

U.S. Fire Administration / National Fire Academy

# Coffee Break Training

## Topic: Plastics (Part II: Plastic Groups)

**Learning Objective:** The student shall be able to explain the characteristics of different plastic groups.

In the past 50 years, plastics made from petroleum have changed our lives forever. Elastomers and natural rubber products have been around longer, but every day we handle products that are made from one or more of these materials.

The amount of additional fuel these products adds to a fire may be substantial. We describe this as “heat of combustion” and measure it in Btu/lb (J/kg). To compare, here are the average heat of combustion values for some common materials.

| Material | Avg. Heat of Combustion |                         |
|----------|-------------------------|-------------------------|
|          | Btu/lb                  | J/kg                    |
| Paper    | 7,000                   | 16,282,000              |
| Wood     | 8,000 - 10,000          | 18,608,000 - 23,260,000 |
| Plastics | 15,000 - 22,000         | 34,890,000 - 51,172,000 |
| Gasoline | 22,000                  | 51,172,000              |

The rate at which a fuel burns and releases its energy is known as the “heat release rate” or HRR and is quantified using Btu/sec (kilowatt). Remember, “heat release rate” is not the same as “heat of combustion” since it describes release over any specific time period.

For fire protection purposes, plastics, elastomers, and rubber are divided into three “groups” based on their relative fire characteristics of both heat of combustion and heat release rate (HRR).



This 36-foot high pile of Group C plastic fruit storage bins creates a fire protection challenge similar to ordinary combustible materials.

| Group | Plastics, Elastomers, and Rubber Fire Characteristics   |
|-------|---|
| A     | High heat of combustion, and HRR higher than Group B plastics.  |
| B     | Heat of combustion may be as high as, or sometimes higher than, Group A, but the HRR is lower than a Group A plastic. |
| C     | Plastic products that incorporate heat of combustion and HRR that are similar to ordinary combustibles                |

Next week’s Coffee Break Training will provide some examples of the various plastics by Group.

You can obtain more information about plastics from the American Plastics Council at [www.plastics-info.com](http://www.plastics-info.com)