

FITTM

FIRE INTERRUPTION TECHNOLOGY[®]

OPERATING MANUAL

▲ARA SAFETYTM

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DISCLAIMER This training manual is intended for trained fire responders and assumes a full understanding of how to safely attack structure and other fires. Civilians and other operators of the FIT-5 should not rely on these guidelines as a substitute for professional training and should never presume to be capable of engaging a fire in the same way as a trained and properly equipped fire fighter. This manual is a supplement to professional training specific to the deployment of the FIT-5. It is not a substitute for common sense, training and/or any structural fire or other operational guidelines. Fire Interruption Technology, specifically handheld FIT, is not appropriate for all fires and all fire conditions. In some cases and conditions, Fire Interruption Technology may fail to perform or to effectively suppress fire. Under no circumstances should FIT be relied on to fully extinguish fire. It is not a fire extinguisher and traditional fire tactics are always required to extinguish fire after FIT deployment, regardless of the efficacy of the FIT deployment. Under no circumstances should any operator expose themselves to elevated risks to personal safety in order to deploy FIT.

Emergency Contacts:

IN THE EVENT OF AN EMERGENCY PLEASE PHONE 1-888-955-8883 AND FOLLOW THE INSTRUCTIONS AT THE PROMPT

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Introduction

Dear First Responder,

Thank you for making Fire Interruption Technology (FIT) an integral part of your firefighting arsenal. FIT is a highly effective light fire suppression tool that is proving itself every day in the field.

FIT allows first responders to buy time and help save a family from the loss of their home and property and the destruction of irreplaceable personal effects from fire and water damage.

In more than 40 real fire deployments to date, FIT has proven so effective that most of the deployed FITs have been replaced by the property owner's insurance company.

Prior to deploying FIT, it is important that responders complete the FIT training program and view the associated short instructional video online at <http://arasafety.com/training/operating-fit.htm> Together, these will provide responders with the basic knowledge required to deploy FIT safely and effectively.

It is also important to recognize from the outset that every fire brings its own unique challenges and dangers and that this FIT Basic Training Program is not a substitute for formal firefighting training. When fighting a fire with Fire Interruption Technology, it is essential that responders fully use their training, common sense and the best tactical information available. Most importantly, responders should always ensure that safety is their top priority.

At ARA Safety, we are continually improving our product offering and our training programs. Your feedback helps us do that and helps us make everyone safer. If you have any questions, concerns or comments, please don't hesitate to contact us directly at 1-888-955-8883.

We look forward to hearing your story of your first deployment of FIT in the near future.

Stay safe,

Michael Ainsworth
Chief Executive Officer

Fighting Fire With FIT

Fighting Fire With FIT

The fire tetrahedron is key to understanding precisely how Fire Interruption Technology (FIT) works.

Fire occurs when oxygen, heat and fuel act together to produce a sustained chemical reaction. If any one of the four components of the tetrahedron is removed, the fire is suppressed.

Fire Interruption Technology is an active fire suppression system utilizing an environmentally safe potassium bicarbonate aerosol that has the constituency and appearance of white smoke.

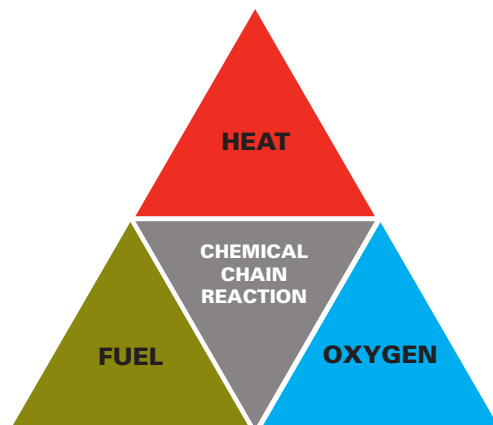
When the potassium bicarbonate aerosol is exposed to heat in a fire, potassium ions break free, absorbing energy and reducing heat levels. These free potassium ions bond with the hydroxyl ions that would otherwise fuel the fire chain reaction. These newly bonded hydroxyl ions cannot then bond with oxygen. This breaks the chemical reaction and rapidly suppresses the fire.

Some suppression systems, such as CO₂, act by reducing oxygen levels. While this often proves successful in suppressing the fire it can prove very dangerous to both occupants and responders alike, particularly in a confined space.

