4. Graphs and charts

Overview

Purpose

Graphs and charts are what you use to represent facts, statistics, or the relationship between physical properties. A visual or graphical description is often easier to understand than a numerical or verbal description. The gas technician/fitter must know how to read and correctly interpret the many types of graphs and charts in the gas industry.

Objectives

At the end of this Chapter, you will be able to:

- identify types of graphs and charts; and
- locate data on graphs.

Terminology

Term	Abbreviation (symbol)	Definition
Chart		Visual or graphical representation of data
Graph		Same as chart

Types of graphs and charts

A graph or chart is a line or diagram showing how one quantity depends on, changes, or relates with, another. Graphs and charts represent facts, statistics, or the relationship between physical properties. A visual or graphical description is often easier to understand than a numerical or verbal description.

Applications

You use graphs and charts in three general ways:

- for graphical presentation of information;
- for graphical analysis; and
- for computing or determining values.

The type of graph or chart you use in an application depends on any of the following factors:

- the audience it is directed at;
- the best type of graph to represent the information;

9) Match the word/phrase that correctly completes each sentence/statement:

a) A/An _____ gives no regard to spatial considerations because only the parts and their functions are important in these drawings. It does not show the actual size, shape, or location of components or devices within the system but rather emphasizes connections, functions, and flow:	Detail or assembly
b) _____ visually represent pipes, fittings, valves, and other components, so they clearly illustrate and explain a piping system and how it operates:	Schematic
c) Piping drawings can be either orthographic or _____. The latter often shows all the pieces in symbol form.	Schedule
d) A/An _____ projection is a two-dimensional look at an object.	Isometric
e) _____drawings show an object as it actually appears, with height, length, and width depicted in a single, three-dimensional view:	Orthographic
f) _____ drawings show a small part of the entire project in great detail.	Lines and symbols
g) A/An _____ list shows details such as colour, terminal locations, etc., and they are often an attachment to a wiring diagram:	Pictorial

10) Match the correct word/phrase to complete each statement:

a) A mechanical drawing scale that reads 1:2 means the drawing is _____ actual size:	Specification
b) A Specifications Book is a _____of the work to be performed:	Bill of materials
c) The purpose of the Revision Block for any mechanical drawing is to list any and all revisions made after the _____drafting of the print:	One Unit
d) A/An enlarged scale of 12:1 on a mechanical drawing means that 12 measuring Units on the print equal _____ of the object:	One-half
e) In most instances, when there is a disagreement between the Mechanical Drawing and the Specification, the _____is usually considered to be correct:	Initial
f) A Materials Block is also referred to as _____. It lists the number and size of each part for the object(s) on that print:	Written description

- the general purpose of the graph;
- the significant features or relationships of the information;
- the way the graph will be used; and
- the type or amount of information.

Types of graphs and charts

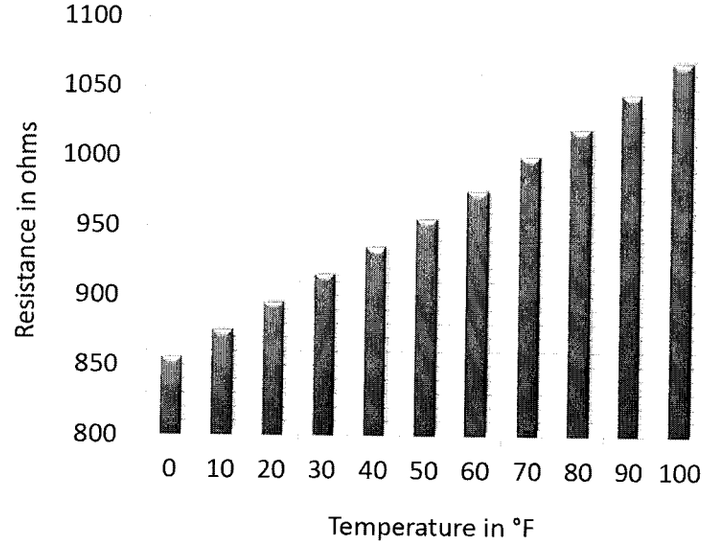
Four common graphs and charts are the:

- bar graph (also called bar or column chart);
- pie chart (also called sector chart);
- X-Y graph (rectangular coordinate line graph); and
- flow chart.

Bar graph

Bar graphs are visual representations of numerical values by bars or columns of different lengths. The bars, which may be vertical or horizontal, begin at a baseline and indicate the relationship between two or more related variables. In Figure 4-1, the two variables are temperature in °F and resistance in ohms for a resistance temperature detector (RTD).

Figure 4-1
Sample bar graph



Bar charts are particularly suitable for the following purposes:

- to present information to a non-technical audience;
- to represent small numbers of plotted values;
- to make a simple comparison of two values along two axes; and
- to represent data for a total period relative to point data.

