

USING PORTABLE COOLING FOR EMERGENCY, TEMPORARY AND LONG-TERM USE

Facility and maintenance managers can benefit from understanding the basics of choosing and using portable cooling equipment for a multitude of applications.

As summer approaches and early heat waves become a more regular occurrence, overworked HVAC systems are prone to failure and portable air conditioners are often pressed into use for emergency service. This white paper will attempt to provide a basic yet timely review of what facility and maintenance managers need to know about portable cooling as the summer season approaches – and beyond.



Before delving into the “how-to” of portable cooling, however, it is useful to take a closer look at the “why”. Contrary to common belief, portable air conditioning units are not just for emergencies or tented weddings. These units are also frequently used to provide temporary cooling during shutdown of primary HVAC systems for service or renovation, or to cool building sites during construction or renovation.

What’s more, the word portable need not be synonymous with temporary. Portable equipment is often installed on a permanent basis to cool special areas with heavy heat loads such as computer server rooms, or to deliver supplemental cooling to growing businesses where the primary HVAC system is no longer adequate. It can also provide targeted cooling to server rooms, office suites or other areas during nighttime and weekend setback of the building thermostat, saving energy by delivering cooling only when and where it is needed. Portables sometimes offer a faster, easier and/or more cost-effective solution than the installation of mini-splits or other unitary A/C systems, as well as a more flexible option for customers who rent space or move or renovate frequently.

There are three main categories of equipment available through portable air conditioning suppliers and distributors:



AIR-COOLED portable air conditioners work by pumping in cool air and exhausting hot air out through ductwork. Air-cooled portables are most often the system of choice for server rooms, data centers, and a host of other applications because they can be installed almost anywhere, usually in minutes.

WATER-COOLED portable air conditioners connect to an external water source. They are very efficient to operate but are best suited for use in facilities with central cooling towers or chiller systems, or in regions where the municipal water supply is plentiful and economical. Water-cooled systems need no exhaust ducts, so they are often specified when there is no convenient way to exhaust hot air out of the room, for example in restaurants.

EVAPORATIVE COOLERS use an internal or external water source to provide cooling and a fan to push the air across the space. Though their performance is not comparable to portable air conditioners, when correctly set up they provide a simple, low-cost cooling option for specialized use – most commonly for outdoor areas where the budget or power supply is limited, as they can run on standard residential current. Warehouses are another potential application for these units. Evaporative cooling is most frequently used in desert climates, but even in Florida it can bring temperature reductions ranging from 5-15 degrees.

Once you have identified both your portable cooling application and the general category of equipment, there are several questions that should be reviewed with your HVAC contractor or cooling supplier to ensure that you get the best equipment for the job:

PROPER SYSTEM SIZING

Sizing of portable equipment is very important, but is too often left to guesswork. If you guess low, the unit will not be able to keep up with demand. If you guess high, the unit will cycle on and off frequently, resulting in inefficient performance.

A good starting point is to plan on 3.413 BTU per watt when calculating equipment size. That translates to around one (1) ton of air conditioning for a 400 - 600 sq ft room with an 8-ft ceiling. This starting point applies to a so-called “typical” space with no additional loads other than lighting.

Among the factors that must next be considered are: Does the room have windows or other openings, and what is the exposure? How much insulation is used? What kind of equipment is in the room and



1 After removing drop ceiling tile, the technician prepares to install the ceiling exhaust kit.



2 Exhaust duct/ceiling tile assembly is inserted directly into the opening.



3 Portable cooling unit is wheeled into place and ducting is connected to the exhaust air vent.



4 Technician turns on the unit and adjusts settings.

how much wattage does it consume? What is the occupant level and activity within the space? How much cooling is already coming in via a central air handling system or other source? All of this should be considered when calculating loads.

For server and telecom rooms, the same calculations apply, but the loads are much heavier due to the high heat generated by such equipment. If the room uses a UPS backup battery, you can actually take the battery wattage (i.e., 6000 watts) and multiply by 3.413 to arrive at the amount of cooling needed for a “worst-case” scenario. It might result in overkill, but server rooms are one of the few applications in which overspecification actually tends not to be a problem, given the low-humidity environment.



