Product Overview

Keen KHTF-1000 Subarc Flux Rebake Oven

About the KHTF-1000 Flux Rebake Oven – 1000 lbs. Capacity

The Keen KHTF-1000 is a floor-positioned, large capacity subarc flux rebake oven. Subarc flux is top-loaded by way of a hinge-supported lid that is easily lifted manually, and discharged through a slide valve located on the bottom of the unit. Handy, fixed steel bars that stretch across the hopper opening allow the easy emptying of new flux from unopened factory packaging. The flux bags can be placed across these bars, cut open and emptied into the oven hopper. When flux needs to be removed, a container is placed by the user beneath the hopper to catch the granulated flux as it is dispensed. The hopper unit is securely mounted onto a stationary, heavy-duty stand.

The welding flux temperature inside the oven is regulated and controlled by a field-adjustable, digital PID controller with bright, LED temperature indicating display (user can switch from Celsius and Fahrenheit). This microprocessor is housed in a control box on the side of the flux oven hopper, along with a separate on/off indicating red light. This light enables users to quickly view from a distance if the oven is receiving power or has been shut off.

Heavy-Duty Construction

The Keen KHTF-1000 subarc flux rebake oven is ruggedly designed to withstand years of use in the most demanding industrial environments. Heavy-gauge steel is used throughout the unit and 4-inch thick, semi-rigid, high-density mineral wool in the oven walls and lid keeps the KHTF-1000 flux oven well-insulated and energy efficient. The exterior features a durable powder-coated paint that is highly resistant to industrial environments and will stand up to years of use. The KHTF-1000's hopper has welded seams inside and out, and is securely mounted to our custom-built stand with heavy-duty screws.

Performance Heating

Thorough, energy-efficient and quick heating of welding flux is the hallmark of all Keen flux ovens. The KHTF-1000 in particular has 39 / 1000W elements evenly dispersed throughout the flux oven hopper cavity. The elements are arranged inside the oven cavity from top to bottom with the last 3 elements at the very top of the oven; if a welding inspector opens the lid to test the temperature, he will get an accurate reading. When loaded with flux, no more than 2" of flux is without direct heating.

Our large-capacity flux ovens are designed to reduce watt density to the heating elements through a unique wiring series, greatly reducing overall power

consumption (The KHTF-1000 is only 2666 watts) while increasing heat-up times for cold loaded flux. This eliminates the problem of flux fusing to the heating elements which is a common problem seen in competing brands (Fusing of flux often creates a "gumming" effect causing the granulated material surrounding the elements to meld together).

Quality Temperature Control and Electrical Safety

As standard equipment, Keen KHTF-1000 flux ovens feature a UL® approved programmable PID microprocessor with digital temperature control and LED temperature-indicating display. The temperature reading can be displayed in either Fahrenheit or Celsius, and has a ±0.2 degree accuracy. Handy tactile increment/decrement keys on the controller's water-resistant front panel enable easy temperature set point adjustment. The controller also features an on/off control mode. The standard control unit supplied with the KHTF-1000 flux oven is programmable for standard operation, and an upgraded "ramp & soak" version is available.

Quality Insulation

Efficient heating design must be supported by quality insulation. The Keen KHTF-1000 features a semi-rigid, mineral wool "board" insulation that is bonded together with a high temperature binder. It is highly thermally efficient and is installed within the walls and lid of the unit.

Optional Accessories

As an optional accessory, Keen offers slag screens that can be installed at the top of the oven chamber. Our slag screens are designed to be a sieve for filtering out contaminants in reused flux as it is being poured back into the flux oven hopper. The hole size on our flux oven slag screens is standard, but we can adjust the screen hole size if you have a different requirement. The slag screens are a fixed size according to the flux oven with which they are used.

Customization

We have the unmatched ability to customize any of our standard ovens, and/or design one-of-a-kind ovens for unique storage requirements. Welding codes are constantly changing, and Keen is ready to meet the demands of today's welders. Please visit our website http://www.keenovens.com for more information about our products and detailed technical information about welding consumable storage.

