

Dear Sir/Mdm,

Technical Advisory For Laundry Factories On The Spontaneous Ignition Of Laundry

We have noted that recently there are cases of fires at laundry factories. Investigation has revealed that these fires could probably have been caused by spontaneous ignition, a result of poor dissipation of heat generated from chemical reactions of chemical residues in the laundry.

2. This advisory (Annex A) is for persons working in laundry factories. It provides information on the spontaneous ignition of laundry and the precautions to prevent the occurrence of such incidents.
3. Spontaneous ignition may occur when heat, combustible material and reactive chemicals are present. The ignition can take place over a period of time, ranging from 3 to more than 57* hours. This implies that fires caused by spontaneous ignition can occur after working hours.
4. Laundry factories need to take note of spontaneous ignition as they are always exposed to the dangerous combination of heat, combustible material and reactive chemicals. In addition, soiled linens can contain all sorts of potentially reactive materials.
5. Here are some measures that laundry factories should implement:
 - a. Inform all workers of the hazard of spontaneous ignition.
 - b. Make sure that all the dryers have a cool down cycle long enough to properly lower the temperature of the dryer load. Check the temperature settings of each dryer on a regular basis.
 - c. Maintain dryers regularly to ensure that laundry will not be heated to excessively high temperatures.
 - d. Wash items with oily stains thoroughly and use a proper heavy-duty liquid laundry detergent.
 - e. Allow enough time for all heat to dissipate before folding or bundling.
 - f. Never store bundled or folded laundry in boiler rooms, next to hot water heaters, behind dryers, or any areas where the temperature is higher than normal room temperature.
 - g. Install smoke detectors (linked to SCDF approved Fire DECAM company) where bundled or stacked laundry are stored. Ensure effective implementation of other emergency measures like fire extinguishers, evacuation route and fire drills.
 - h. Never allow large loads to remain in dryers after the drying cycle has ended.
 - i. When laundry catches fire, normal plastic laundry carts will melt and the flaming liquid plastic can spread the fire. Check with your cart supplier or manufacturer to ensure that the laundry carts are made of noncombustible or highly fire-retardant materials.

*Robison, Don. "Laundry Fire, Probable Cause: Spontaneous Ignition" in *Industrial Fire World Magazine*

6. If you have any queries, please contact Mr. Teo Boon Kwang (6875 5176) or email us at mom_oshd@mom.gov.sg

Yours faithfully

SILAS SNG
DIRECTOR
OCCUPATIONAL SAFETY AND HEALTH INSPECTORATE
(This is a computer generated letter, no signature is required)

Annex A

TECHNICAL ADVISORY FOR LAUNDRY FACTORIES ON THE SPONTANEOUS IGNITION OF LAUNDRY

This advisory is for persons working in laundry factories. It provides information on the spontaneous ignition of laundry and the precautions to prevent the occurrence of such incidents.

Spontaneous ignition of laundry is not an uncommon hazard in laundry factories, especially for those where substantial quantities of laundry is washed and stacked. It is particularly dangerous as it can take place long after the laundry is washed, dried and stacked. Thus, it is possible for fire caused by spontaneous ignition to occur after the laundry factory has closed for the day. Often the fire will go undetected and may result in death or serious injuries.

Below are two recent cases of laundry factories due to spontaneous ignition of laundry.

Case 1

The fire occurred at the rear of the laundry shop where three dryers were located. The area in front of these dryers was used for storage of washed articles like face towels, bath towels, body suits, etc. The washed articles were removed from the dryers during the evening and put into large plastic containers to be folded and packed the next day. The fire happened after midnight. SCDF concluded that the cause of fire was due to spontaneous ignition due to heat generated by chemical reaction within the towels placed inside the meshed plastic containers.



Case 2

A fire broke out at the ground floor of a laundry in the middle of the night. Four workers were sleeping at the second level of the factory at the time of the fire. Three of them managed to escape by jumping out of the window, but one of the workers failed to escape and was killed in the fire.



Basic Elements of Fire

For a fire to occur, three basic elements must be present:

- Any combustible material that would act as fuel for the fire – most laundry materials such as linens, towels, blankets, clothing and other fabrics are combustible;
- Oxygen surrounding the combustible material to support and sustain the fire; and
- Ignition source to provide sufficient heat energy to start the fire.

When the combustible material (fuel) is heated to a certain critical temperature called the ‘ignition temperature’, it will ignite and continue to burn as long as there is fuel, the proper temperature and a supply of oxygen.

Spontaneous Ignition

Spontaneous ignition is the occurrence of fire without the application of an external heat source. They can occur in the following forms:

- A pile of soiled laundry where the soiling agents are reactive and heat up the fabric as a result of the respective reaction processes until ignition takes place.
- Washed and dried laundries where there are still remains of oil residues which generate heat (from exothermic chemical reactions) that is poorly dissipated.

Heat, combustible material and residual oils increase the possibility of spontaneous ignition. The residual oils such as vegetable oils, massage oils can self-heat to the point of ignition. Improper washing practices such as the lack of proper detergent, low water temperature settings and faster wash cycles may not be able to remove these oils in a normal wash. To make matters worse, these washed laundries with residual oils are often stacked up after the drying process without adequate prior cooling time. Poor dissipation of the inherent heat (from the drying process) and generated heat (from the residual oil reactions) could lead to spontaneous ignition.

Another possible contributing factor is that soiled laundry is often collected and stored in carts. Washed laundry from the dryer or ironer may also be placed in carts for storage or delivery. Some of these carts are made of plastics which are excellent thermal insulators and may hold in the heat generated, an effect similar to that of a large stack or pile of laundry. This increases the likelihood of spontaneous ignition of laundry in the carts. Furthermore, when ignition takes place, most plastics can become fuel to further sustain the fire.

Control and Preventive Measures

Here are some measures that laundry factories should implement:

- a. Inform all workers of the hazard of spontaneous ignition.
- b. Make sure that all the dryers have a cool down cycle long enough to properly lower the temperature of the dryer load. Check the temperature settings of each dryer on a regular basis.
- c. Maintain dryers regularly to ensure that laundry will not be heated to excessively high temperatures.

- d. Wash items with oily stains thoroughly and use a proper heavy-duty liquid laundry detergent.
- e. Allow enough time for all heat to dissipate before folding or bundling.
- f. Never store bundled or folded laundry in boiler rooms, next to hot water heaters, behind dryers, or any areas where the temperature is higher than normal room temperature.
- g. Install smoke detectors (linked to SCDF approved Fire DECAM company) where bundled or stacked laundry are stored. Ensure effective implementation of other emergency measures like fire extinguishers, evacuation route and fire drills.
- h. Never allow large loads to remain in dryers after the drying cycle has ended.
- i. When laundry catches fire, normal plastic laundry carts will melt and the flaming liquid plastic can spread the fire. Check with your cart supplier or manufacturer to ensure that the laundry carts are made of noncombustible or highly fire-retardant materials.

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