. **[RB] SHALL.** The term, where used in the code, is construed as mandatory.
116. **[RB] SHEAR WALL.** A general term for walls that are designed and constructed to resist racking from seismic and wind by use of masonry, concrete, cold-formed steel or wood framing in accordance with Chapter 6 of this code and the associated limitations in Section R301.2 of this code.
117. **[RB] SINGLE PLY MEMBRANE.** A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.
118. **[RB] SINGLE STATION SMOKE ALARM.** An assembly incorporating the detector, control *equipment* and alarm sounding device in one unit that is operated from a power supply either in the unit or obtained at the point of installation.
119. **[RB] SHINGLE FASHION.** A method of installing roof or wall coverings, water-resistive barriers, flashing or other building components such that upper layers of material are placed overlapping lower layers of material to provide drainage and protect against water intrusion at unsealed penetrations and joints or in combination with sealed joints.
120. **[RE] SKYLIGHT.** See Section N1101.6 for definition applicable in Chapter 11.
121. **[RB] SKYLIGHT AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, tubular daylighting devices, solariums, sunrooms, roofs and sloped walls are included in this definition.
122. **[RB] SKYLIGHT, UNIT.** A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the roof assembly while preserving the weather-resistant barrier of the roof.

123. **SLIP JOINT.** A mechanical-type joint used primarily on fixture traps. The joint tightness is obtained by compressing a friction-type washer such as rubber, nylon, neoprene, lead or special packing material against the pipe by the tightening of a (slip) nut.

124. **SLOPE.** The fall (pitch) of a line of pipe in reference to a horizontal plane. In drainage, the slope is expressed as the fall in units vertical per units horizontal (percent) for a length of pipe.

125. **[RB] SMOKE-DEVELOPED INDEX.** A comparative measure, expressed as a dimensionless number, derived from measurements of smoke obscuration versus time for a material tested in accordance with ASTM E 84 or UL 723.

126. **SOIL STACK OR PIPE.** A pipe that conveys sewage containing fecal material.

127. **[RE] SOLAR HEAT GAIN COEFFICIENT (SHGC).** The solar heat gain through a fenestration or glazing assembly relative to the incident solar radiation (Btu/h • ft^2 • °F).

128. **[RB] SOLID MASONRY.** Load-bearing or nonload-bearing construction using masonry units where the net cross-sectional area of each unit in any plane parallel to the bearing surface is not less than 75 percent of its gross cross-sectional area. Solid masonry units shall conform to ASTM C 55, C 62, C 73, C 145 or C 216.

129. **[RB] SPLINE.** A strip of wood structural panel cut from the same material used for the panel facings, used to connect two structural insulated panels. The strip (spline) fits into a groove cut into the vertical edges of the two structural insulated panels to be joined. Splines are used behind each facing of the structural insulated panels being connected as shown in Figure R610.8.

130. **STACK.** Any main vertical DWV line, including offsets, that extends one or more stories as directly as possible to its vent terminal.

131. **[RB] STACK BOND.** The placement of masonry units in a bond pattern is such that head joints in successive courses are vertically aligned. For the purpose of this code, requirements for stack bond shall apply to all masonry laid in other than running bond.

132. **STACK VENT.** The extension of soil or waste stack above the highest horizontal drain connected.

133. **[RB] STAIR.** A change in elevation, consisting of one or more risers.

134. **[RB] STAIRWAY.** One or more flights of stairs, either interior or exterior, with the necessary landings and connecting platforms to form a continuous and uninterrupted passage from one level to another within or attached to a building, porch or deck.

135. **[RB] STAIRWAY, SPIRAL.** A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

136. **[RB] STANDARD TRUSS.** Any construction that does not permit the roof-ceiling insulation to achieve the required *R*-value over the *exterior walls*.

137. **STATIONARY FUEL CELL POWER PLANT.** A self-contained package or factory-matched packages that constitute an automatically-operated assembly of integrated systems for generating useful electrical energy and recoverable thermal energy that is permanently connected and fixed in place.

138. **STORM SEWER, DRAIN.** A pipe used for conveying rainwater, surface water, subsurface water and similar liquid waste.

139. **[RB] STORY.** That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.

140. **[RB] STORY ABOVE GRADE PLANE.** Any *story* having its finished floor surface entirely above *grade plane*, or in which the finished surface of the floor next above is either of the following:

    1. More than 6 feet (1829 mm) *above grade plane*.
    2. More than 12 feet (3658 mm) above the finished ground level at any point.

141. **[RB] STRUCTURAL COMPOSITE LUMBER.** Structural members manufactured using wood elements bonded together with exterior adhesives.

    Examples of structural composite lumber are:

    1. **Laminated veneer lumber (LVL).** A composite of wood veneer elements with wood fibers primarily oriented along the length of the member, where the veneer element thicknesses are 0.25 inches (6.4 mm) or less.