Disadvantages

Bar charts are not particularly suitable for the following purposes:

- for comparing several series of data; and
- for plotting large numbers of values.

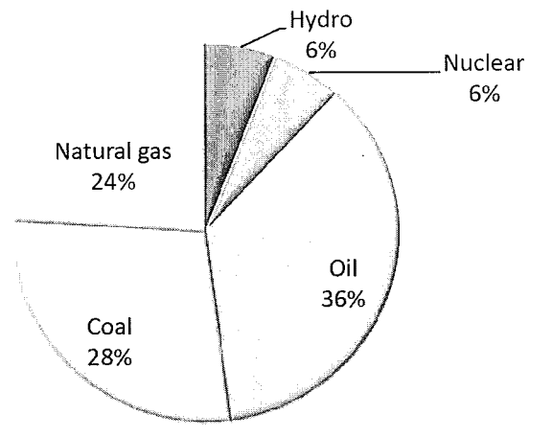
Pie Chart

You use pie charts to compare individual parts in relation to their total by representing them as sectors of a circular area. Its common uses are the following:

- to visually present data on a percentage basis;
- to present a general overall view of certain information;
- to show the relationship between a small number of values; and
- to emphasize the amount of data rather than a trend.

The pie chart in Figure 4-2 represents world energy consumption by fuel type for the year 2006. This example shows each fuel type as its percentage of the whole.

Figure 4-2
Sample pie chart



X-Y graph

X-Y graphs have the values of two related variables plotted as points on a coordinates grid. The points are then joined together successively to form a continuous line or curve.

X-Y graphs have the following purposes:

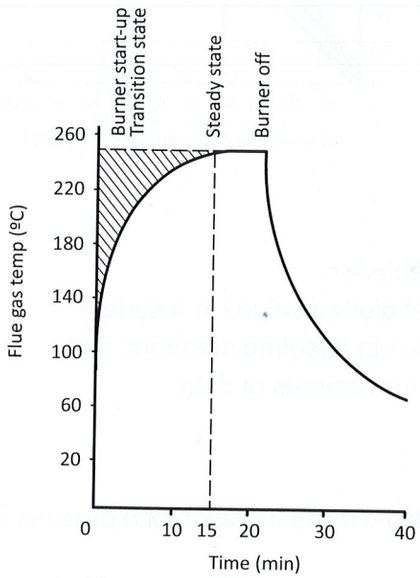
- to compare large numbers of values in a compact space;
- to compare the trends of several curves on one graph; and
- to calculate values that fall between the plotted points.

Reading X-Y graphs

On X-Y graphs, you see the values of the two variables plotted with reference to two axes that are perpendicular to one another, meeting at a common *origin* or *zero point*.

The curve on the X-Y graph in Figure 4-3 represents the relationship between flue gas temperature and the operating time of a burner. The x-axis is the time of burner operation in minutes and the y-axis is the flue gas temperature in degrees Celsius.

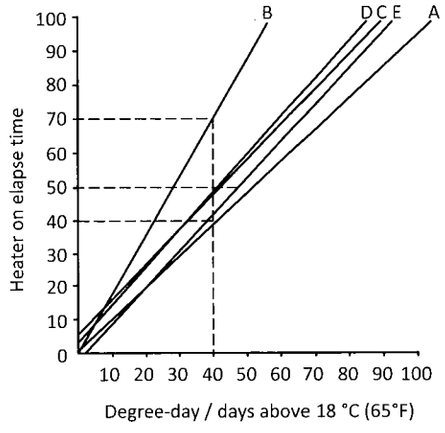
Figure 4-3
Sample X-Y graph



Flue gas temperature change during a transition operation for a burner adjusted to 120 000 Btuh.

The five lines labelled A, B, C, D, and E on the X-Y graph in Figure 4-4 represent the relationship between outside air temperature (x-axis) and the operating time (y-axis) of each of five different building's heating systems.

Figure 4-4
An X-Y graph showing outside air temperature vs. heating system operating times



Disadvantages

X-Y graphs are generally unsuitable for:

- representing small numbers of plotted values in a series;
- showing changes or differences in absolute amounts; and
- showing extreme or irregular movements of data.

