CHAPTER 10
TRAPS, CLEAN-OUTS, AND INTERCEPTORS

We have covered most of the regulations you will need to know about drains and vents. This chapter will round out your knowledge. Here you will learn about traps. Traps have been mentioned before, and you have learned the importance of vents to trap seals, but here you will learn more about traps themselves.

Clean-outs are a necessary part of the drainage system. This chapter will tell you what types of clean-outs you can use and when and where they must be used. Along with clean-outs, backwater valves will be explained. Grease receptors, or grease traps as they are often called, will be explored. By the end of this chapter you should be prepared to tackle just about any DWV job.

CLEAN-OUTS

What are clean-outs, and why are they needed? Clean-outs are a means of access to the interior of drainage pipes. They are needed so that blockages in drains may be cleared. Without clean-outs, it is much more difficult to snake a drain. In general, the more clean-outs you have, the better. Plumbing codes establish minimums for the number of clean-outs required and their placement. Let’s look at how these regulations apply to you.

WHERE ARE CLEAN-OUTS REQUIRED?

There are many places in a plumbing system where clean-outs are required. Let’s start with sewers. All sewers must have clean-outs. The distances between these
Clean-outs vary from region to region. Generally, clean-outs are required where the building drain meets the building sewer. The clean-outs may be installed inside or outside the foundation. The clean-out opening must extend upward to the finished floor level or the finished grade outside.

Some jurisdictions prefer that the clean-outs at the junction of building drains and sewers be located outside. If the clean-out is installed inside, it may be required to extend above the flood level rim of the fixtures served by the horizontal drain. When this is not feasible, allowances may be made. The requirement for a

**Trade Tip**

Generally, clean-outs are required where the building drain meets the building sewer.
junction clean-out may be waived if there is another clean-out with at least a 3-inch diameter within 10 feet of the junction.

An approved two-way clean-out is allowed in locations where a building drain meets a building sewer. This clean-out is approved for both the building drain and the building sewer.

Once the sewer is begun, clean-outs should be installed every 100 feet. Some regions require clean-outs at an interval distance of 75 feet for 4-inch and larger pipe and 50 feet for pipe smaller than 4 inches. Clean-outs are also required in sewers when the pipe changes direction. Clean-outs are usually required every time a sewer turns more than 45 degrees. In some cases, a clean-out is required whenever the change in direction is more than 135 degrees. The general rule for a building sewer is to install a clean-out at intervals that do not exceed 100 feet. This is measured from the upstream entrance of the clean-out. When a building sewer has a diameter of 8 inches or more, the distance between clean-outs can be extended to 200 feet from the junction of the building drain and the building sewer at each change of direction and at intervals not more than 400 feet apart. For these larger sewers, all manholes and manhole covers must be of an approved type.

The clean-outs installed in a sewer must be accessible. This generally means that a stand-pipe will rise from the sewer to just below ground level. At that point, a clean-out fitting and plug are installed on the standpipe. This allows the sewer to be snaked out from ground level, with little to no digging required.

For building drains and horizontal branches, clean-out location will depend upon pipe size, but they are normally required every 50 feet for pipes with diameters of 4 inches or less. Larger drains may have their clean-outs spaced at 100-foot intervals. Clean-outs are also required on these pipes at each change in direction in excess of 45 degrees. Clean-outs must be installed at the end of all horizontal drain runs. Some jurisdictions do not require clean-outs at intervals less than 100 feet.

Clean-out openings must not be used for the installation of new fixtures, except where approved and where another clean-out with equal access and capacity is provided.

**Fastfact**

An approved two-way clean-out is allowed in locations where a building drain meets a building sewer.

**Trade tip**

Clean-outs are usually required every time a sewer turns more than 45 degrees.
As with most rules, there are some exceptions. Some potential exceptions are as follows:

- If a drain is less than 5 feet long and is not used for sinks or urinals, a clean-out is not required.
- A change in direction from a vertical drain with a fifth-bend does not require a clean-out.
- Clean-outs are not required on pipes other than building drains and their horizontal branches that are above the first-floor level.

