

SAFER, CLEANER POWER FOR YOUR REEFER

What you need to know about 480 VAC power for
hybrid reefers and the CARB regulations



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Anti-idling regulations for reefers are becoming increasingly important in the heavy-duty trucking market. In an industry that uses high-voltage power, it can be challenging to find solutions that protect personnel, property, and the environment. Understanding the need for high-voltage power and finding a safe solution to fit your fleet's needs can be challenging. The following questions can help you in your journey to finding the perfect 480 VAC system to power your hybrid eTRUs.

What is 480 volt power?

Details about 480 VAC power can be complicated and there isn't really a reason to get into the nitty-gritty. So, to keep it simple and fairly high-level, 480 VAC power generally refers to an electricity system that uses a three-phase configuration of alternating current. The power you have at home in a regular wall outlet is a 120-volt, single-phase power system, so 480 VAC power provides a lot more power, with higher current, which allows it to power

heavy-duty equipment. Since this equipment is not something the average person needs, 480 VAC power is generally found in industrial applications where large amounts of power are needed.

Why is 480-volt power useful in reefer applications?

Reefer applications require about 12 KW of power to operate, which means very high currents are needed. Reefers also use a compressor, which is a rotating machine that spins the reefer pumps to press the refrigerant so the box can be cooled. Multi-phase circuits, used in 480 VAC power, are very good for running rotating machines, which is why the vast majority of eTRUs on the market today use 480 VAC.

Is 480-volt power easily available? If not, is it easy to convert regular power to 480?

The availability of 480 VAC power is highly dependent on the infrastructure of a facility. However, it is often available in industrial environments, though it is not often widely distributed in that form. More often, 480 VAC is split up to sub-circuits to serve lower power loads. Because of the high voltage and current that come with 480 VAC, special breakers, shut-offs, and signage are required to keep people safe.

However, if a facility doesn't have 480 VAC power, it can be installed with the help of an electrician. Cost of installation depends on the type of configuration needed, but once installed, the efficiencies and costs of connecting a reefer unit to shore power are a lot less than the costs of fuel.

What do the CARB regulations entail?

California is putting regulations in place to prepare for a mandatory 480 VAC power infrastructure that must be present in all facilities by 2024. CARB indicates that diesel-powered reefers represent approximately 25% of total PM2.5 diesel emissions (making reefer pollution #3 after truck and train diesel engines). As a result, CARB will ban diesel-powered reefer units starting in 2031, so steps must be taken now to prepare for these changes.

If you manage a fleet that uses reefers, it is crucial for you to understand the regulations that apply to your fleet's situation. It will simplify your compliance process if you start preparing now so you can meet the CARB deadlines.



Here is a basic overview of the CARB regulations that will impact reefer use over the next few years

2022

All reefers operating in California must register with CARB

All new reefers must use refrigerant that is less than 2,200 GWP

2023

All facilities that receive reefer containers must register with CARB

2024

All facilities must complete installation of an electric powering infrastructure to support zero-emission reefers

2025

All truck fleets must turn over more than 15% per year from diesel to zero-emission reefers

All reefers must use zero-emissions if parked for more than 15 minutes

All remaining diesel reefers must meet US EPA Tier 4 emissions standards

2031

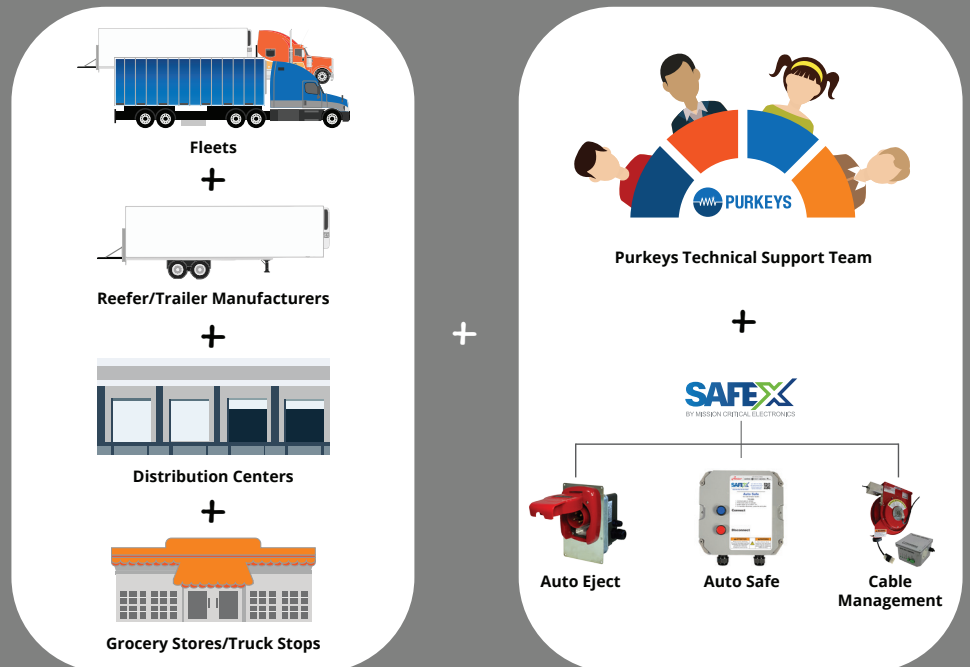
All new and used reefers must be 100% zero-emission (no diesel engines)