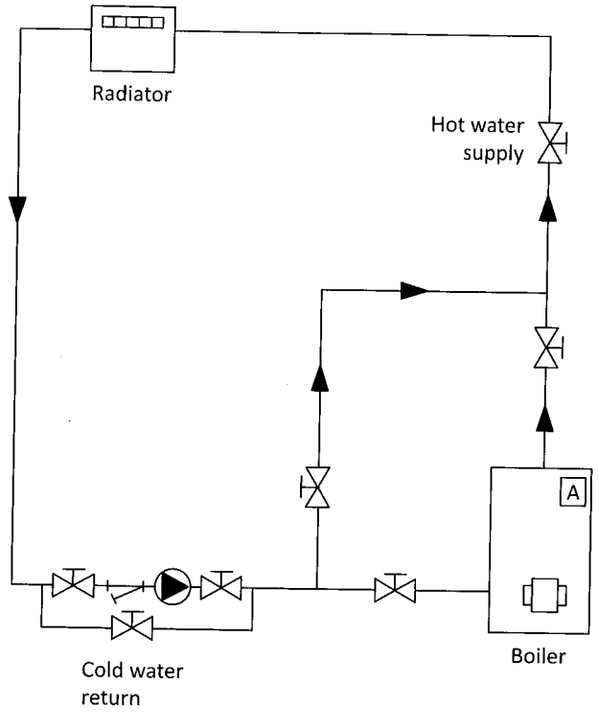
Flow chart

A flow chart is generally a schematic representation of a process flow, showing the information in several ways, including:

- pictorial form;
- schematic symbols;
- labelled blocks; and
- combinations of all three.

The flow chart in Figure 4-5 shows the water circulation flow-path through a hot-water heating system. In Figure 4-5, the arrowheads indicate the direction of water flow through the system, schematic symbols represent the valves, and the boiler and radiator are in pictorial form.

Figure 4-5
Flow chart showing water circulation through a hot-water heating system



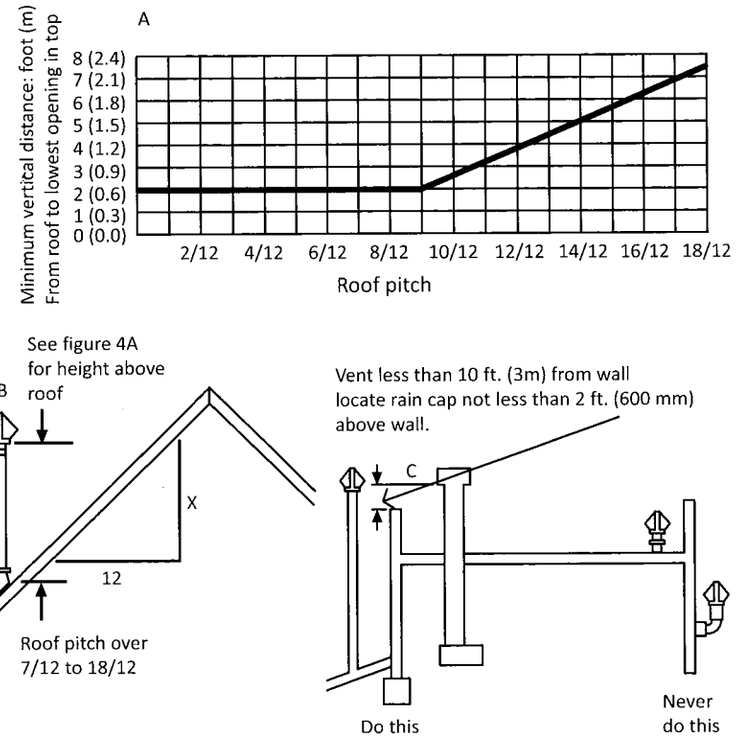
Locating data on graphs

The X-Y chart in Figure 4-6 is what you use to determine the correct termination height for a vent on roofs with a pitch greater than 9/12. You can see the roof pitch values along the x-axis, and the minimum allowable vertical distance from the roof surface to the lowest opening in the top along the y-axis.

To determine the correct termination height for a vent or chimney, using this chart, do the following:

1) Determine the pitch of the roof (x-axis).
2) Locate the point on the diagonal line in the chart that coincides with the roof pitch by tracing a line from the roof pitch value vertically up the y-axis.
3) Trace the horizontal line nearest the point where the roof pitch value crosses the diagonal line back to the distance scale along the y-axis.
4) The corresponding value on the y-axis scale indicates the minimum allowable vertical distance between the vent or chimney discharge and the nearest obstruction or opening.

Figure 4-6
An X-Y graph showing vent termination heights



Assignment Questions – Chapter 4

1) Which of the following is not a general way graphs and charts are used?
   a) Determining location of equipment
   b) Graphical presentation of information
   c) Graphical analysis
   d) Computing or determining values

2) Which type of chart compares individual parts in relation to their total and displays this relationship as sectors of a circular area?
   a) Flow chart
   b) Eye chart
   c) Pie chart

3) Which type of chart is (generally) a schematic representation of a process?
   a) Flow chart
   b) Eye chart
   c) Pie chart