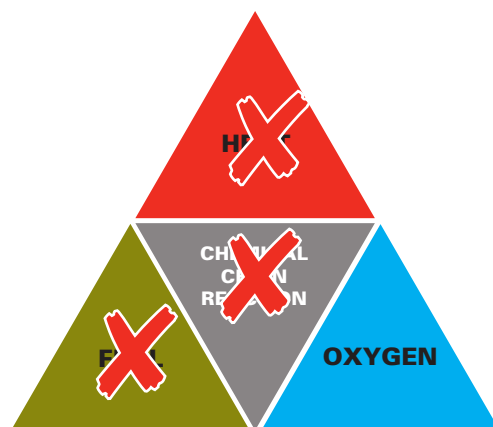
Water, and water-based systems, attack only the heat and cause substantial collateral and environmental damage over a wide area. Water-based systems are particularly harmful when deployed in an environment containing irreplaceable

personal effects or sophisticated electronic equipment.

Fire Interruption Technology is significantly different in that it works simultaneously on three components of the tetrahedron –heat, fuel and the chemical reaction– without affecting oxygen levels. Used in accordance with these instructions, deployment of FIT poses little inherent risk to occupants and responders and minimizes collateral and environmental damage.



FIRE TETRAHEDRON



FIRE TETRAHEDRON INTERRUPTED BY FIT

Why Use FIT

Why Use FIT

Fire Interruption Technology is a light attack fire suppression tool. It can be used at any stage of fire response, but is most effective when deployed early in the life of a fire.

Following are just some of the ways Fire Interruption Technology aids an interior attack.

Buy Time

A first arriving crew can deploy FIT without entering a structure. This can be done safely while additional crews are en route, or while waiting for water or foam to become available. In a fully involved fire, deploying one or more FIT can suppress and contain the fire so that the structure can be saved when additional resources become available.

Lower Temperature

When deployed, FIT can lower the temperature by as much as 700°F in as little as 30 seconds. Lowering the temperature this way makes an interior attack safer.

Hard to Access Fires

Attic fires, basement fires, and fires in confined spaces can be difficult and dangerous to attack. When strategically deployed, FIT can attack fire in areas that are difficult or impossible for crews to access.

Prevent Property Damage

Next to saving lives, saving a homeowners property from loss is one of the most important roles of a firefighter. Deploying FIT can halt fire progress and minimize the need for water, saving tens of thousands of dollars in structure damage and minimizing the loss of irreplaceable personal items and mementoes.

Victim Recovery

FIT was designed for use as a light attack fire suppression tool and not specifically intended for victim recovery. In most cases, ARA Safety recommends that all victims be recovered before FIT is deployed. However, if a rescue would be impossible without deploying FIT, ARA Safety recommends responders carefully follow a specific series of procedure. These are discussed on page 7.

Large Fires

Large fires that have not yet vented may be suitable for multiple FIT deployments. If the fire is too large to attack effectively with existing resources, the deployment of one FIT for every 2,000 cubic feet can help significantly in bringing the fire under control.

Preparing and Storing FIT

Preparing FIT for Use

FIT consists of a two part assembly, a main body, with an integral handle, and a supplied starting assembly. Although the starting assembly is a separate item, FIT are generally shipped with the starting assembly pre-installed and protected by a tamper-proof seal.

Units which arrive with the tamper-proof seal broken should not be used and should be returned. In the event the starting assembly is shipped separately, it should be carefully and firmly inserted in the starting assembly bracket as soon as FIT is received. The urgency of the fire ground is not the place to attempt to assemble FIT.

Please note that FIT is designed to have the starting assembly installed at all times and, once delivered and assembled, the starting assembly should never be removed.

Storing FIT on Apparatus

All FIT should be stored in the protective carrying case sold with FIT. Replacement FIT should be transferred to an empty protective carrying case without delay to replace a deployed unit.

FIT, complete in its high visibility protective carrying case, should be kept in an easy to access location on as many department vehicles as possible. All responders should be briefed on which vehicles are equipped with FIT, and where FIT is stored on the vehicles.

Generally, a department will equip with a minimum of four FIT per station or hall. FIT are customarily installed on those vehicles most likely to arrive first at the fire ground.

Storing FIT in Station

FIT should be visually inspected on receipt and on an annual basis thereafter. The inspection should ensure that a starting assembly is installed and that there are no visible signs of damage or corrosion and that the tamper-proof seal on the starting assembly is intact. Contact ARA Safety for support in inspecting FIT if required.

Replacement FIT should be stored in their corrugated shipping and storage carton until needed in a clean, dry, location in the station or hall. FIT should be stacked no more than 5 high in original packaging.

FIT are warranted for five years, and have an operational lifetime expectancy of up to 10 years under normal storage conditions. After that time, FIT should be withdrawn from service and used for training.

FIT that on visible inspection appear damaged or corroded should be taken out of service and used for training purposes. Please note that FIT require no user service and should not be disassembled by unauthorized personnel. ***ARA Safety accepts no responsibility for units which have been modified or tampered with in any way or damaged due to improper storage.***

Deploying FIT

At the Fire Ground

On arrival at a fire, FIT should always be retrieved immediately from responder's vehicles and taken directly to the structure by the responders. If multiple FIT are available, responders should have at least two FIT available for deployment, with one acting as back-up or for providing additional coverage.