The SAFEX System Solution

What is SAFEX and what are its key components?

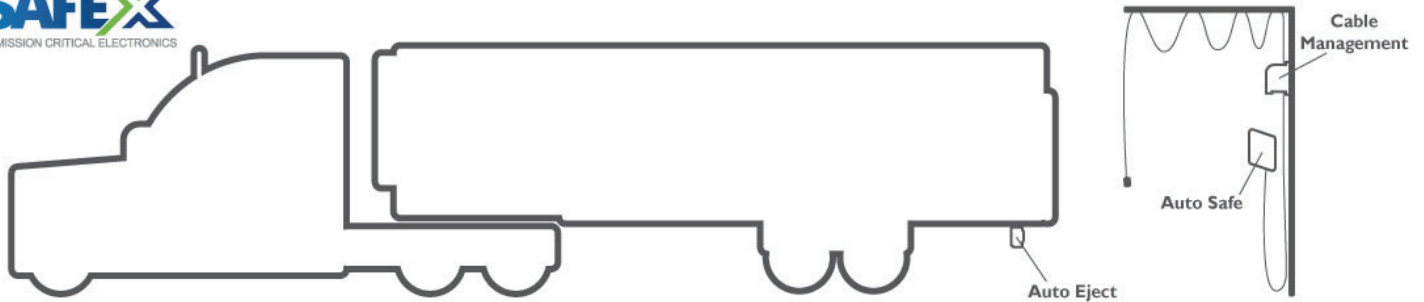
As a strong advocate for fleets, Purkeys wants to help make your fleet's transition to meeting CARB regulations as simple as possible. To this end, we have created the SAFEX System.

SAFEX is designed and engineered to provide safe and reliable 480 VAC power to operate reefers while they are docked at a distribution center or when they are being unloaded at the place of delivery. The SAFEX system offers a safe, environmentally-friendly power solution for fleets, reefer and trailer manufacturers, distributions centers, grocery stores, and truck stops to help them meet CARB and other anti-idling regulations.



= a safe, reliable, and environmentally-friendly system to provide 480 VAC power for eTRUs

SAFEX uses a system of components to safely provide 480 VAC power for your eTRU. These components include: 1) Auto Eject; 2) Auto Safe; and 3) Your choice of cable management.



1

THE AUTO EJECT

The Auto Eject is installed on the trailer. It includes a 480 volt, 30 amp receptacle that automatically detects when the cable is connected and ensures that the load is not live unless fully inserted. It utilizes an IEC (International Electrotechnical Commission) standard 4-pin-and-sleeve connector.

When the driver presses the tractor brake, the Auto Eject ejects the cable to prevent damage caused by drive-offs (after which your choice of cable management will take over) and the Auto Safe disconnects the power so that the cable is no longer live.

2

THE AUTO SAFE

The UL listed Auto Safe can be installed at distribution centers, refrigerated warehouses, truck stops, seaports and intermodal facilities, grocery stores, or on a designated shore power station out in the lot. When the Auto Safe receives the signal from the Auto Eject that the power cable is properly connected to the vehicle, it allows power to flow once the operator presses the power button. When the Auto Eject disconnects the cable, the Auto Safe automatically deactivates the 480 volt power cable to prevent accidental electric shock to personnel.