Specifications for Keen KHTF-1000 Flux Oven

High-Temperature Rebake Unit

Part Number(s)	011522 (480V 3-Phase)
Oven Category	Flux Oven
Flux Capacity (LBS)	1000 lbs. Subarc Flux
Flux Capacity (KGS)	453.59 kgs. Subarc Flux
Standard Voltages Available	240V (Call Keen), 480V
Wattage	4333W
Temperature Range (°F)	Ambient - 999°F
Temperature Range (°C)	Ambient - 537°C
Thermostat	Digital Proportional Integral Temperature Control
Safety Feature	Manual Reset Over Temperature Control
Insulation	4” Thermal Wool
Interior Dimensions (IN)	26”L” x 26”W” x 45” D Sloped Bottom
Interior Dimensions (CM)	66cm L x 66cm W x 114.30cm D Sloped Bottom
Exterior Dimensions (IN)	45” L x 37” W x 69” D
Exterior Dimensions (CM)	114.30cm L x 93.98cm W x 175.26cm D
External Thermometer	Digital Temperature Display
Net Weight (LBS)	540 lbs.
Net Weight (KGS)	244.94 kgs.
Shipping Dimensions (IN)	78” L x 58” W x 46” H
Shipping Dimensions (CM)	198.12cm L x 147.32cm W x 116.84 H
Shipping Weight (LBS)	730 lbs
Shipping Weight (KGS)	331.13 kgs.
Power Cord Length	8 ft.
“ON” Indicating Light	Yes
CSA Approval	No
UL Approval	No
Accessories	Slag Screen 100618
Similar Keen Ovens	KF-100A, KF-300, KF-600, KHTF-600

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KEEN Submerged Arc Welding Flux Ovens (SAW)

Made in the USA and ruggedly constructed, KEEN submerged arc flux storage and rebake ovens are available in a variety of capacities to suit the most rigorous subarc welding operations. Our flux ovens have industry-leading heat up times due to our proprietary design, and can be found in a wide variety of industries across the world.

Below is a list of industries where KEEN subarc flux storage and rebake ovens are commonly used:

- Wind Turbine Tower Fabrication
- Longitundinal Submerged Arc Welded Pipe (LSAW) Production
- Helical Submerged Arc Welded Pipe (HSAW) Production
- Double Submerged Arc Welded Pipe (DSAW) Production
- Carbon Steel Tank and Vessel Fabrication
- Boiler Fabrication
- Pressure Vessel Fabrication
- Large Bridge Joint Installation
- Thick Plate Installation in Shipbuilding
- Offshore Platform Construction and Repair

Just as stick welding electrodes readily pick up moisture from the surrounding atmosphere, the same applies to bonded welding fluxes that are comprised mostly of dry, powdered ingredients. The purpose of welding flux is to clean and shield the weld area from impurities. If moisture has contaminated the flux, hydrogen is released into the metal when heat is applied. When the weld cools, it can become brittle, crack and/or develop pinholes. Moisture-contaminated flux can also accelerate corrosion to certain metals like aluminum and must be kept dry throughout the welding process.

KEEN welding flux holding ovens and rebake ovens are an indispensable addition to any subarc welding operation to help ensure quality welds. Our flux holding ovens and rebake ovens are suitable for almost any flux heating application that is required for today's welding professionals.

Please read the following FAQ section for more information about KEEN flux ovens, as well as individual product overviews and specifications for the various subarc flux ovens we manufacture at KEEN.

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KEEN Stick Electrode Ovens (SMAW) – FAQs

What are stick electrodes and what is shielded metal arc welding (SMAW)?

SMAW (Shielded Metal Arc Welding) is a manual arc welding process that is often called *stick welding.* It is one of the most popular welding processes used today. Its popularity is due to the versatility of the process and the simplicity and low cost of the equipment and operation. SMAW is commonly used with such materials as mild steel, cast iron, and stainless steel.

The process requires a consumable electrode that is coated in flux (stick rod) to lay the weld, and an electric current is used to create an electric arc between the electrode and the metals that are being welded together. The electric current may be either an alternating current or a direct current from a welding power supply.

While the weld is being laid, the electrode's flux coating disintegrates. This produces vapors that provide a shielding gas and a layer of slag. Both the gas and slag protect the weld pool from atmospheric contamination. The flux also serves to add scavengers, deoxidizers, and alloying elements to the weld metal.

Why do I need to store stick welding electrodes in a heated rod oven?

In stick welding (SMAW), the most commonly used welding electrode is low hydrogen 7018. It is covered with flux which is hygroscopic (easily absorbs moisture from the air). This flux coating burns and converts into a shielding gas that protects the weld pool from atmospheric contaminants such as hydrogen, nitrogen, oxygen and others. If these contaminants enter the weld pool they will cause defects such as cracking, and porosity (worm holes.) These defects can create a weak point at which the weld may fail under stress or load.

Low-hydrogen 7018 rods are just what their name states…low hydrogen. **They allow very little hydrogen into the weld pool unless they have been stored improperly and contaminated by moisture. Moisture allows hydrogen into the flux, which is then introduced into the weld pool adversely**. This moisture contamination is super-heated during the welding process, converts into steam and then bubbles up to the surface leaving an open pocket in the finished weld bead. So at that particular spot the weld is weaker because it is not a solid bead. This will happen at the beginning of the bead with each new rod used, and diminish as the rod heats up and burns the moisture out as it is being consumed.