Tactical Assessment

Once a tactical assessment has been conducted, the determination should then be made as to whether or not deploying FIT is appropriate. Best judgment and training should always be used in making any FIT deployment determination, but generally, if the answer to any of the following questions is yes, FIT deployment is supported.

- Is the fire too big to combat with an available conventional fire extinguisher?
- Is the fire small enough that FIT may fully suppress the fire, limiting or eliminating the need to use water?
- Is an interior attack planned and the structure not significantly venting?
- Is the temperature of the fire too high to get close enough to effectively attack the fire with water?
- Is victim rescue required and is rescue impossible without deploying FIT?
- Are additional resources such as manpower, water or foam not immediately available?

Announce Deployment

Before deploying FIT, it is important that everyone on the fire ground be briefed on what to expect.

- FIT will become active within 8~12 seconds of activation.
- On becoming active, FIT momentarily reach very high temperatures. FIT must be thrown immediately on activation and must NOT be deployed within six feet of a fellow firefighter or other live person.
- An active FIT generates a very large dense white cloud of potassium bicarbonate aerosol that reduces visibility to zero in the room in which it is deployed.
- Successful knockdown of a fire by FIT will result in the smoke escaping the structure changing from dark gray or black, to light gray or white.

Activation and Deployment

Once the decision to deploy FIT has been made, the deployment process is very simple and straightforward.

- Ensure the starting assembly is present and is firmly installed and that the tamper-proof seal is intact.
- Identify the easiest, safe throwing path to the seat of the fire, or the nearest point possible, and identify a clear exit path.
- Firmly instruct bystanders to stand clear. Ensure no bystanders are in the

Deploying FIT

intended FIT throw path, or are in the vicinity of the thrower when FIT is activated.

- All responders on the fire ground should be clearly advised of the intention to deploy FIT. Bystanders should also be notified loudly just prior to activation.
- FIT may be deployed from a standing or kneeling position. From either position, FIT should be gripped firmly in the right hand so that the starting assembly faces upwards towards the responders left.
- Activation should be initiated by the removal of the starting assembly cap and pulling firmly on the exposed starter cord with the left hand in a smooth, fluid, motion. The cord may be wrapped around a finger, or a finger may be placed through the loop in the cord.
- Care should be taken to ensure the starter cord is pulled smoothly and cleanly upwards diagonally to the left in a straight line out from the starting assembly. Avoid jerking the starter cord or pulling it so that it is significantly off-axis or impinges in any way on the starting assembly itself.
- After pulling the cord, the starting assembly will likely make a loud "POP" sound. Even if no POP is heard, the device should be assumed to be active.
- FIT is now active and should IMMEDIATELY be thrown towards the seat of fire using an underhand throw. FIT is designed so that it will function

fully and effectively regardless of how it lands.

- Activation will commence in 8 to 12 seconds and FIT will momentarily reach high temperatures as the aerosol cloud forms. Temperatures will then drop rapidly.
- Activation will cause visibility in the deployment area to quickly reduce to zero and responders should leave the area if at all possible. Time should be allowed for FIT to suppress the fire. This will take between approximately 60 seconds. Responders should then assess the fire condition and proceed according to their Structure Fire Operational Guidelines.
- If a thermal imaging camera is available it should be held at the ready. In the zero visibility environment following deployment, one will help to identify hot spots and locate any victims not already identified. It will also help in the evaluation of the effectiveness of FIT deployment.
- Finally, always overhaul completely with water or foam.

CAUTION

- ALWAYS THROW FIT AWAY FROM YOU AND TOWARDS THE SEAT OF THE FIRE IMMEDIATELY AFTER PULLING THE STARTING CORD – DO NOT HOLD ONTO FIT ONCE ACTIVE – FIT MOMENTARILY GETS VERY HOT ON ACTIVATION

Deploying FIT

Disposal

Expendable FIT canisters are not a hazardous material and can safely be disposed of with other fire ground waste in accordance with local regulations.

Important Procedures for Victim Recovery

FIT should only be deployed for victim recovery if safe recovery of the victim would not otherwise be possible.

FIT should be deployed as far from the victim as possible, while still deploying FIT in the area that will impact the fire.

Responders should always be aware that deploying FIT may disrupt thermal layers in the structure causing hot air to move temporarily towards the floor, creating a burn hazard for any occupants.

A thermal imaging camera should be held at the ready. In the zero visibility environment following deployment, one will be necessary in order to locate the victim.

The victim should be removed as quickly as possible. The victim should be treated as for smoke inhalation, in particular, supplemental oxygen should be provided.

Deployment Tips

Having learned how FIT works, how it is deployed and when it should be deployed,

It's time to review the key issues that lead to successful deployment.