P-traps and water closets are often allowed to act as clean-outs. When these devices are approved for clean-out purposes, the normally required clean-out fitting and plug at the end of a horizontal pipe run may be eliminated. Not all jurisdictions will accept P-traps and toilets as clean-outs; check your local requirements before omitting standard clean-outs.

Clean-outs must be installed in such a way that the clean-out opening is accessible and allows adequate room for drain cleaning. The clean-out must be installed to go with the flow. This means that when the clean-out plug is removed, a drain-cleaning device should be able to enter the fitting and the flow of the drainage pipe without difficulty.

Clean-outs are frequently required at the base of every stack. This is good procedure at any time, but it is not required by all codes. The height of the clean-out should not exceed 4 feet. Many plumbers install test tees at these locations to plug their stacks for pressure testing. The test tee doubles as a clean-out.

When the pipes holding clean-outs will be concealed, the clean-out must be made accessible. For example, if a stack will be concealed by a finished wall, provisions must be made for access to the clean-out. This access could take the form of an access door, or the clean-out could simply extend past the finished wall covering. If the clean-out is serving a pipe concealed by a floor, the clean-out must be brought up to floor level and made accessible. This ruling applies not only to clean-outs installed beneath concrete floors but also to those installed in crawlspaces with very little room to work.

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Clean-outs must be installed at the end of all horizontal drain runs.

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WHAT ELSE DO I NEED TO KNOW ABOUT CLEAN-OUTS?

There is still more to learn about clean-outs. Size is one of the lessons to be learned. Clean-outs are required to be the same size as the pipe they are serving unless the pipe is larger than 4 inches. If you are installing a 2-inch pipe, you must install 2-inch clean-outs. However, when a P-trap is allowed as a clean-out, it may be smaller than the drain. An example would be a 1.25-inch trap on a 1.5-inch drain. Remember, though, that not all code enforcement officers will allow P-traps as clean-outs, and they may require the P-trap to be the same size as the drain. Once the pipe size exceeds 4 inches, the clean-outs used should have a minimum size of 4 inches.

When a clean-out is installed in a floor, it may be required to have a minimum height clearance of 18 inches and a minimum horizontal clearance of 30 inches. No under-floor clean-out is allowed to be placed more than 20 feet from an access opening.

Clean-out plugs and caps must be lubricated with water-insoluble, non-hardening material or tape. Only listed thread tape or lubricants and sealants specifically intended for use with plastics can be used on plastic threads. Conventional pipe thread compounds, putty, linseed-oil based products, and unknown lubricants and sealants must not be used on plastic threads.

ACCEPTABLE TYPES OF CLEAN-OUTS

Clean-out plugs and plates must be easily removed. Access to the interior of the pipe should be available without undue effort or time. Clean-outs can take on many appearances. The “U” bend of a “P” trap can be considered a clean-out, depending upon local interpretation. A rubber cap, held onto the pipe by a stainless-steel clamp, can serve as a clean-out. The standard female adapter and plug is a
Did you know

When clean-outs are installed, they must provide adequate clearance for drain cleaning. The clearance required for pipes with diameters of 3 inches or more is 18 inches. Smaller pipes require a minimum clearance of 12 inches in front of their clean-outs. Many plumbers fail to remember this regulation. It is common to find clean-outs pointing toward floor joists or too close to walls. You will save yourself time and money by committing these clearance distances to memory.

Fine clean-out. Test tees will work as clean-outs. Special clean-outs, designed to allow the rodding of a drain in either direction, are acceptable.

Clean-outs with plate-style access covers shall be fitted with corrosion-resisting fasteners. Plastic clean-out plugs must conform to code requirements. Plugs used for clean-outs are to be constructed of plastic or brass. Countersunk heads are

FIGURE 10.2  A P-trap, like this one, can be used as a clean-out. Copyright 2002, International Code Council, Inc., Falls Church, Virginia. Reproduced with permission. All rights reserved.
required where raised heads might pose a tripping hazard. Brass clean-out plugs can be used only with metallic drain, waste, and vent piping.