Portable units serving a large command center are hard-ducted to create an evaporator-side closed-loop system.

For applications where you are evaluating portable cooling versus a residential mini-split unit, take care not to make direct sizing comparisons. The two types of systems are tested and rated differently, which can be a source of confusion. The main thing to know is that a 3-ton portable unit is not interchangeable with a 3-ton mini-split. You will actually need more capacity when selecting a portable unit; but if you follow the sizing guidelines above, you should be able to arrive at an accurate calculation.

After installation, if sizing turns out to be less than perfect, all is not lost. Remember, a big advantage of portable cooling equipment is, to state the obvious, its portability. A rented unit can be readily swapped out with a larger or smaller model to ensure optimum cooling performance. A permanently installed A/C system that is over- or undersized will be a much bigger and more costly problem.

ADDITIONAL SELECTION FACTORS

POWER SUPPLY: Every model of portable air conditioner is designed for use with a particular type of electric circuitry. So after you and your supplier have correctly sized the equipment and determined the required tonnage, the available power supply might dictate your final equipment selection.

Fortunately, with recent technological advances, the choices are better than they were just a few years ago. There are now portables on the market that will run on convenient 460-volt 3-phase power and deliver an impressive 5 tons of cooling or more – allowing a single unit to do the job where two or three were previously needed.

Sometimes, however, more is better. With special event cooling, for example, two smaller units might be a better choice than a single large machine, because you will have critical backup in the unlikely event of equipment failure.

LOCATION, LOCATION, LOCATION: Will the unit be located inside or outside the space to be cooled? This will have an impact on ducting and return air considerations.

If the portable unit is inside a room, the first decision is whether to use one or two ducts. For many applications, it is advantageous to use a single duct coming off the top of the unit to dissipate hot air into the return air plenum or out of the space. This approach is often used in facilities where a central A/C system is running in the building at all times. As you direct hot air out of the room, the air has to be replenished. The room will receive additional cooling because the unit will be pulling at negative pressure. That is why, as mentioned earlier, the presence of other cooling sources must be considered when sizing a portable air conditioner.

But what if the building uses night/weekend temperature setback? In these situations, it is best to put a condenser plenum on the unit with an additional duct so there will now be two ducts going to the drop ceiling. This creates a closed-loop system that no longer draws in negative pressure. With the door shut, the space can now be cooled independently. The system will pay for itself quickly through energy-cost savings.



The portable air conditioner for this medical lab was placed outdoors due to space constraints.



One window panel was replaced with an exact-fitting manifold with pre-cut openings for the supply and return ducts.



Roll-out plastic ducting was suspended from the acoustical ceiling grid, with slits at appropriate locations to maintain proper airflow.

If the portable unit is inside the space and a spot cooling effect is desired, you might want to select a model equipped with cold air nozzles (sometimes called “snorkel packs”) that allow you to direct the air at hot spots within the room. If you are using a portable cooler with a grill-front design, there are kits available to retrofit most units with nozzles.

If the portable cooling must be located outside the room due to floor space limitations, aesthetics or other concerns, you will need to find a way to get the return and cold air supply in. This might involve cutting openings in the dry wall to insert the ductwork. If the portable installation is temporary, alternative solutions can sometimes be found.

For example, to supply temporary cooling to a medical lab, the project team placed the portable air conditioner outdoors and replaced a window panel with an exact-fitting manifold with pre-cut openings for the supply and return ducts. They selected non-sweating, heavy duty flexible duct for use outside, and roll-out plastic duct for indoors. They suspended the temporary ducting from the



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acoustical ceiling grid, with slits cut into the ducting at appropriate locations to maintain proper airflow of conditioned air through the space. This design helped ensure security for the facility, while allowing cool air to circulate in and hot air to be exhausted out.

Often a portable unit will be used to cool an office, server room or other small space within a warehouse. If it is a large facility with high ceilings, the hot air can usually be discharged up towards the warehouse ceiling with minimal effect on the rest of the building.

