Whether it is a hospital, hotel, or commercial laundry service, NFPA data indicates that eight percent of all fires in these occupancies involve laundries. For hospitals and hotels, laundry operations support the primary business function, and laundry fires threaten to interrupt business as usual. For commercial laundries, fires immediately threaten the core business. Threats of laundry fires can be mitigated through reasonable measures offered in this document.

Introduction
Laundry fires can be due to a number of causes; however, two specific scenarios addressed in this document are:

- Fires involving lint in and around dryers
- Fires involving grease or oil contaminated cloth in or around laundry equipment

Housekeeping, employee training, maintenance, and other management practices can reduce the likelihood of fire due to lint or contaminated cloth. Additional measures are also available to minimize the impact of fire that does occur.

Discussion

**Dryer lint**
When dryers operate with lint clogged screens, overheating may occur. Overheating may lead to the ignition of lint accumulations which can then spread to other cloth in the load being dried. Depending upon the continuity of combustibles, fire may even spread to laundry and laundry carts outside of the dryer.
Other sources of lint ignition are also possible. They may include:

- Frictional heating (dryer drive belt slipping)
- Electrical breakdown (dryer fan motor failure)
- Overloading (too much laundry in one load)

### Lint source

During the washing and drying process, lint is collected from high cotton fabrics. Lint is highly combustible and can act as a source of fuel in event of an ignition. If the lint builds up, this will prevent air intake from circulating in the dryer making the machine work harder to dry the laundry. The lint trap of a dryer acts as a filter between the dryer and the exhaust vent. The heat from the dryer alone does not cause the majority of laundry fires, but if heat cannot dissipate, it can build upon itself to the point of combustion.

### Spontaneous ignition

Loosely piled, grease or oil laden cloth is subject to thermal decomposition, self-heating, and eventually spontaneous ignition. Fires caused by spontaneous ignition are challenging as there is no way to predict the precise conditions necessary to either cause or avoid a fire. The process of spontaneous ignition often takes hours to develop; therefore, fires can occur after normal operating hours.

![Figure 1: Washer (left) and dryer (right) (Photo source: Zurich)](image)

### Guidance

The following guidance is offered to reduce the potential for a dryer fire, reduce the likelihood of spontaneous ignition of grease or oil laden laundry, and to detect and respond to fires that may occur.

1. Dryer maintenance
   
   a) Clean the lint screens to maintain the minimum required airflow through the dryer when operating. As a minimum clean screens at least once a day. Where dryer use is heavy, more frequent cleaning may be needed.
b) Use a maintenance checklist to implement routine dryer maintenance in accordance with manufacturer’s guidelines.

2. Employee training

a) Discard (or return to owner) laundry that is greasy or saturated with residues potentially subject to spontaneous ignition.

b) Separate laundry items known to be contaminated with substances that may react exothermically (release heat) and potentially ignite.

c) Do not leave soiled linens in bins or containers overnight.

d) Do not wash the laundry that cannot be dried the same day.

e) Do not load dryers beyond the manufacturer’s specified capacity. All laundry must be able to tumble freely when the dryer is operating.

f) Where available, use moisture sensor drying cycles to avoid under or over drying loads.

g) Provide adequate cooling time for laundry after being removed from a dryer.

h) Do not leave laundry in machines overnight.

3. Management practices

a) Select noncombustible laundry carts to reduce the fire load and continuity of combustibles in the laundry area.

b) Where nonmetallic laundry carts exceeding 0.15 m³ (40 gal) are used, consider the selection carts certified to reduce heat release and smoke development. Specify a peak rate of heat release not exceeding 300 kW/m² at a flux of 50 kW/m². NFPA 1, Fire Code, applies a peak heat release rate of 300 kW/m² to plastic laundry carts and plastic rubbish containers as it corresponds to the peak heat release rate of similar container made of wood (Douglas fir).

Examples of possible tests for non-metallic laundry carts


4. Fixed fire protection and fire detection

a) Select a dryer that includes an automatic fire detection and water spray system. Such water spray systems are typically supplied from a 20 mm (3/4 in.) domestic water connection. Where available, connect the fire detection signal to the building fire alarm system.

b) Where possible, locate laundries in an area protected with automatic sprinklers.

Conclusion

While laundry fires are always possible, appropriate housekeeping, employee training, and maintenance practices can reduce the potential of a fire occurring. To diminish the potential of fire spread through the laundry area, select noncombustible or other suitable nonmetallic laundry carts. Finally, be prepared to detect and control any fire that does occur by providing fire protection within and around the dryers.

References


Appendix A

Soiled linen presents various fire challenges:

- Combustion due to chemicals heated to their flash point
- Washed items contaminated with substances subject to spontaneous heating
- Exothermic reactions of chemicals accidentally brought into contact in the laundry handling process

The usage of cleaning products, oils, and fats cause product residue to build up on linens. Detergent, bleach, urine, and cosmetics have been implicated in fires involving the washing and drying of linens.

Substances such as oil (vegetable oil) can oxidize, which lead to a release of heat. Spontaneous ignition may occur outside of the dryer if fresh hot laundry is left unattended in a laundry cart or bin with a substance susceptible to combustion (e.g. residual vegetable oil).

The NFPA Fire Protection Handbook 20th edition lists over 70 common materials which are subject to spontaneous heating. The following table, based upon the Fire Protection Handbook offers examples of common oils that could be present in commercial laundry operations. The table includes a relative danger level and conditions for fire.

<table>
<thead>
<tr>
<th>Material</th>
<th>Danger</th>
<th>Condition for fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castor Oil</td>
<td>Slight</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Coconut Oil</td>
<td>Slight</td>
<td>Dangerous in fabrics</td>
</tr>
<tr>
<td>Corn Oil</td>
<td>Moderate</td>
<td>Dangerous in heated piles</td>
</tr>
<tr>
<td>Cottonseed Oil</td>
<td>Moderate</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Fish Oil</td>
<td>High</td>
<td>Saturated fabrics</td>
</tr>
<tr>
<td>Lard Oil</td>
<td>Slight</td>
<td>Dangerous in fabrics</td>
</tr>
<tr>
<td>Linseed Oil</td>
<td>High</td>
<td>Extremely dangerous in saturated fabrics</td>
</tr>
<tr>
<td>Oleo oil</td>
<td>Slight</td>
<td>May heat in saturated fabrics</td>
</tr>
<tr>
<td>Olive oil</td>
<td>Moderate</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Palm Oil</td>
<td>Low</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Peanut Oil</td>
<td>Low</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Pine Oil</td>
<td>Moderate</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>Moderate</td>
<td>May heat in saturated fabrics</td>
</tr>
<tr>
<td>Tung Oil</td>
<td>Moderate</td>
<td>Fabrics in poorly ventilated piles</td>
</tr>
</tbody>
</table>

As an example from the cosmetology and spa treatment industry, spontaneous combustion may occur in dirty laundry carts if towels soaked with acetone nail polish remover come in contact with towels soaked in hydrogen peroxide, a common disinfectant.
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