**VERY BIG CLEAN-OUTS**

The ultimate clean-out is a manhole. You can think of manholes as very big clean-outs. When a pipe’s diameter exceeds a certain size, usually either 8 or 10 inches, manholes replace clean-outs. Manholes are typically required every 300 to 400 feet. Check your local code requirements. In addition, they are required at all changes in direction, elevation, grade, and size. Manholes must be protected againstflooding and equipped with covers to prevent the escape of gases. Connections with manholes are often required to be made with flexible compression joints. These connections must not be closer than 1 foot to the manhole and not further than 3 feet away.

**TRAPS**

Traps are required on drainage-type plumbing fixtures. No fixture is allowed to be double-trapped, and traps serving automatic clothes washers or laundry tubs must not discharge into a kitchen sink. With some fixtures, such as toilets, traps are not apparent because they are an integral component. The following regulations do not apply to integral traps, which are governed by regulations controlling the use of approved fixtures. Drawn brass tubing traps are not allowed for use with urinals.

Every trap for every fixture is required to have a trap seal that is made with a liquid, usually water that is not less than 2 inches and not more than 4 inches in depth. In special cases, the depth of a trap seal may vary. If there is a possibility
that a trap seal will be compromised through evaporation, the trap must be
equipped with a primer that will maintain the trap seal.

**P-TRAPS**

P-traps are the traps most frequently used in modern plumbing systems. These traps are self-cleaning and frequently have removable U-bends that may act as clean-outs, pending local approval. Fixture traps must be self-scouring and are not allowed to have interior partitions. An exception concerning interior partitions comes into play with integral traps and traps that are constructed of an approved material that is resistant to corrosion and degradation. P-traps must be properly vented. Without adequate venting, the trap seal can be removed by backpressure. Slip joints must be made with an approved elastomeric gasket and can only be installed on the trap inlet, trap outlet, and within the trap seal.

**S-TRAPS**

S-traps were very common when most plumbing drains came up through the floor instead of out from a wall. Many S-traps are still in operation, but they are no longer allowed in new installations. S-traps are subject to losing their trap seal through self-siphoning.

**DRUM TRAPS**

Drum traps are not normally allowed in new installations without special permission from the code officer. The only occasion when drum traps are still used
frequently is when they are installed with a combination-waste-and-vent system. It is acceptable to use drum traps when they are used as solids interceptors and when they serve chemical waste systems.

**BELL TRAPS**

Bell traps are not allowed for use in new installations.

**HOUSE TRAPS**

House traps are no longer allowed; they represent a double trapping of all fixtures. Local codes may allow house traps under certain circumstances. House traps were once installed where the building drain joined with the sewer. Most house traps were installed inside the structure, but a fair number were installed outside underground. Their purpose was to prevent sewer gas from coming out of the sewer and into the plumbing system. But house traps make drain cleaning very difficult and they create a double-trapping situation, which is not allowed. This regulation, like most regulations, is subject to amendment and variance by the local code official.

**CROWN-VENTED TRAPS**

Crown-vented traps are not allowed in new installations. These traps have a vent rising from the top of the trap. As you learned earlier, crown venting must be done at the trap arm, not the trap.

**OTHER TRAPS**

Traps that depend on moving parts or interior partitions are not allowed in new installations.

**DOES EVERY FIXTURE REQUIRE AN INDIVIDUAL TRAP?**

Basically, every fixture requires an individual trap, but there are exceptions. One such exception is the use of a continuous waste to connect the drains from multiple sink bowls to a common trap. This is done frequently with kitchen sinks.

