14.01 Where is double wall piping required?
Double wall piping is required by nearly all regulations for underground fuel piping. Aboveground piping is often required to be double contained by State and local regulations – however, requirements vary widely. NFPA 30 requirements for piping allow for single wall piping, however, piping within walls or otherwise inaccessible needs to have welded pipe joints.

In practice, most technical building have double wall piping within buildings for all piping that can contain fuel. Vent piping is typically single wall.

14.02 What are common pipe materials?
The primary underground pipe materials are:

- Fiberglass piping – primary and secondary
- Flexible double wall plastic piping
- Steel primary piping with a fiberglass or coated steel containment

The primary aboveground pipe materials are

- Schedule 40 carbon steel pipe for primary
- Schedule 10 carbon steel pipe for secondary

There is a PVC secondary containment pipe that is approved for inside building applications in some jurisdictions.
15.01 What are common types of underground piping?
The primary underground pipe materials are:

- Fiberglass piping – primary and secondary. There are 2 primary providers of fiberglass pipe in the US: Smith Fiberglass and Ameron

- Flexible double wall plastic piping. Flexible plastic piping has had a mixed history based on failures associated with some of the earlier versions of the products. There are currently 2 primary providers of flexible plastic piping in the US: EBW (Franklin) and OPW (Environ)

- Steel primary piping with a fiberglass or coated steel containment. The primary providers of these piping systems are Perma-Pipe and Rovanco.

15.02 What are the benefits of fiberglass piping systems? The primary benefits of fiberglass underground piping are:

- Proven history of installation and operational success and proven secondary containment systems
- Local qualified installation specialists and local material and parts availability
- Inherent corrosion protection, and internal chemical resistance for fuel additives
- Relative ease of installation and flexibility for a nearly any system configuration

15.03 What are the benefits of pre-engineered piping systems? The benefits of pre-engineered systems are:

- Ability to place multiple primary pipes within a single containment jacket
- Pre-assembly can minimize installation labor
- Welded steel piping provides highest strength pipeline to resist ground and thermal loads
- Lowest costs for long piping runs

15.04 What are the benefits of flexible piping system? The benefits of flexible plastic piping are:

- Ease of installation
- Lack of pipe joints for runs up to 250 feet

15.05 What are common problems with underground pipe systems? Common problems with underground pipe systems

- Workmanship of joints causes re-work after testing
- Damage to piping from excavation or drilling
- Damage to piping during backfill, compaction, and surface paving
- Damage to piping from ground or surface loads or thermal changes
- Thermal expansion / contraction causes leaks at pipe joints and sump fittings
- Leakage at pipe penetrations to tank sumps

15.06 What are typical maintenance / inspection requirements for underground piping? During installation, piping should be inspected and pressure tested in accordance with the manufacturers requirements prior to backfilling. Typically a local inspection by building or fire officials is required at this point. Underground piping primary and secondary should also be pressure tested after backfilling is complete and prior to the system being placed into service. This helps protect against the problem of damage during backfilling and surface paving.
California regulations will require an enhanced leak detection test for underground fuel piping. The test, performed by a qualified testing service, includes pressurizing the pipe with a tracer gas, and checking the piping run for leakage.

Underground piping systems are inherently difficult to inspect. However since many problems occur where the piping enters tank sumps and building, these areas should be inspected on a regular basis, at least monthly.

Underground piping system, including secondary containment should be pressure tested at least annually. Many State and local regulations require annual testing.

16.01 What are common types of aboveground piping?
Aboveground piping for fuels is typically carbon steel piping. Regulations prohibit pipe materials such as plastics that would have a relatively low failure temperature in the event of a fire.

Schedule 40 carbon steel black pipe is typical for primary piping. Schedule 10 carbon steel black pipe is typically used for secondary piping.

Double wall piping in buildings is sometimes provided as pre-engineered piping such as that made by Perma-Pipe and Rovanco. Many mechanical contractor also shop fabricate their own secondary containment systems.

16.02 Should aboveground pipe be threaded or welded?
Aboveground piping may be threaded or welded. We highly recommend welded pipe joints for aboveground piping to minimize the risk of leaks. Either butt weld or socket weld fittings are appropriate.

There are locations where welded joints are not practical and threaded joints are allowed: connection to tanks and equipment, connections to existing fuel system piping, and connection to threaded valves and accessories.

