Winter Ops: Fun Fuel Facts

OPSGROUP Team
29 November, 2024

Fuel is to airplanes what coffee is to pilots – something you just cannot fly without. But just as there are different types of coffee, you're going to come across different types of fuel as well…

The Menu

Jet-A1 – The most traditional drink, it is straw coloured with a flash point of 38°C (100°F), and a freezing point of -47°C.

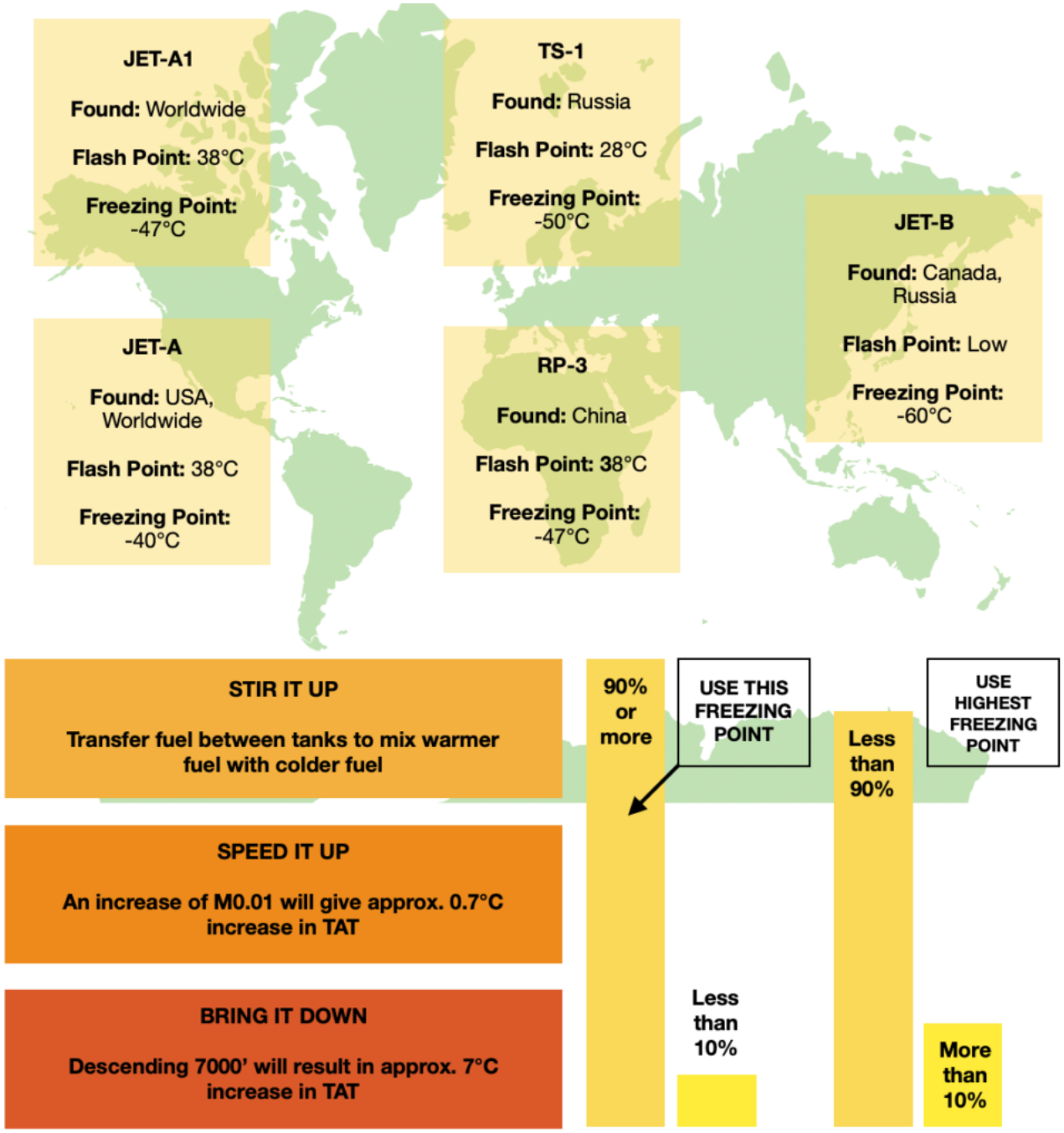
Jet A – Another tasty kerosine grade fuel which will work just fine. The flash point is the same but this turns into an icy slushie at only -40°C.

Jet B – A delicacy from the Northern Regions. This is a cocktail of kerosine and naphtha – the stuff dragons produce out their nostrils (ok, that is not true, but it might as well be because this stuff is hard to handle with its higher flammability). Wide cut, and only really used in colder climates, with its freezing point of -50°C.