There are some restrictions involving the use of continuous wastes. Let’s take a kitchen sink as an example. When you have a double-bowl sink, it is okay to use a continuous waste as long as the drains from each bowl are no more than 30 inches apart and neither bowl is more than 6 inches deeper than the other bowl.
Some jurisdictions require that all sinks connected to a continuous waste must be of equal depth. Exceptions to this rule do exist.

What if your sink has three bowls? Three-compartment sinks may be connected with a continuous waste. You may use a single trap to collect the drainage from up to three separate sinks or lavatories, as long as the sinks or lavatories are next to each other and in the same room. But the trap must be in a location central to all sinks or lavatories.

**TRAP SIZES**

Trap sizes are determined by the local code. A trap may not be larger than the drainpipe it discharges into.

**TAILPIECE LENGTH**

The tailpiece between a fixture drain and the fixture’s trap may not exceed 24 inches.

**STANDPIPE HEIGHT**

A standpipe, when installed, must extend at least 18 inches but not more than 42 inches above the trap. The standpipe should not extend more than 4 feet from the trap. Some local codes require that a standpipe not exceed a height of more than 2 feet above the trap. Plumbers installing laundry standpipes often forget this regulation. When setting your fitting height in the drainage pipe, keep in mind the

**Fastfact**

Traps must be installed level in order for the trap seal to function properly.
height limitations on your standpipe. Otherwise, your take-off fitting may be too low, or too high, to allow your standpipe receptor to be placed at the desired height. Traps for kitchen sinks may not receive the discharge from a laundry tub or clothes washer.

**PROPER TRAP INSTALLATION**

There is more to proper trap installation than location and trap selection. Traps must be installed level in order for the trap seal to function properly. An average trap seal will consist of 2 inches of water. Some large traps may have a seal of 4 inches, and where evaporation is a problem, deep-sealing traps may have a deeper water seal. The positioning of the trap is critical for the proper seal. If the trap is cocked, the water seal will not be uniform and may contribute to self-siphoning.

When a trap is installed below grade and must be connected from above grade, the trap must be housed in a box of some kind. An example of such a situation would be a trap for a tub waste. When installing a bathtub on a concrete floor, the trap is located below the floor. Since the trap cannot be reasonably installed until after the floor is poured, access must be made for the connection. This access, frequently called a tub box or trap box, must provide protection against water, insect, and rodent infiltration.

**WHEN IS A TRAP NOT A TRAP?**

One type of trap we have not yet discussed is a grease trap. The reason we haven’t talked about grease traps is that they are not really traps; they are interceptors. They are frequently called grease traps, but they are actually grease interceptors. There is a big difference between a trap and an interceptor. Grease traps must conform to PDI G101 and must be installed in accordance with the manufacturer’s instructions.

The vented flow control device must be located so that there are no system vents between the flow control and the grease trap inlet. The vent or air inlet of the flow control device must connect with the sanitary drainage vent system as elsewhere required by the code or terminate through the roof of the building and not terminate to the free atmosphere inside the building.

**Trade Tip**

Grease traps must be equipped with devices to control the rate of water flow so that the water flow does not exceed the rated flow of the trap.
Grease interceptor with solids interceptor servicing dishwasher with pre-rinse station and food grinder—flow control air intake terminates above flood level.

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Traps are meant to prevent sewer gas from entering a building. Traps do not restrict what goes down the drain, only what comes up the drain. Of course, traps do prevent objects larger than the trap from entering the drain, but this is not their primary objective.

Interceptors, on the other hand, are designed to control what goes down a drain. Interceptors are used to keep harmful substances from entering the sanitary drainage systems. Separators, because they separate the materials entering them and retain certain materials while allowing others to continue into the drainage system, are also required in some circumstances. Interceptors are used to control grease, sand, oil, and other materials.

There are some guidelines provided in plumbing codes for interceptors and separators. The capacity of a grease interceptor is based on two factors, grease retention and flow rate. Capacity determinations are typically made by a professional designer. The size of a receptor or separator is also normally determined by a design expert.

