



FIRE SAFETY

Jessy Spin
PERFORMANCE
Mesmerising modern circus

This guide is a general introduction to fire spinning safety procedures. However, it should be recognised that – while spinning fire is fun and exhilarating – it is also **an inherently dangerous activity**. *There will always be a risk*. By learning and abiding by proper fire safety practices, we minimise harm by *reducing the likelihood* of an incident occurring and *the severity of consequences* if something does happen to go wrong.

HAIR

Our hair should be **tied back or concealed** (e.g. by a beanie or scarf). I often opt for a bun, or braids. You can also **mist your hair** with water. I especially make sure to do this if I am using big fire (such as lycopodium powder – a large flame effect), or if I know fire will be coming close to my head (e.g. wearing my fire mask or practicing body tracers).

CLOTHING

Fitted (vs. loose)

Clothing should be **relatively fitted**. Clothing that is worn loosely has potential to get *caught in our props*, and the last thing we want is to get entangled with a lit prop. It is also *more likely to catch fire*, as there is more oxygen available around the material.

Tight weave (vs. loose weave)

Tight weaves of natural fibre fabrics are the most fire safe. Fabrics with *loose weaves can ignite more easily* (such as a light, floaty silk or a loose knit wool). This is because there is more oxygen around the fibres to fuel the flames.

Natural fibres (vs. synthetics)

We also want to wear clothing made of **natural fibres**. Natural fibres will *burn to ash* when on fire. This means the fabric will burn away before the fire reaches our skin. When synthetic fibres burn, however, they form a *hard bead-like plastic residue*. This plastic residue can **melt to our skin**, causing severe burns.

The following page has some examples of both natural and synthetic fibres. Be extra cautious when dealing with blended fabrics, as even a natural fibre blended with a synthetic fibre may not be fire safe (e.g. lycocell, a type of rayon, is often blended with polyester). I recommend doing a burn test on a small section of the fabric to know for sure whether it fire safe!

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Natural fibres

Cotton	Ignites on contact with flames, burns quickly, does not melt
Leather	Doesn't actually ignite, burns slowly, does not melt
Denim	Takes longer to ignite, burns moderately quickly, does not melt (nb. Many thicknesses of denim)
Silk	Ignites on contact with flames, burns slowly, does not melt
Hemp	Burns quickly, does not melt
Linen (flax)	Takes longer to ignite, does not melt
Wool	Burns slowly, does not melt, self extinguishing

Synthetic fibres

Polyester	Burns quickly, melts into hard beads, dripping occurs
Spandex	Burns and melts into soft, sticky black ash
Nylon	Burns slowly, melts into hard beads, dripping occurs
Acrylic	Ignites rapidly, melts into hard beads, dripping occurs
Acetate	Ignites rapidly, burns quickly, melts into hard beads

Manufactured fibres that act like natural fibres

Rayon (made of wood pulp)

Types of rayon include:

- Viscose
- Modal
- Lycocell

Burn test result

Burns without flame or melting.

Exercise **caution** when using, as often comes in many blends – a burn test is recommended

Note that the fire service wears expensive, industrial, flame resistant clothing, made from a myriad of speciality materials that are designed to reflect heat!

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FIRE SAFETY PERSON + SAFETY EQUIPMENT

A. Safety equipment

We must have a **fire safety person** with us when spinning fire. They will need:

1. Damp towel, duvetyne, or fire blanket *(to be used on people)*

A duvetyne is a thick fire safe material that is fire retardant, and can be used for extinguishing fires. A damp towel can also be used. Fire blankets are acceptable, but these are one time use only – so end up being both wasteful and costly.

2. ABE rated or AB rated fire extinguisher in Australia *(not to be used on people)*

There are different types of fire extinguishers for different types of fires. In Australia, we want to use a fire extinguisher that is ABE rated (dry powder), AB rated (foam), or BE rated (CO₂). Note that fire extinguishers are **not to be used on people**, but instead on things like the surrounding environment. Using an extinguisher on a human can be hazardous – for example, dry powder extinguishers can cause major lung irritation!