2. **Parallel strand lumber (PSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.25 inch (6.4 mm) or less and their average lengths are not less than 300 times the least dimension of the wood strand elements.
3. **Laminated strand lumber (LSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 150 times the least dimension of the wood strand elements.
4. **Oriented strand lumber (OSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 75 times and less than 150 times the least dimension of the wood strand elements.

142. **[RB] STRUCTURAL INSULATED PANEL (SIP).** A structural sandwich panel that consists of a light-weight foam plastic core securely laminated between two thin, rigid wood structural panel facings.
143. **[RB] STRUCTURE.** That which is built or constructed.
144. **[RB] SUBSOIL DRAIN.** A drain that collects subsurface water or seepage water and conveys such water to a place of disposal.
145. **SUMP.** A tank or pit that receives sewage or waste, located below the normal *grade* of the gravity system and that must be emptied by mechanical means.
146. **SUMP PUMP.** A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.
147. **[RB] SUNROOM.** A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof.

    For definition applicable in Chapter 11, see Section N1101.6.
148. **SUPPLY AIR.** Air delivered to a *conditioned space* through ducts or plenums from the heat exchanger of a heating, cooling or ventilating system.
149. **SUPPORTS.** Devices for supporting, hanging and securing pipes, fixtures and *equipment*.
150. **SWEEP.** A drainage fitting designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line. Sweeps provide a longer turning radius than bends and a less turbulent flow pattern (see "Bend" and "Elbow").
151. **TEMPERATURE- AND PRESSURE-RELIEF (T AND P) VALVE.** A combination relief valve designed to function as both a temperature-relief and pressure-relief valve.
152. **TEMPERATURE-RELIEF VALVE.** A temperature-actuated valve designed to discharge automatically at the temperature at which it is set.
153. **[RB] TERMITE-RESISTANT MATERIAL.** Pressure-preservative treated wood in accordance with the AWPA standards in Section R318.1, naturally durable termite-resistant wood, steel, concrete, masonry or other *approved* material.
154. **[RB] THERMAL ISOLATION.** Physical and space conditioning separation from *conditioned space(s)* consisting of existing or new walls, doors or windows. The *conditioned space(s)* shall be controlled as separate zones for heating and cooling or conditioned by separate *equipment*.

    For definition applicable in Chapter 11, see Section N1101.6.
155. **[RE] THERMAL RESISTANCE, *R*-VALUE.** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot ft^2 \cdot °F/Btu$) ($m^2 \cdot K)/W$.
156. **[RE] THERMAL TRANSMITTANCE, *U*-FACTOR.** The coefficient of heat transmission (air to air) through a building envelope component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h $\cdot ft^2 \cdot °F$) $W/(m^2 \cdot K)$.

157. **[RB] THIRD-PARTY CERTIFICATION AGENCY.** An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.

158. **[RB] THIRD PARTY CERTIFIED.** Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

159. **[RB] THIRD-PARTY TESTED.** Procedure by which an approved testing laboratory provides documentation that a product material or system conforms to specified requirements.

160. **[RB] TOWNHOUSE.** A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from foundation to roof and with a *yard* or public way on not less than two sides.

161. **TRAP.** A fitting, either separate or built into a fixture, that provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or waste water through it.

162. **TRAP ARM.** That portion of a *fixture drain* between a trap weir and the vent fitting.

163. **TRAP PRIMER.** A device or system of piping to maintain a water seal in a trap, typically installed where infrequent use of the trap would result in evaporation of the trap seal, such as floor drains.

164. **TRAP SEAL.** The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

165. **[RB] TRIM.** Picture molds, chair rails, baseboards, handrails, door and window frames, and similar decorative or protective materials used in fixed applications.

166. **[RB] TRUSS DESIGN DRAWING.** The graphic depiction of an individual truss, that describes the design and physical characteristics of the truss.

167. **[RE] TUBULAR DAYLIGHTING DEVICE (TDD).** A nonoperable fenestration unit primarily designed to transmit daylight from a roof surface to an interior ceiling via a tubular conduit. The basic unit consists of an exterior glazed weathering surface, a light-transmitting tube with a reflective interior surface, and an interior-sealing device such as a translucent ceiling panel. The unit may be factory assembled, or field assembled from a manufactured kit.

168. **TYPE L VENT.** A *listed* and *labeled* vent conforming to UL 641 for venting oil-burning *appliances listed* for use with Type L vents or with gas *appliances listed* for use with Type B vents.

169. **[RE] *U*-FACTOR, THERMAL TRANSMITTANCE.** See Section N1101.6 for definition applicable in Chapter 11.

170. **[RB] UNDERLAYMENT.** One or more layers of felt, sheathing paper, nonbituminous saturated felt, or other *approved* material over which a roof covering, with a slope of 2 to 12 (17-percent slope) or greater, is applied.

171. **VACUUM BREAKER.** A device that prevents back-siphonage of water by admitting atmospheric pressure through ports to the discharge side of the device.