A grease trap or grease interceptor is required to receive the drainage from fixtures and equipment with grease-laden waste located in food preparation areas, such as in restaurants, hotel kitchens, hospitals, and so forth.

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**Did you know**

Grease traps must be equipped with devices to control the rate of water flow so that the water flow does not exceed the rated flow of the trap. A flow-control device must be vented. The vent cannot terminate less than 6 inches above the flood rim level and must be installed in accordance with the manufacturer’s instructions.

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**Pro pointer**

Interceptors and separators are required when conditions provide an opportunity for harmful or unwanted materials to enter a sanitary drainage system. When oil, grease, sand, or other harmful substances are likely to enter a drainage system, an interceptor is required. For example, a restaurant is required to be equipped with a grease interceptor. An oil separator would be required for a building where automotive repairs are made. Interceptors and separators must be designed for each individual situation. There is no rule-of-thumb method for choosing the proper interceptor or separator without expert design.
Where food waste grinders connect to grease traps or grease interceptors, the interceptors must be sized and rated for the discharge of the food waste grinder. Grease traps and interceptors are not required in private living quarters and individual dwelling units.

Interceptors for sand and other heavy solids must be readily accessible for cleaning. These units must contain a water seal of not less than 6 inches. Some codes require a minimum water depth of only 2 inches. When an interceptor is used in a laundry, a water seal is not required. Laundry receptors, used to catch lint, string, and other objects, are usually made of wire and they must be easily removed for cleaning. Their purpose is to prevent solids with a diameter of .5 inch or more from entering the drainage system.

**TABLE 10.1** Capacity of grease interceptors. *Copyright 2006, International Code Council, Inc., Falls Church, Virginia. Reproduced with permission. All rights reserved.*

<table>
<thead>
<tr>
<th>TOTAL FLOW-THROUGH RATING (gpm)</th>
<th>GREASE RETENTION CAPACITY (pounds)</th>
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For SI: 1 gallon per minute = 3.785 L/m, 1 pound = 0.454 kg.
a. For total flow-through ratings greater than 100 (gpm), double the flow-through rating to determine the grease retention capacity (pounds).
Backwater valves are essentially check valves. They are installed in drains and sewers to prevent the backing up of waste and water in the drain or sewer. Backwater valves are required to be readily accessible and must be installed whenever a drainage system is likely to encounter backups from the sewer.

The intent behind backwater valves is to prevent sewers from backing up into individual drainage systems. Buildings that have plumbing fixtures below.

**Codealert**

Fixtures and equipment to include:
1. Pot sinks
2. Pre-rinse sinks
3. Soup kettles or similar devices
4. Wok stations
5. Floor drains
6. Sinks into which kettles are drained
7. Automatic hood wash units
8. Dishwashers without prerinse sinks

Grease interceptors and automatic grease removal devices will only receive wastes from fixtures and equipment that allow fats, oils, or grease discharge. Emulsifiers, chemicals, enzymes, and bacteria must not discharge into the food waste grinder.

**BACKWATER VALVES**

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**Did you know**

Oil separators are required at repair garages, gasoline stations with grease racks, grease pits or work racks, car washing facilities with engine or undercarriage cleaning capability, and factories where oily and flammable liquid wastes are produced. The separators must keep oil-bearing, grease-bearing, and flammable wastes from entering the building drainage system or other point of disposal.

Other types of separators are used for various plants, factories, and processing sites. The purpose of all separators is to keep unwanted objects and substances from entering the drainage system. Vents are required if it is suspected that these devices will be subject to the loss of a trap seal. All interceptors and separators must be readily accessible for cleaning, maintenance, and repairs.
the level of the street where a main sewer is installed are candidates for back-water valves.

This concludes our section on traps, clean-outs, interceptors, and other drainage-related regulations. While this is a short chapter, it is an important one. You may not have a need for installing manholes or backwater valves every day, but, as a plumber, you will frequently work with traps and clean-outs.