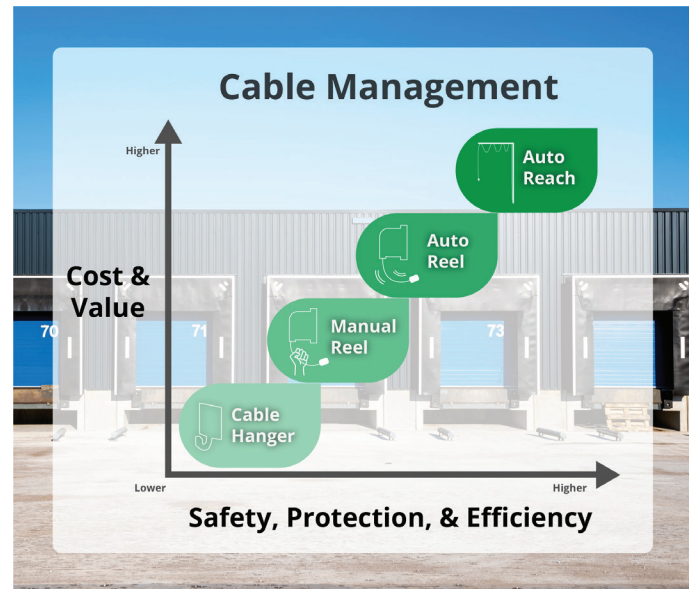


3

CABLE MANAGEMENT

The basic SAFEX package includes a sturdy cable hanger that the cable can be manually coiled on after the vehicle drives away. Cable management systems with higher levels of safety, protection, and efficiency are available in various forms:

- Manual Reel – allows an operator to tug the cable to activate the spring-loaded reel, which then neatly coils the cable
- Auto Reel – automatically coils the cable once it detects that power has been shut off, allowing for quick cable clean-up without requiring the operator to interact with the system
- Auto Reach – automatically retracts the hanging cable to the building or shore power station while keeping the cable off the ground
- Any of these options allow the cable to be removed from the ground, ensuring that tripping hazards, drive-off damage, drive-over damage, and other potential cable-related risks are mitigated.



WHO WILL INSTALL AND SUPPORT THE SAFEX SYSTEM?

The Purkeys team would love to discuss your reefer shore power needs and help you select the right SAFEX package. We want you to be confident that the system will meet your needs.

Once the SAFEX package has been selected, the Auto Eject and cable management system can be installed on the trailer by a manufacturer, fleet, or upfitter—whichever option best fits the needs of your fleet. The Auto Safe must be installed by a licensed electrician to ensure that the component is correctly and safely mounted. As always, the Purkeys team will be available to answer any questions or provide support as needed.



SUMMARY

The need to meet CARB regulations for hybrid reefers is quickly approaching. A 480 VAC system is needed, but it is crucial to find a system for your fleet that not only meets regulations but also protects your employees. The SAFEX system allows you to meet CARB regulations and ensures proper connection and disconnection of shore power, all while protecting personnel and property.



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ABOUT MISSION CRITICAL ELECTRONICS (MCE)

Mission Critical Electronics (MCE) is parent of Xantrex and many other industry leading brands such as Kussmaul Electronics, ZeroRPM, Newmar Power, ASEA Power Systems, Power Products, Purkeys, and American Battery Charging. Headquartered in Huntington Beach, California, MCE is a leader in the development of innovative solutions for power conversion, energy storage, power generation and shore power connectivity for a wide variety of applications in vehicle, marine, industrial and network markets. MCE takes great pride in translating its customers' needs into the highest quality products and solutions available in the markets it serves. MCE delivers its products and solutions with an unmatched level of responsiveness. MCE serves its customers in North America through 9 offices and a 3rd party warehousing facility. MCE also maintains manufacturing facilities in the US and employs over 300 people. MCE continues to invest in advanced and innovative technologies for electrification of power systems in boats and vehicles. The introduction of FREEDOM eGEN, ZeroRPM and SAFX power systems are a testament to MCE's commitment of offering clean, green, environmentally friendly power solutions for both recreational and commercial applications. MCE offers a complete suite of AC and DC power solutions including energy storage and renewable energy source for vehicle and marine applications.

ABOUT PURKEYS

Purkeys provides product solutions that charge and protect batteries—and other cool stuff—on big trucks. Our liftgate charging systems are easy to use, provide peace of mind by maintaining and protecting batteries, and save money by maximizing battery life and reducing downtime. Some of our other solutions allow drivers to use household comforts without discharging tractor batteries or provide trailer auxiliary power. Purkeys is part of Mission Critical Electronics (MCE) headquartered in Huntington Beach, CA.

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