Type Extinguisher	Fire	CLASS A	CLASS B	CLASS C	CLASS D	Electrical	CLASS F	Comments
		Combustible materials (e.g. paper & wood)	Flammable liquids (e.g. paint & petrol)	Flammable gases (e.g. butane and methane)	Flammable metals (e.g. lithium & potassium)	Electrical equipment (e.g. computers & generators)	Deep fat fryers (e.g. chip pans)	
Water		✓	✗	✗	✗	✗	✗	Do not use on liquid or electric fires
Foam		✓	✓	✗	✗	✗	✗	Not suited to domestic use
Dry Powder		✓	✓	✓	✓	✓	✗	Can be used safely up to 1000 volts
CO ₂		✗	✓	✗	✗	✓	✗	Safe on both high and low voltage
Wet Chemical		✓	✗	✗	✗	✗	✓	Use on extremely high temperatures

The rating of a fire extinguisher is very important. If we use a fire extinguisher on a fire that the extinguisher is *not rated for*, it can be **very dangerous**. For example, a Class A extinguisher, which uses water, will be ineffective against a Class B fire and may potentially make it even bigger, as the water will spread out the flammable liquid. Make sure you also understand how to use your fire extinguisher *before* an emergency, by reading the instructions on the packaging.

Note that in **other countries**, the same kind of fire extinguisher may have *different class labels* e.g. in the USA, it is an ABC rated fire extinguisher instead of ABE – so be sure to always check.

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Do fire extinguishers expire?

Although they should work for 5 to 15 years, you may need to replace your fire extinguisher over time. If your fire extinguisher is *an aerosol can*, it should come with a **clearly marked expiry date** (usually five years). If you have *a fire extinguisher with a hose*, **check the pressure gauge monthly**. The fire extinguisher will need replacing if the gauge reads anywhere outside of the green area.

You should also replace your extinguisher if *any general wear and tear has occurred* e.g. the hose or nozzle is damaged, the locking pin on the handle is missing or unsealed, or the handle is wobbly and/or damaged. Note that fire extinguishers are **one time use only!**

B. Fire Safety Person

The role of the fire safety person is to *watch us spin*, so they can:

- Let us know if anything catches fire that shouldn't be, by calling out the name of the spinner and then the body part (e.g. 'Jessy, arm!')
- Use a damp towel/duvetyne to extinguish any unwanted fires, if after a few seconds of being informed the fire spinner has not done so themselves. The fire safety person should put the damp towel against the highest point of the flame and swipe down.
- Use a fire extinguisher to extinguish any unwanted fires, where a damp towel/duvetyne cannot. The fire safety person should aim the extinguisher at the bottom of the flames.
- Use a damp towel/duvetyne to help the performer put out a prop. Here, the fire safety person must smother the flame, by wrapping the damp towel around the wick for 5 seconds or so to cut off the flow of oxygen. Do not pat the blanket, as this will actually create more oxygen flow! If possible, leave extinguished props wrapped in the towel or set them away from people, as *the vapours they continue to exude are toxic*.

If you or someone else is on fire, don't forget at any stage you/they can **STOP. DROP. AND ROLL.**

OUR PROPS

We must also **check our equipment is safe**. This involves cutting off *any stray bits of kevlar* from our wicks (that might fall off when lit) and also making sure *any screws, split rings, handles, and/or chains are secure and not faulty*. We don't want any lit wicks or spokes to fly off our prop as we are spinning! Note that *any metal part of our prop will retain a lot of heat*, even after the flame is extinguished, and should be placed in a safe spot once we finish spinning fire.

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TYPES OF FUEL

The most common fuels used are kerosene, white gas, lamp oil and isoparaffins. Currently, the best fuel to use in Melbourne, Australia, is **Firelight** (a type of Isoparaffin) from the store *Threeworlds*, or **D60** sold at chemical wholesalers (there is one in Epping).

Different types of fuel have different properties, such as their flash point. The **flash point** is *the lowest temperature at which the fuel will ignite* when given an ignition source. Isoparaffins and D60 have a high flashpoint, and so do not ignite easily. White gas, however, has a low flashpoint and ignites **very easily** – it is not unheard of to have the main supply of fuel accidentally catch fire when spinning fire with white gas!

Note that you can obtain *Safety Data Sheets* (SDS), which are documents that provide detailed information on hazardous chemicals (i.e. all fuels!) in their unlit form.

Below is a list of fuels that can be used for fire spinning and their general characteristics when lit:

Type of fuel	Flash point	Characteristics
<u>Isoparaffins:</u> Shellshol T/D/M/K Isopar G/H/L/M Recosol G/M/GT	High 40°C - 60°C	Burns bright, not too smokey. Often sold as fire spinning fuel e.g. a type of isopar G is branded as <i>Firelight</i> . Good burn time. Very low odour, not as bad for you as kerosene. More smoke than white gas. Most common fuel in Australia.
<u>Shellite/White Gas</u> aka Naphtha Coleman fuel	Very low < -20°C	Ignites instantly, burns bright. Feels slightly hotter than other fuels. Short burn time. Most volatile of fire spinning fuels, very low flashpoint. Used for fire eating, because vapour tricks and transfers require low flashpoint. Most common fuel in USA.

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<u>Aliphatic Mineral Spirits:</u> Shellsol D60 Exxsol D60/80 Recosol D60/78	High 40°C - 60°C	Not too smokey, low odour (though not as low as Isoparaffins) Good burn time. Not as bad for you as kerosene.
<u>Lamp Oil</u> (basically type of Paraffin)	Very high 118°C	Hard to ignite, low odour, not too smokey. Good burn time. Oily and thick compared to other fire fuels. Most common fuel in Western Europe.
<u>Kerosene</u> aka Kero Paraffin	High 38°C	Very smokey and smelly, can cause headaches. Good burn time, burns with bright flame. Unpleasant to use but readily available and cheap. Most common fuel in South East Asia.
<u>Citronella</u>	High 69°C	Smokey and oily to burn, can trigger asthma. Similar to kerosene, but has anti insect properties.
<u>Alcohol:</u> Methylated Spirits Isopropyl alcohol Denatured alcohol	Moderate 13°C	Poor flame. Low toxicity makes this more appealing option for fire eating/breathing, but risk becoming intoxicated accidentally.

It is good practice to **be familiar with different fuels**, as you may not always have access to the same kind. For example, *different countries tend to use different fuels, and sometimes even use different names*. If you find yourself spinning fire in the USA, you will likely be using white gas – because of its low flash point, this is far more volatile than the fuel we commonly use in Australia. Further precautions must be taken, such as keeping a lid on your fuel container when not in use and waiting for your prop to cool down before re-dipping to spin fire again. You may also come across *mixes of fuel* being used e.g. 50% lamp oil and 50% white gas.

Never use petrol or diesel for fire spinning, as these fuels are dangerous!



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FUEL SET UP

Our fuel set up is important. Always **label** fuel, and **store and transport correctly** in its original container, or in a container designed specifically for this purpose e.g. a jerry can. Next, we must consider our *fuel station* (sometimes called *fuel depot* or *dipping station*). This is where we fuel our props, and should be kept separate from where we plan to spin.

The process by which we fuel our props is also important. If we take care when fuelling our props, there should be no excess fuel! This presents as drips or spray from wicks when props are shaken.

1. Container for Fuel

Empty paint tins (clean of paint) or ammo boxes are commonly used as fuelling containers. Ammo boxes are popular because they are leak proof, so fuel can also be stored in them, and are particularly common in the USA. Avoid using plastic containers, as the fuel acts as a solvent against the plastic. Do not use glass, which risks shattering.

2. Secondary Container

Our secondary container is a large plastic tub (or similar), which our main fuelling container can sit inside. This catches any accidental spills, which can then be poured back into our main supply.

3. How do we fuel props?

Measuring with a syringe

The most precise way of fuelling our props is by using a syringe to measure the amount of fuel needed. First, syringe fuel into the wicks. Second, 'spin off' your props (see no. 4 below). Repeat these two steps until fuel starts to spray from wicks. The amount of fuel required in the future is the point just before wicks start to spray.

Note that the more we burn our wicks, the smaller they will become over time. This means your fuel measurement will slowly decrease over time! Wicks may also eventually need replacing.

Partial/quick dip

Alternatively, we can dip the wick $\frac{3}{4}$ of the way into the fuel, before removing. The fuel will then spread throughout the rest of the wick. We can also "quick dip" our props, by very briefly submerging the wicks.

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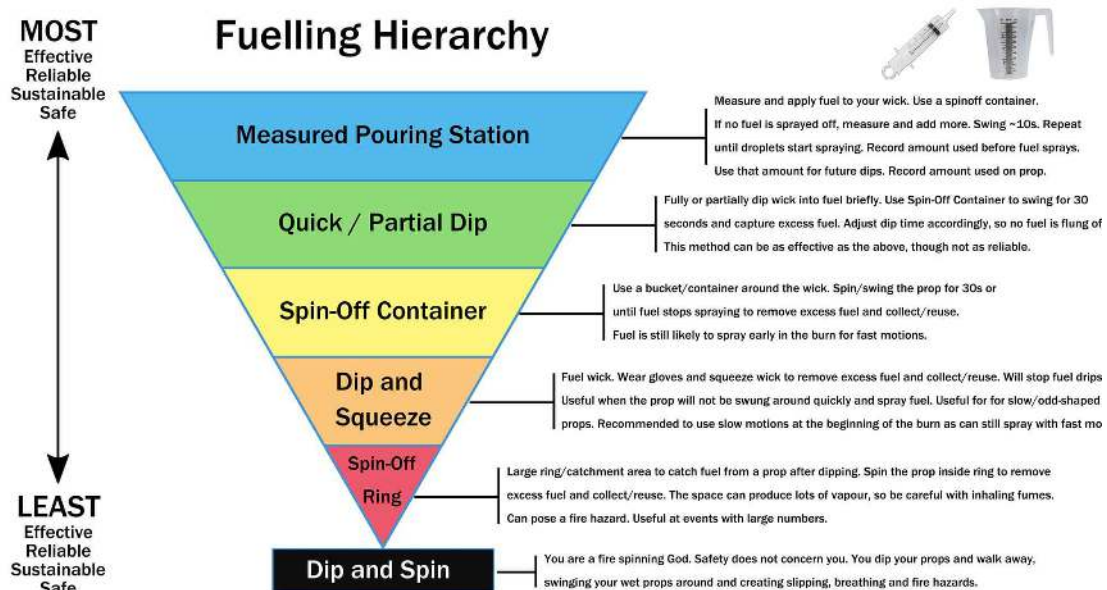
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4. Spin off container or set up

Spinning off is the process by which we make sure there is no excess fuel in our props. Otherwise, as we spin fire, bits of lit fuel can flick off our props like fiery rain!

For props such as staff or poi, we can do this by creating a **spin off container** to catch excess fuel as we quickly spin our props around. This might look like a small container that wicks can sit inside, attached to props by rope. For smaller wicks or oddly shaped props, we can wear neoprene gloves to **squeeze excess fuel off wicks** into a container. The latter method can still result in some fuel spray, so start with gentle movements after lighting up (so excess fuel can burn off).

These processes help to conserve fuel, saving resources and money, and also minimise harm to our environment! Below is a helpful infograph, made by Jed Fowler. It shows the different options we have for fuelling our props, in order of most to least desirable.



Fun Facts:

If you measure your fuel with poi, for every two burns, you can save enough fuel to get a third burn free! (Compared with dip and spin, tested using cathedral poi)

If you use a spin-off container with poi, for every five burns you can save enough fuel to get a sixth burn free! (Compared with Dip and spin, tested using cathedral poi)

When I measure fuel for my poi, they only use about 65% of the fuel that they would soak up if dipped. The other 35% sprays in the air and on the ground and has little effect on burn time.

Fuel usage reduces as wicks degrade. There is residual fuel left in a wick as the end of a burn.

Jed Fowler, Rev 1, Feb 2019

5. Funnel, extra towel and light

It's also a good idea to have a decent sized funnel, for when we finish spinning and need to pour the fuel from our dipping container back into our main supply. An extra towel is also useful for wiping down any excess fuel or spillages, as is a light (e.g. torch or camping lantern) so our dipping station can be seen clearly at night!

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WHEN LIGHTING UP

Safety procedures

Make sure your clothing, fire safety person, fire safety equipment, fuel set up and props are in order before lighting up. If you have any doubts, don't light up until you resolve them!

Mark out your space

It is often a good idea to mark out the parameters of the space you will be spinning fire in. This is known as the *fire circle*, and can be done with rope or, even better, LED rope light that can be seen clearly at night. This is especially important when multiple people are spinning fire and/or there are people who are not spinning that could potentially walk through your space. If you and a friend are spinning on the beach at night with no one around and lots of space, this practice will be less relevant.

Stay aware

Always stay aware of your surroundings. You don't want to collide with any other fire spinners you are sharing the space with, or trip on any uneven patches of earth!

Make a note of any local safety regulations or permits required. In Australia, we are lucky and can spin in public parks. For many other countries, however, this is not the case!

You should also be aware of weather conditions (including any local fire bans). On particularly hot and/or windy days, it is generally unsafe to spin fire. For fire eating, there must be no wind at all to safely light up!

Distance from dipping station

Before lighting up, make sure you are a safe distance away from the dipping station. This is generally three metres when spinning fuel with a high flashpoint, and *at least* 5 metres when using fuel with a low flashpoint.