TS-1 – A Russian cocktail, more flashy than most at 28°C, but with a freezing point of -50 °C. It is also sometimes called RT (which looks like PT when it is written in Russian). RT is a superior grade TS-1, but not widely available.

RP – Brewed in China, the RPs come in a variety of styles. RP-1 has a freezing point of -60°C, RP-2 -50°C, but it is RP-3 we really recommend because it is basically Western Jet-A1 produced at export grade.

Chip fat oil – Not literally, but if you fly into a remote airport in some regions you might find fuel is not of the standard required. Look out for anything that isn't straw coloured, doesn't smell right, or has things floating in it.



Cutting it wide

Wide cut fuel is a mixture of kerosene and gasoline (Jet A1 in comparison is highly refined Kerosene). Wide cuts are not often recommended by airplane manufacturers because the quality and performance specifications are generally not as good.

If you are going to use it, there are likely going to be some pretty specific operational procedures involved because these fuels are much more volatile. Things like over-wing fuelling is generally a no-no, and the filtration system is going to appreciate a slow flow so it can keep up.

All those numbers

Fuel doesn't freeze like water. It is not liquid one minute and ice the next. Instead it turns into a strange, slushy porridge consistency.

What's more, if you have a mixture of freezing points, the freezing point won't be a nice in the middle -44.5°C so the only reliable way to work this out when you've mixed a load together is to take a

measurement – assuming you're carrying your own Fuel Freezing Point Measuring Gadget…

If not, the next best method to use is this –

- **90% or more of your fuel is one type?** Use that freezing point.
- **89% or less of your fuel is one type?** Use the highest (worst case) freezing point.
- **You have 900 gallons of Jet A1 freezing at -47°C and 100 gallons of Jet A freezing at -40°C?** Then call it -47°C and be off on your merry way.
- **You have 899 gallons of Jet A1, and 101 gallons of Jet A?** Then take the highest freezing point which in this case would be Jet A at -40°C

Do we really care about freezing points of fuel?

Yes, very much so, especially if you are flying some long haul treks over the North Pole at high altitude in the winter.

With outside air temperatures lower than -60 degrees, freezing fuel can get you into some very hot water, (or cold fuel to be more accurate.)

In Jan 2008, British Airways Flight 38 crashed just short of the runway at EGLL/Heathrow after flying from Beijing, China. They had been cruising between FL350 and FL400, with OATs reported to be between -65 to -74°C. While the fuel itself never froze, it did become cold enough for ice crystals to form in the fuel system.

These pesky little ice particles blocked stuff up and reduced the fuel flow, starving the engines, and causing a big loss in thrust right when the pilots needed it.

TUDNU	PARAS	ROVON	PAREX
N3753.0	N3731.6	N3716.0	N3605.5
E04444.8	E04541.6	E04553.4	E04651.9
410 262/087 -60	410 266/095 -61	450 265/076 -61	450 270/088 -64
390 259/104 -59	390 261/113 -59	410 266/098 -61	410 267/113 -61
370 259/106 -57	370 261/114 -57	390 262/115 -59	390 263/121 -59

KEBEP	NOTSA	RADID	IMGOD
N3504.9	N3317.8	N3024.7	N3014.3
E04740.2	E04903.3	E05126.2	E05130.8
450 272/100 -65	450 275/121 -67	450 281/131 -68	450 281/130 -68
410 268/124 -62	410 271/139 -63	410 279/139 -63	410 280/138 -63
390 266/120 -60	390 271/128 -58	390 280/134 -57	390 280/132 -57

DASDO	LAGSA	LAM	T_O_D
N2854.0	N2833.1	N2722.4	N2702.1
E05205.9	E05220.9	E05311.0	E05317.3
450 282/123 -69	450 283/121 -69	450 287/116 -70	NO WX DATA
410 282/127 -62	410 282/124 -62	410 285/116 -63	NO WX DATA
390 282/122 -56	390 282/119 -56	390 284/110 -56	NO WX DATA

DESCENT
390 288/092 -56
350 285/085 -47
310 286/082 -37
200 307/058 -13
100 327/027 P08

The temperature gets darn cold at altitude!

What can we do about it?

Ultimately, you need to **turn up the temperature!** There are only a few ways to heat your fuel up if it starts getting too chilly:

Stir it Up – Unlike Bond who preferred his drinks shaken and not stirred, mixing cold fuel with warmer fuel makes it better. Some larger aircraft with complex fuel systems do this automatically, but if you are able to do so manually there will probably be a checklist and following it to avoid turning off the wrong pumps might be wise.

Speed it Up – Flying faster means more drag which means more energy converted into hotness. Not much though… an increase in Mach 0.01 will increase the TAT by around 0.7°C, and increasing your speed also increases your fuel burn.