172. **[RB] VAPOR PERMEABLE.** The property of having a moisture vapor permeance rating of 5 perms (2.9×10^{-10} kg/Pa • s • m^2) or greater, where tested in accordance with the desiccant method using Procedure A of ASTM E 96. A vapor permeable material permits the passage of moisture vapor.

173. **[RB] VAPOR RETARDER CLASS.** A measure of the ability of a material or assembly to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E 96 as follows:

    1. Class I: 0.1 perm or less
    2. Class II: 0.1 < perm ≤1.0 perm
    3. Class III: 1.0 < perm ≤ 10 perm

174. **VENT.** A passageway for conveying flue gases from fuel-fired *appliances*, or their vent connectors, to the outside atmosphere.

175. **VENT COLLAR.** See "Flue collar."

176. **VENT CONNECTOR.** That portion of a venting system that connects the flue collar or draft hood of an *appliance* to a vent.

177. **VENT DAMPER DEVICE, AUTOMATIC.** A device intended for installation in the venting system, in the outlet of an individual, automatically operated fuel burning *appliance* and that is designed to open the venting system automatically where the *appliance* is in operation and to close off the venting system automatically where the *appliance* is in a standby or shutdown condition.
178. **VENT GASES.** Products of combustion from fuel-burning *appliances*, plus excess air and dilution air, in the venting system above the draft hood or draft regulator.
179. **VENT STACK.** A vertical vent pipe installed to provide circulation of air to and from the drainage system and that extends through one or more stories.
180. **VENT SYSTEM.** Piping installed to equalize pneumatic pressure in a drainage system to prevent trap seal loss or blow-back due to siphonage or back pressure.
181. **VENTILATION.** The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

    For definition applicable in Chapter 11, see Section N1101.6.
182. **VENTING.** Removal of combustion products to the outdoors.
183. **VENTING SYSTEM.** A continuous open passageway from the flue collar of an *appliance* to the outside atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a chimney and vent connector, if used, assembled to form the open passageway.
184. **VERTICAL PIPE.** Any pipe or fitting that makes an angle of 45 degrees (0.79 rad) or more with the horizontal.
185. **[RB] VINYL SIDING.** A shaped material, made principally from rigid polyvinyl chloride (PVC), that is used to cover exterior walls of buildings.
186. **[RB] WALL, RETAINING.** A wall not laterally supported at the top, that resists lateral soil load and other imposed loads.
187. **[RB] WALLS.** Walls shall be defined as follows:
    1. **Load-bearing wall.** A wall supporting any vertical load in addition to its own weight.
    2. **Nonbearing wall.** A wall which does not support vertical loads other than its own weight.
188. **WASTE.** Liquid-borne waste that is free of fecal matter.
189. **WASTE PIPE OR STACK.** Piping that conveys only liquid sewage not containing fecal material.
190. **WASTE RECEPTOR.** A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.
191. **WATER DISTRIBUTION SYSTEM.** Piping that conveys water from the service to the plumbing fixtures, *appliances*, appurtenances, *equipment*, devices or other systems served, including fittings and control valves.
192. **WATER HEATER.** Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system.
193. **WATER MAIN.** A water supply pipe for public use.
194. **WATER OUTLET.** A valved discharge opening, including a hose bibb, through which water is removed from the potable water system supplying water to a plumbing fixture or plumbing *appliance* that requires either an *air gap* or backflow prevention device for protection of the supply system.
195. **[RB] WATER-RESISTIVE BARRIER.** A material behind an *exterior wall* covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the *exterior wall* assembly.
196. **WATER SERVICE PIPE.** The outside pipe from the water main or other source of potable water supply to the water distribution system inside the building, terminating at the service valve.
197. **WATER SUPPLY SYSTEM.** The water service pipe, the water-distributing pipes and the necessary connecting pipes, fittings, control valves and appurtenances in or adjacent to the building or premises.
198. **WET VENT.** A vent that receives the discharge of wastes from other fixtures.
199. **WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM.** An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air for outdoor air where operating continuously or through a programmed intermittent schedule to satisfy the whole-house ventilation rate.

For definition applicable in Chapter 11, see Section N1101.6.

200. **[RB] WINDBORNE DEBRIS REGION.** Areas within *hurricane-prone regions* located in accordance with one of the following:

1. Within 1 mile (1.61 km) of the coastal mean high water line where the ultimate design wind speed, V_{ult}, is 130 mph (58 m/s) or greater.
2. In areas where the ultimate design wind speed, V_{ult}, is 140 mph (63.6 m/s) or greater; or Hawaii.

201. **[RB] WINDER.** A tread with nonparallel edges.

202. **[RB] WOOD STRUCTURAL PANEL.** A panel manufactured from veneers; or wood strands or wafers; bonded together with waterproof synthetic resins or other suitable bonding systems. Examples of wood structural panels are plywood, OSB or composite panels.

203. **[RB] YARD.** An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated.