

GRAPHICAL SYMBOLS FOR DRAWINGS¹

Symbol	Description of Item	Typical units
W_a	weight of dry air	lb
W_v	weight of water	lb
x	quality of vapor	percentage
z	concentration	lb per lb of mixture
z	thickness, distance	ft
Z	vertical distance from horizontal datum plane	ft
Z	Gibbs function, $H - TS$	Btu, Btu per lb
α	thermal diffusivity	sq ft per hr
α	absorptivity (radiation)	percentage
β	coefficient of thermal volumetric expansion	1/F
γ	ratio of specific heats, c_p/c_v	
γ	exponent of isentropic expansion or compression	
Δ	difference between values	
ϵ	emissivity	percentage
η	efficiency	percentage
ν	degree of saturation	percentage
μ	viscosity, dynamic	lb per (ft)(sec)
μ_a	viscosity, absolute	(lb)(sec) per sq ft
ν	viscosity, kinematic	sq ft per sec
ρ	density, 1/v	lb per cu ft
σ	Stefan-Boltzmann constant	Btu per (hr)(sq ft)
τ	time	sec, hr
ϕ	relative humidity, ps/P_s	percentage
ϕ	Helmholtz free energy, $U - TS$	Btu, Btu per lb

SUBSCRIPTS

These are to be affixed to the appropriate symbols. Several subscript may be used together to denote combinations of various states, points, or paths. Often the subscript indicates that a particular property is to be kept constant in a process.

- a, b, ... referring to different phases, states or physical conditions of a substance, or to different substances
- air
- a ambient
- b barometric (pressure)
- c referring to critical state or critical value
- c convection
- db dry bulb
- dp dew point
- e base of natural logarithms
- f referring to saturated liquid
- f film
- fg referring to evaporation or condensation
- f friction
- g referring to saturated vapor
- h referring to a process having no change in enthalpy
- H water vapor
- i referring to saturated solid
- i internal
- v referring to change of phase in melting
- q referring to change of phase in sublimation
- k kinetic
- L latent
- m mean value
- M molar basis
- e referring to initial or standard states or conditions
- p referring to constant pressure conditions or processes
- p potential
- r refrigerant
- r radiant or radiation
- s saturated water vapor
- s sensible
- s referring to isentropic conditions or processes
- s static (pressure)
- s surface
- t total (pressure)
- T referring to isothermal conditions or processes
- v referring to constant volume conditions or processes
- v vapor
- v velocity (pressure)
- w wall
- w water
- w wet bulb
- 1, 2, ... different points in a process, or different instants of time

Piping

Heating

High-Pressure Steam
Medium-Pressure Steam
Low-Pressure Steam
High-Pressure Return
Medium-Pressure Return
Low-Pressure Return
Boiler Blow Off
Condensate or Vacuum
Pump Discharge
Feedwater Pump Discharge
Make-Up Water
Air Relief Line
Fuel Oil Flow
Fuel Oil Return
Fuel Oil Tank Vent
Compressed Air
Hot Water Heating Supply
Hot Water Heating Return

Air Conditioning

Refrigerant Discharge
Refrigerant Suction
Circulating Water Flow
Circulating Water Return
Condenser Water Flow
Condenser Water Return
Chilled Water Flow
Chilled Water Return
Make-Up Water
Humidification Line
Drain
Brine Supply
Brine Return

Plumbing

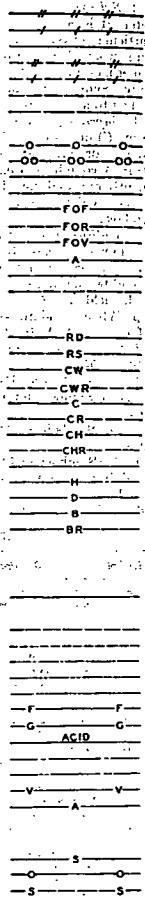
Soil, Waste, or Leader
(Above Grade)
Soil, Waste, or Leader
(Below Grade)
Vent
Cold Water
Hot Water Return
Fire Line
Gas
Acid Waste
Drinking Water Flow
Drinking Water Return
Vacuum Cleaning
Compressed Air

Sprinklers

Main Supplies
Branch and Head
Drain

Valves

Check Valve



Abbreviations and Symbols

Angle Check Valve

Stop Cock

Valve, Diaphragm

Valve, Float Operated

Gate Valve, Elevation

Gate Valve, Plan

Gate Valve, Motor Operated

Angle Gate Valve, Elevation

Angle Gate Valve, Plan

Globe Valve, Elevation

Globe Valve, Plan

Globe Valve, Motor Operated

Angle Globe Valve, Elevation

Angle Globe Valve, Plan

Valve, Lock and Shield

Valve, Air Line

Water Regulating Valve,
Pressure Operated

Valve, Quick Opening

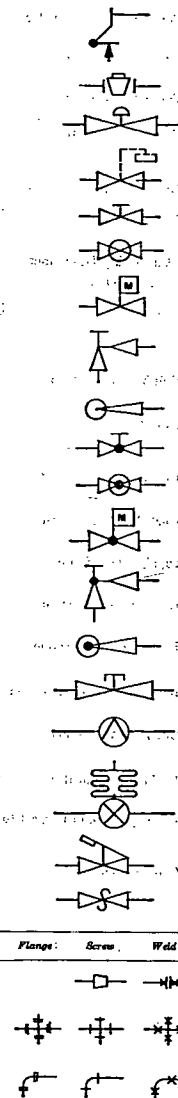
Safety Valve

Fittings

Bushing

Cross

Elbow, 90°



Fittings (Continued)

Elbow, 45°

Elbow, turned up

Elbow, turned down

Elbow, reducing

Elbow, base

Elbow, long radius

Elbow, double branch

Elbow, side outlet, outlet up

Elbow, side outlet, outlet down

Flange, expansion joint

Flange, reducing

Joint

Reducer, concentric

Reducer, eccentric

Sleeve

Tee

Tee, outlet up

Tee, outlet down

Tee, side outlet, outlet up

Tee, side outlet, outlet down

Tee, single sweep

¹ Extracted from: American Standard Graphical Symbols for Pipe Fittings, Valves, and Piping (ASA E22.2.3-1949) and American Standard Graphical Symbols for Heating, Ventilating, and Air Conditioning (ASA E22.2.4-1949) with the permission of the publisher, The American Society of Mechanical Engineers.