Flexible ducting offers a variety of ways to deliver controlled cooling. You might, for example, incorporate two 6-in. diameter

nozzles: The first duct can go to a diffuser to drop cool air down to one side of the space, with a second duct serving the other side. It is all quite basic; though since one duct will probably be longer, the system must be balanced to achieve even air distribution.

GETTING THE WATER OUT

The cooling process creates condensate water, so you will need to determine how to dispose of this water. If you plan to collect it in the standard condensate tank or bucket that comes with the portable cooler, it simply needs to be emptied when full.

In many applications, especially server rooms, it will be necessary to run a condensate line out of the room to an external drain of some sort – in a janitor's closet, bathroom floor drain, or perhaps out a window to an outdoor drain. A condensate pump for this purpose can be obtained from your portable cooling equipment supplier.

THE ROLE OF AN EMERGENCY PREPAREDNESS PLAN

When it comes to protecting people, equipment, and/or critical processes, it is wise to plan ahead and be prepared for the worst-case scenario. If you plan to use portable cooling for emergency backup, here are the most important steps to review with your supplier:

MAKE SURE THERE IS A BACKUP GENERATOR THAT WILL PROVIDE SUFFICIENT POWER FOR PORTABLE COOLING.

Many times, backup generators are not large enough to power the central air conditioning system. Spot cooling of critical areas offers an effective alternative: But even though electrical requirements will be reduced, you will still need adequate generator power to do the job.

PINPOINT SPECIFIC AREAS TO BE COOLED. Typically, portable cooling is used for critical applications within hospitals, nursing homes and extended care facilities that are not equipped with 100 percent emergency power, as well as data centers or server rooms to keep computers and other vital equipment functioning in all types of facilities.

CONSIDER SPECIAL VULNERABILITIES. Power outages are not the only factor to consider. Rooftop air handlers or other outdoor units may be vulnerable to A/C equipment breakdowns due to damage from

fallen trees or airborne debris during windstorms. It is a good idea to have portable backup cooling equipment “on call” in these situations.

LOOK FOR NEARBY POWER OUTLETS with the required voltage and phase. If they are not available, determine the requirements for electrical cables, extension cords or other accessories.

ESTABLISH A WRITTEN EMERGENCY COOLING PLAN using the information collected above. It should include a list of the specific areas to be cooled, a full inventory of the needed portable units and accessories and emergency contact information for the portable air conditioning supplier.

Whenever possible, specify equipment delivery before a hurricane or other anticipated event. The fact is, when disaster strikes and a panic mode sets in, the demand for portable cooling equipment exceeds the local supply. Ordering ahead is the only way to ensure that your facility will have the right equipment at the right time.

SELECTING A PORTABLE COOLING EQUIPMENT SUPPLIER

A reputable distributor of portable air conditioners should be able to lead you through most of the above steps and provide technical and installation assistance. When selecting a supplier, ask:

What kinds of equipment are offered? Look for a supplier who carries different types of equipment from multiple manufacturing sources so you can get unbiased advice on the best unit for your application. Ask what accessories are available and whether they are included in the basic rental price.

Does the supplier have a national accounts program? If you manage multiple facilities, look for a supplier who offers a program tailored to national account customers. You may be able to save time and money with an integrated program that includes a single point of contact within the portable cooling supplier organization for all your service needs, a customized emergency response plan and the ability to accommodate your company’s ordering system.

What other support and/or certifications are available? Ask what kind of technical support is available from the supplier. If you manage a government facility, determine if the distributor is U.S. General Services Administration (GSA) certified. Ask if they follow green initiatives such as the use of environmentally-friendly refrigerants, etc. Also, make sure the supplier has a large inventory of locally-stocked equipment and a proven track record in emergency response.

Portable cooling equipment gives facility and maintenance managers a valuable tool that can provide both short-and long-term comfort solutions across a wide range of applications – from temporary one-day emergency or event cooling to keeping high-tech equipment in a server room or data center cool year-round.

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