Light from bottom of wick

Always light props from the bottom of the wick. This is because the fire will travel upwards, so once the base is lit, the fire will continue to light the rest of the prop. It also prevents us from burning our hand once our prop ignites!



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FIRST AID

Burns are the most common injury in fire spinning, and when in doubt, do not hesitate to seek medical assistance. In short, you want to **immerse or run the burn under cold water** (not ice!) for ideally 10-20 minutes – but in practice, as long as possible! There is an excellent flow chart on ‘Burn Management for Fire Performers’ made by Jed Fowler, listed under the Resources section of this guide. It is worth checking out, and specifies what a complete burns first aid kit should include!

Superficial Burns (formerly known as first degree burns)

A first degree burn occurs with brief exposure to heat, for example, a sunburn. This can occur when the fire does not come in direct contact with our skin, but the heat is so intense that our skin becomes slightly red and tender.

If this level of burn requires care, immerse or run the burn under cold water for at least 10 minutes. This is soothing, reduces the temperature of the burn, and stops the burn from getting worse. Afterwards, leave the skin uncovered.

Partial Thickness Burns (formerly known as second degree burns)

A second degree burn is caused by prolonged exposure to heat or high temperatures. The burn is painful and blisters may form. This may occur from our skin coming into direct contact with a metal part of our prop when spinning.

Where the skin is intact, immerse or run the burn under cold water for at least 20 minutes. After the skin has cooled, you can apply an antibiotic ointment or burn cream. Do not burst blisters. Where the skin has broken, apply a dressing to the wound - speak to a qualified pharmacist for advice on wound care!

Full Thickness Burns (formerly known as third degree burns)

A third degree burn is caused by prolonged exposure to very high temperatures. The burn has gone through the full thickness of the skin, and there may be exposed tissues and charring.

Call an ambulance, and immediately immerse or run the burn under cold water for 20 minutes. Do not remove any clothing left in the burn. Because of the exposed tissues, this kind of burn is prone to getting infected and medical attention should be promptly sought.

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RESOURCES

I hope that this guide has you feeling more confident about fire safety! I learnt this information from the flow community, personal experience after spinning fire for many years, and also consulted the following resources:

General (and worth checking out!)

'Fire Safety Resources' by Jed Fowler:

<https://drive.google.com/drive/folders/1-2hyhd3m5Gp-EPvFi6QvI8Pbex5pHHk?usp=sharing>

Fire safety article by Spunout Festival: <http://www.spunoutfestival.com.au/safety.html>

Fire safety video by DrexFactor: https://www.youtube.com/watch?v=_8mf7pjcykM

Fabrics

https://www.life.ca/naturallife/0908/ecofiber_or_fraud.htm

<https://www.fabricmartfabrics.com/Burn-Test-Chart.html>

https://siterepository.s3.amazonaws.com/5968/burn_test_to_identify_textile_fibers.pdf

<https://www.homeofpoi.com/en/lessons/teach/Fire-Training/Fire-training-safety/Clothing-Costume-Fire-safety>

Fire extinguishers

<https://www.fireequipmentonline.com.au/5-types-of-extinguishers-in-australia/>

<https://rpg.stackexchange.com/questions/133321/is-a-co2-fire-extinguisher-safe-to-use-indoors-to-represent-offensive-magic-or-b>

<https://www.homeofpoi.com/en/lessons/teach/Fire-Training/Fire-training-safety/Fire-Extinguisher>

<https://www.jimstestandtag.com.au/blog/can-fire-extinguishers-expire.html>

<https://www.realsimple.com/work-life/technology/safety-family/when-to-replace-a-fire-extinguisher>

Fire extinguisher table

<https://www.fireextinguisheronline.com.au/blog/post/types-of-fire-extinguisher-in-australia-all-you-need-to-know/>

Fuels

'Fuel Hierarchy Infograph' by Jed Fowler (see General above)

<http://www.spunoutfestival.com.au/safety.html>

<https://www.trickconcepts.com/what-fuel-do-i-use/>

<https://www.safeworkaustralia.gov.au/sds#obtaining-safety-data-sheets>

<https://www.threeworlds.com.au/collections/fire-fuel/products/5-lt-firelight-fire-twirling-fuel>

First aid

'Burn Management for Fire Performers' by Jed Fowler (see General above)

<http://www.spunoutfestival.com.au/safety.html#general>

Happy, safe spinning!!
Big love, Jessy XOX