Threaded pipe fittings are commonly malleable iron – not cast iron, and are typically Class 150 or Class 300 rated. Many contractors use forged fittings for unions, because of their superior sealing characteristics, or replace unions with flange connections.

16.03 Is secondary containment required for aboveground piping?
Aboveground piping is often required to be double contained by State and local regulations – however, requirements vary widely. NFPA 30 requirements for piping allow for single wall piping, however, piping within walls or otherwise inaccessible needs to have welded pipe joints.

In practice, most technical building have double wall piping within buildings for all piping that can contain fuel. Vent piping is typically single wall.
16.04 What are common problems with aboveground piping? The common problems with aboveground piping are:

- Leaks at threaded joints and unions
- Inadequate pipe supports or pipe supports that do not allow for expansion / contraction
- Vibration in piping caused by pumps or fluid hammer
- Over-pressurization from missing or inadequate pressure relief devices

16.05 Does aboveground exterior piping need to be heat traced?
In cold weather climates there is a concern for maintaining the functionality of critical fuel systems in freezing weather. In general a winter blend of #1 and #2 diesel fuel will lower the cloud point to about -10 degrees F and the pour point to minus 30. However this may be borderline for many users, and for that reason exterior piping is often heat traced and insulated.

The problem with cold weather performance is often not the fuel itself, but any water that may be present in trace amounts in the fuel. This water can accumulate within the cavities of valves and other equipment, so it is important that these devices also be heat traced and insulated, or located within heated enclosures.

17.01 What are common types of piping in buildings?

Fuel piping inside buildings is typically carbon steel piping. Regulations prohibit pipe materials such as plastics that would have a relatively low failure temperature in the event of a fire.

Schedule 40 carbon steel black pipe is typical for primary piping. Schedule 10 carbon steel black pipe is typically used for secondary piping.

Double wall piping in buildings is sometimes provided as pre-engineered piping such as that made by Perma-Pipe and Rovanco. Many mechanical contractor also shop fabricate their own secondary containment systems.

17.02 Should pipe in buildings be threaded or welded?

Aboveground piping may be threaded or welded. We highly recommend welded pipe joints for aboveground piping to minimize the risk of leaks. Either butt weld or socket weld fittings are appropriate.

There are locations where welded joints are not practical and threaded joints are allowed: connection to tanks and equipment, connections to existing fuel system piping, and connection to threaded valves and accessories.

Threaded pipe fittings are commonly malleable iron – not cast iron, and are typically Class 150 or Class 300 rated. Many contractors use forged fittings for unions, because of their superior sealing characteristics, or replace unions with flange connections.
17.03 Is secondary containment required for piping in building?
Aboveground piping is often required to be double contained by State and local regulations – however, requirements vary widely. NFPA 30 requirements for piping allow for single wall piping, however, piping within walls or otherwise inaccessible needs to have welded pipe joints. In practice, most technical building have double wall piping within buildings for all piping that can contain fuel. Vent piping is typically single wall.

An alternative for piping inside buildings is single wall piping within floor trences designed for fluid containment. This piping arrangement is often used in generator rooms to simplify pipe routing, and to allow for gravity return flow from day tanks.

17.04 Is fire protection required for pipe in buildings and how is it provided?
Local regulations may require fire protection for fuel piping in buildings where it is routed outside special rooms such as generator rooms, boiler rooms, and tank storage rooms. Typically 2 hour fire protection is required.

A typical method of providing the fire protection is by insulating the pipe with fire rated insulation.

A common alternative method is to route the piping through fire rated shafts which are often provided for utility risers in multi-story building.

Either method prevents visual inspection of the piping, so double contained pipe with leak detection is typically used.

17.05 What are requirements for fire-stops for pipe in building?
Where fuel piping passes through building walls the fire rating of the wall must be maintained by using approved fire-stop sealant around the pipe penetration.

17.06 What are emergency valves and where should they be located?
Emergency valves are installed in fuel piping to provide shutoff in the case of a fire event. The most common type of emergency valve is a normally closed valve, held open by a fusible link which fails at 165 degrees F.

Emergency shutoff valves are located immediately inside the wall of a building or room, so that a fire in the room will close and isolate the valve. In some installations an emergency valve is located at each generator, to protect against a fire related failure of the fuel hoses at the generator.

Many common emergency valves are not UL or FM approved. Common brands of approved valves are Jamesbury and Essex. These valves include valves that are fire rated, and a fail-safe close mechanism, held open but a fusible link.