Be Safe. Always put safety first. Never expose yourself, other firefighters, or occupants to unnecessary risks.

Information is Critical. Conduct a complete tactical size-up of the fire. The more information you have about the fire, the more effective a deployment will be. Communicate clearly your intent to use FIT.

Contain Aerosol. Limit venting. Openings such as doors and windows should be kept shut until FIT has done its job and crews are ready to overhaul with water.

Deploy Low and Near Seat of Fire. Throw FIT at the lowest point and as close to the seat of the fire as possible.

Be FIT Ready. Time matters. Always take FIT with you to the structure. This will ensure deployment readiness at the earliest possible moment.

Carry Two. Always have a second FIT available, in the event that the fire is too big, too vented or any other circumstance prevents a single unit from adequately knocking down and containing the fire.

Deploy Before Water. Water mist will wash the aerosol out of the air and eliminate its effectiveness.

Health and Safety

Safety Precautions

FIT is a very powerful fire suppression tool specifically designed to make the fire ground safer, but it does not remove the risks inherent in any fire response. The following precautions are important. Memorizing them and applying them rigorously will help keep everyone safe during FIT deployment.

Gear Up. Always wear SCBA and protective gear before entering a structure before, during and after FIT deployment.

Occupant Search. Always conduct your occupant search before deploying FIT. ONLY deploy FIT with occupants present if they could not otherwise be safely rescued.

Thermal Layers. FIT can lower temperatures rapidly. This can cause the thermal layer to temporarily move towards the floor.

Re-ignition Following Venting. Rapid venting following FIT deployment can lead to re-ignition. Always enter the structure with caution following deployment. Use of a thermal imaging camera will ensure that hot spots can be identified and cooled using water or foam.

Health and Safety

FIT powder aerosol is non-toxic however it may irritate the mucous membranes of respiratory organs. Brief exposure of unprotected skin and mucous membranes to FIT powder aerosol is not known to be harmful, but long term exposure should be avoided.

Other fire by-products are produced in much higher concentrations and have much higher potential to cause harmful effects to life than FIT deployment. Consequently, normal firefighter inhalation protection measures such as the use of a SCBA are sufficient to protect the responding firefighter from any potential exposure issues originating from FIT deployment.

Personnel not wearing protective respiratory equipment are advised to only enter the structure after FIT has discharged completely and the powder aerosol has had time to dissipate.

Neither FIT powder aerosol or any resulting residue will cause any damage to firefighters' protective clothing which should be cleaned in the normal way after any exposure to FIT powder aerosol.

Since FIT powder aerosol residues are water soluble, a thorough water rinse at the scene is sufficient to remove the residues from skin, gloves, tools and outerwear. Camera gear and other electronic devices should be wiped down with a damp cloth and dried to remove any visible material.

Other fire by-products are produced in much higher concentrations and have much higher potential to cause harmful effects to life and materials than the residues from FIT. Consequently, normal decontamination and post-incident cleanup procedures used to maintain fire fighting equipment after a response are more than sufficient to remove any traces of FIT residues.

Product Notes

General Notes

FIT is NOT A FIRE EXTINGUISHER. Fire Interruption Technology (FIT) is a light attack fire suppression tool intended for use by trained first responders to control and knockdown class A, B and C fires within a contained structure up to 2,100 ft³/60 m³ in volume before attacking with water.

ALWAYS overhaul the fire with water after using FIT, regardless of the observed state of the fire

FIT can also be used in rooms which contain cables, electric installations and electrical equipment in which the voltage is no higher than 100kV. Ensure all electrical equipment is no longer energized before overhauling the fire with water.

Usage is restricted to adult first responders who have received training on the proper method of activating and placing FIT within a burning structure.

Operational Conditions

FIT can be deployed over a wide range of operational conditions between a temperature range of -60°F/-50°C to +160°F/+70°C with a Relative Humidity up to 98%.

FIT have an operational lifetime expectancy of up to 10 years under normal storage conditions. After that time, FIT should be withdrawn from service and used for training.

No Environmental Issues

There are no environmental issues associated with the use of FIT.

Both the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) are zero.

General Properties of Agent

Potassium bicarbonate is an environmentally benign mildly alkaline, odorless, noncombustible, white crystalline powder, stable under normal conditions.

Potassium bicarbonate contains no toxic chemicals and is not listed as a carcinogen or potential carcinogen.

Potassium bicarbonate is classified by the FDA as a food ingredient "generally recognized as safe" (GRAS)

Empirical formula	KHCO ₃
CAS number	298-14-6
Appearance	White powder
Taste	Slightly salty
pH	1% solution at 77°F/25°C Approximately 8.2
Solubility	Soluble in Water
Thermal stability	Stable up to 350°F/ 177°C. Decomposes without melting into K ₂ CO ₃ , H ₂ O, CO ₂