Moisture-contaminated rods may make a good-looking weld at first, but they will be subject to longitudinal cracking either right after welding, or later on (longitudinal cracking occurs where a crack begins at one point and follows the length of the weld). Defects may also be noticed by a visiting welding inspector as described by one of our seasoned welders here :

KEEN Stick Electrode Ovens (SMAW) – FAQs

What are the proper storage and rebaking guidelines for stick rods?

For specific storage and rebake temperature guidelines, we recommend contacting the welding consumable manufacturer directly. It is also important to check with local welding codes and/or ask a welding inspector to provide some information. Welding standards change frequently, and each manufacturer often provides a different recommendation regarding welding electrode storage. Check the packaging and also manufacturer websites for information. Keen offers a wide range of products to handle almost any welding consumable storage requirement.

What is the difference between welding electrode holding and welding electrode rebaking?

Generally, there are two processes involved with the proper maintenance of stick welding electrodes: holding (also called storing) and rebaking (also called reconditioning).

The holding process refers to the short-term* or long-term** heated storage of welding electrodes to maintain factory-fresh dryness. Storing the rods at elevated temperatures prevents atmospheric moisture contamination of the electrode's hygroscopic flux coating. There are various temperature requirements according to the type of electrode and also that are also set forth by welding codes. **For specific holding temperature guidelines, please contact the manufacturer of your consumable.**

The rebaking process refers to the short-term*, high temperature heating of welding rods that have been or may have been contaminated by atmospheric moisture. The rebaking process "reconditions" the welding rod, meaning it bakes out the moisture that has entered the coating thus restoring the electrode so it is suitable for reuse. Many large shops have a rebake rod oven in the tool crib in which electrodes coming back from the field are procedurally rebaked as a precaution to remove any moisture, and then put into a holding oven for long term low temperature storage for reuse. **For specific rebake temperature guidelines, please contact the manufacturer of your consumable.**

* - In relation to our products, we consider short-term to mean 8 hours or less.

** - In relation to our products, we consider long-term to mean 24 hours/day 7 days/week.

What are the key differences between welding rod holding ovens and welding rod rebake ovens?

Keen rod ovens are specifically designed according to the temperature range of the process, and the amount of electrodes to be stored. The standard holding ovens are designed to accommodate a maximum temperature of 550F and the rebake ovens are designed to reach 999F. The higher temperature ovens have larger wall thicknesses to accommodate more insulation, explosion proof latches

KEEN Stick Electrode Ovens (SMAW) – FAQs

and digital programmable temperature controllers. The large, floor-positioned holding ovens feature basic digital temperature control, and the bench and portable ovens have analog temperature control or constant input without thermostatic control.

Can I use a Keen portable holding oven for long term storage?

Portable welding electrode ovens are designed primarily for short-term holding, not long-term holding. Portable units are commonly used by individual welders in the field to keep electrodes dry at the welding station. Typically, welders are provided electrodes that are stored in a larger, long-term holding oven at the tool crib. They load up their portable for a day's work, and any that are left at the end of the day are returned to the crib for rebaking or long term storage. The portable is shut off until the next time it is used in the field.

Are the large ovens used only for long term storage?

Yes. Keen holding ovens from 200 lbs capacity and up are designed to be run 24 hours/day, 7 days/week. The idea is to keep all unpackaged electrodes at elevated temperatures all the time to preserve the integrity of the electrode and to ensure optimal welds.

How can I determine the amp draw for a particular rod oven model?

Use this formula: Watts / Voltage = Amps

What is the permissible atmospheric exposure of low-hydrogen welding rods?

The AWS specification for carbon steel electrodes (AWS A5.1), E70XX maximum limit is 4 hours.

For the AWS 5.5 specification, please see below:

E70XX-X 4 hours max E80XX-X 2 hours max E90XX-X 1 hour max E100XX-X 1/2 hour max E1100XX-X 1/2 hour max

Are there any commonly known welding rod storage methods that are inadequate?

One welding rod storage myth perpetuated by some in the industry is that an old refrigerator equipped with a light bulb will sufficiently heat the covering on low-hydrogen electrodes to the consumable manufacturer recommended storage temperature range of 225-300F. Most light bulbs do not provide sufficient heat to bring the electrodes up to the proper temperature to stave off moisture contamination in the covering.

Another myth that we have come across over the years is that storing welding electrodes in a freezer will keep the rods dry. This of course is a myth because as soon as the rods are removed from the freezer they will be a magnet for any

atmospheric moisture that exists in the air and produce condensation on the coating.

It is always best to review instructions on the manufacturer's packaging, and to consult the manufacturer for guidelines of if you have any questions pertaining to proper storage. Please note that not everyone is informed about welding rod storage, even in customer service departments at major manufacturers. It is best to speak with an experienced welder or inspector that knows AWS SMAW specifications and proper industry-approved storage guidelines.