Bring it Down – Warmer air will help, and by descending 7000’ you can increase the TAT by around 7°C. In seriously cold air masses, descent to at least FL250 might be required, but this all means a much higher fuel burn.

Tanker? No thank ya…

Tankering fuel if you are operating into somewhere chilly might cause you some problems. The fuel is likely to get cold in flight, and up the likelihood of some frosty wings on the ground. So check the de-icing situation at your destination if you are tankering and it’s cold out.

Some other useful info

- 1 imperial gallon = 1.2 US gallons.
- You can monitor the price of jet fuel here.

The Day After Tomorrow is Now...

OPSGROUP Team
29 November, 2024

Pilots and operators are definitely not the ones hoping for a white Christmas because it means **horrible weather, delays and disruption.**

Unfortunately for all, weather news sites are calling **a 'storm of epic proportions' is heading towards North America.** It might already have reached you even...

So here is the update on the weather forecast, and a hopefully handy refresher on some of the challenges this might mean for aviation. *(So you know we care and are thinking about you while we sit cosy in our warm houses drinking Eggnog).*

The Forecast.

On a scale of 1 to bad, they are calling this a *'once in a generation'* weather event, a *'looming winter storm of historic proportions'.* Not quite A Day After Tomorrow level weather phenomena, but not far off...

The weather is being caused by a **severe low pressure system** known colloquially as a 'bomb cyclone' because of the **rapid and significant pressure drop** that occurs – around 24 millibars in 24 hours (and that right there is one thing to be cautious about).

The arctic storm is expected to fully impact the **east coast of the US and Canada** later on December

23, and the following warnings are in place:

- Powerful winter storm bringing sharp cold front and severe snowfall from **Midwest to Ohio Valley:** *Dec 23 onwards*
- Powerful winter storm bringing sharp cold front and severe snowfall through **Great Lakes and interior Northeast:** W*eekend Dec 24-25 onwards*
- Extreme cold and high gusts over **central an eastern US:** *Dec 23 onwards*
- Flooding in the **Northeast:** *Weekend Dec 24 onwards*
- **States of emergency** declared across New York, Kentucky, North Carolina, West Virginia, Georgia and Oklahoma. An 'energy emergency' in Wisconsin.

What is the impact for aviation?

Here is a general 'things to look out for' list:

- Airports are likely to see **significant disruption, cancellations and closures** leading to limited alternate options. En-route airspace will be more congested with diversions and detours taking place
- Significant **ground delays for de-icing/anti-icing**, and during periods of extreme weather operations will be grounded leading to significant backlogs, parking issues and congestion
- **Power outages** are likely in the Midwest and Canada which may have a knock on effect for airports
- **Staff shortages** may occur if folk are unable to commute to airports
- **Oil prices** are leaping up. Check the costs for fuel.

You can find the **National Weather Service** page on the storm warnings here. They post regular updates via their Twitter page as well.

You can monitor the current US **National Airspace System Status** here.

Is there anything you can prepare for?

The weather conditions are severe, they are saying things like "*life-threatening wind chills"* so think about that before sending your poor First Officer out, unless you want a fingerless icicle trying to fly with you. It really is going to get nasty in places.

Here is our list of ***Winter Chillers & Thrillers*** to look out for:

- **Conditions might really get too severe** so *don't push it* if they do. Look after yourselves!
- There are going to be **significant delays in the air and on the ground**. Take fuel and make a plan B (preferably before you need it).
- **HOTs are going to be hard to manage:** Anyone who has ever operated out of JKF on a winter's day and has waited 7+ hours for de-icing knows what I am talking about. With queues of traffic and bad weather there is a good chance you'll go out of your HOT so keep an eye on the clock.

- **The Global Reporting Format** is great but if it is saying things like 1/1/1 then you might find you can't stop so well, so check that performance. Some operators don't allow takeoff on icy runways unless treated, for example.
- Ice pellets, hail etc, and severe icing ain't great. Check them SigWx charts too.
- Refresh on **Cold Weather operations procedures**.We found some that might or might not be helpful:
    - IFALPA put this guidance out on Finland airport operations (but it is applicable to anywhere cold)
    - The FAA published this (which is geared to GA but still has some handy info in it)
    - AOPA published this and it looks pretty helpful
- **Look after your batteries** – they have minimum temperature limits and you might need to take them off if you're parking up outside.
- **Watch the fuel temperatures** – JET A1 freezes at -47°C, Jet A at -40°C.
- **Check your altitudes** – apply those cold temperature corrections
- Snow and blizzards bring **LVPs**

We have a few posts which you might find handy for swotting up on all things chilling:

- Fuel Facts: Let's get to the (freezing) point
- De-ice De-ice Baby

Be careful!

Not much more to say than that. Stay warm and safe.