What are common storage and handling mistakes that can lead to damaged welding rods?

Welding electrodes are manufactured to be within acceptable moisture limits consistent with the type of covering and strength of the weld metal to be used with the electrode. They are then packaged in a container which has been designed to provide the degree of moisture protection considered necessary by the industry for the type of covering involved.

Some common handling mistakes of welding rods are:

- Exposing to atmospheric moisture beyond the consumable manufacturer's suggested time limits
- Storing rods in opened factory packaging
- Opening the container from the wrong end
- Tossing the rods around which can crack the low hydrogen coating on the welding rods thus rendering them useless
- Exposing to abrupt temperature fluctuations, particularly from cold to warm areas – condensation may be drawn to the coating
- Exposure to grease or dirt which also contains moisture
-

What issues can potentially result during welding from improperly stored welding rods?

Poor arc direction, excess spatter, poor shielding, lack of penetration and porosity are common results that occur when welding rod coatings have been contaminated by moisture. Another common occurrence is "fingernailing" which is a term used to describe uneven burn-off on one side of the welding rod. This is often due to moisture contamination in one area of the electrode causing it to burn off more slowly than other areas.

What terms should I know that are related to poor storage of welding consumables?

Porosity: formed by entrapment of discrete pockets of gas in the solidifying weld pool. The gas can be formed in a variety of ways: poor gas shielding, surface contaminants such as moisture, grease, rust. Porosity can also result from insufficient deoxidants in the parent metal, electrode of filler wire.

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Wormholes: A severe form of porosity caused by heavy contamination of the weld pool as a result of surface contamination or welding with damp electrodes. Under radiograph, they appear as elongated pores and are indicative or a large amount of gas that has formed in the weld which is trapped by the solidifying weld metal.

Hydrogen: Contributes to cracking in the solidified weld. In combination with high tensile stresses and sensitive steels, hydrogen can cause cold cracking several hours or days after the weld is complete. For structural welding using high strength steels, consumables that give low hydrogen levels are often used. These types of consumables are prone to moisture pick-up and must be stored at elevated temperatures.

How can I tell if the coating on my low-hydrogen welding rods has been compromised?

Visually inspect the rod coating to determine if the color has changed during storage. Any discolored welding rods should be discarded or your supplier should be contacted. Also visually inspect for physical damage to the coating that may have occurred during handling. Any sections of the rod coating that may have been damaged will render the rod useless and it should therefore be discarded.

How can I find recommended storage guidelines from the manufacture of my consumable?

Check the consumable packaging for information, your local supplier and/or the manufacturer of the consumable you purchased. Please note that not everyone is informed about proper welding rod storage, even in customer service departments at major manufacturers. It is best to speak with an experienced welder or inspector that knows AWS SMAW specifications and proper industry-approved storage guidelines.

How do storage methods differ for low hydrogen rods, stainless steel rods, cellulosic rods and non-low hydrogen rods?

Proper storage procedures should be followed for all types of welding electrodes. Please consult the consumable manufacturer for specific instructions. It is generally accepted that the same storing and rebaking procedures for low-hydrogen welding rods also apply to stainless steel welding rods. Cellulosic electrodes should not be stored in an oven because moisture exposure does not have a detrimental effect on performance. If non-low-hydrogen rods have been exposed to moisture, they can be heated in a rod oven at low temperatures only (100-120°F).

Can I store different types of welding electrodes simultaneously in a rod oven?

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This can present some problems, and the consumable manufacturer must always be contacted before storing multiple types of electrodes together in a single rod oven. Welding electrodes are manufactured to have a specific range of moisture content. For example, low-hydrogen rods have a moisture content of approximately 0.1 – 0.4 percent. Cellulosic rods on the other hand have a moisture content of 4 to 6 percent. If these two types of electrodes are stored in the same oven, the lower moisture content low-hydrogen rods will absorb moisture from the higher moisture content cellulosic rods. It is important to note that cellulosic rods are not to be stored long term in a rod oven, and are only heated at low temperatures (100-120°F) if they have been exposed to humid air for an extended period of time.

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One Year Limited Warranty

Henkel Enterprises, LLC warrants its products against defects in material and workmanship. Henkel Enterprises, LLC will either repair or replace without charge any properly installed product which fails under normal operating conditions within one year from date of installation, provided it is returned to our factory, transportation prepaid, and our inspection determined it to be defective under the terms of this warranty. The warranty covers only equipment manufactured by Henkel Enterprises, LLC and does not extend to transportation, installation, or replacement charges at the buyer's facility; nor does it apply to any other equipment of another manufacturer used in conjunction with Henkel Enterprises, LLC equipment. No other warranty, expressed or implies exists beyond that included in this statement.