



**UCC**

**UNION CARBIDE AND  
CARBON CORPORATION**

*Products*  
**FOR**

**OXY-ACETYLENE WELDING  
AND CUTTING**

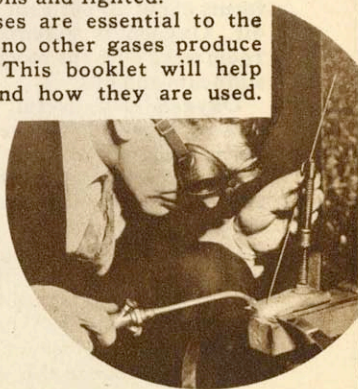
# **UAE** PRODUCTS

## **for Oxy-Acetylene Welding and Cutting**

Everything that is used in the oxy-acetylene process of welding and cutting metals is sold by The Linde Air Products Company—a Unit of Union Carbide and Carbon Corporation.

The oxy-acetylene process for joining and severing metals utilizes the terrifically hot flame (6000 degrees Fahrenheit) that is produced when the two gases—oxygen and acetylene—are mixed in the correct proportions and lighted.

These two gases are essential to the process because no other gases produce so hot a flame. This booklet will help you to understand how they are used.





### Oxygen

The air that we breathe is an invisible mixture of many tasteless, odorless gases. One of these gases is oxygen, which forms about 20 per cent of the volume of air. Oxygen is essential to life; if a room were without oxygen, people would suffocate and die.

Oxygen is a useful gas for another reason as well. Oxygen makes things burn, although oxygen itself does not burn. In pure oxygen, things burn faster and more hotly than they would in air, which is only one-fifth oxygen. In fact, many things that will not burn in air will burn easily if they are lighted while in a jar of oxygen. Upstairs in the Basic Science exhibit of "The Story of Air", you can see a piece of steel wire burn like a wax taper in this way.

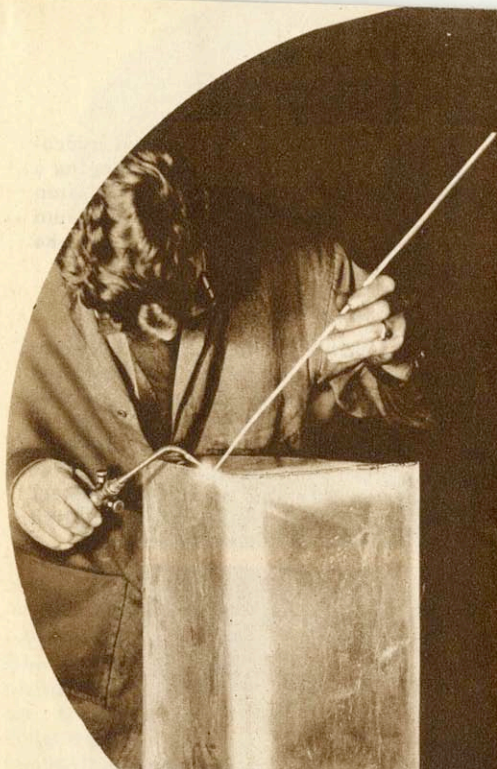
### Acetylene

Acetylene is a gas composed of hydrogen and carbon. It is made by bringing a gray, stone-like material called calcium carbide into contact with water. Calcium carbide is produced from lime and coke in an electric furnace.

### The Oxy-Acetylene Mixture

When acetylene is mixed with oxygen, which we have seen makes things burn better or faster, it produces the hottest flame known to science. This oxy-acetylene flame has a temperature of over 6000 degrees Fahrenheit (water boils at 212 degrees). In this terrific heat, steel and iron—and even platinum—melt like butter.





### Oxy-Acetylene Welding

Because the oxy-acetylene flame melts metal so easily, it is ideal for welding. Oxy-acetylene welding is the method of joining two or more pieces of metal by melting the edges in an oxy-acetylene flame, so that they flow together and become one and the same piece. The oxy-acetylene weld is as strong as—or frequently stronger than—the pieces joined.

### Oxy-Acetylene Cutting

Oxy-acetylene cutting is a fascinating process, one of the most spectacular achievements of modern science. The process itself is very simple. A spot on the edge of the piece of steel or iron to be cut is heated with an oxy-acetylene flame—but not quite to the melting point (oxy-acetylene cutting is *not* melting).

When this spot is red hot, a hair-line stream of oxygen is directed against the heated metal. Then what happens?

Well, we already know that oxygen makes things burn, even iron and steel. So, here, we have a red-hot piece of steel being suddenly touched by a thin jet of oxygen. Only one thing can happen. The part of the steel touched by the oxygen burns like paper. It burns right through its whole thickness, as cleanly as if a saw had cut it.

### Gases and Apparatus

Now that we know what welding and cutting do, it will be interesting to consider the equipment and supplies that make these things possible.



## Linde Oxygen

Linde Oxygen is produced from air by the Linde liquid air process. It was the Linde process which first made oxygen a commercial possibility and, by rendering this gas relatively inexpensive and easy to obtain, made possible the present development of oxy-acetylene welding and cutting.

When the oxygen has been separated from the liquid air, it is compressed into the gray and green Linde oxygen cylinders. These are made of strong steel, because the oxygen is held in them under a pressure of 2000 pounds per square inch.

## Prest-O-Lite Acetylene

Acetylene can be obtained in two ways. The user can either buy Prest-O-Lite dissolved acetylene ready to use, in steel cylinders; or he can make his own from Union Carbide and water in a machine called an acetylene generator.



## Acetylene Generators

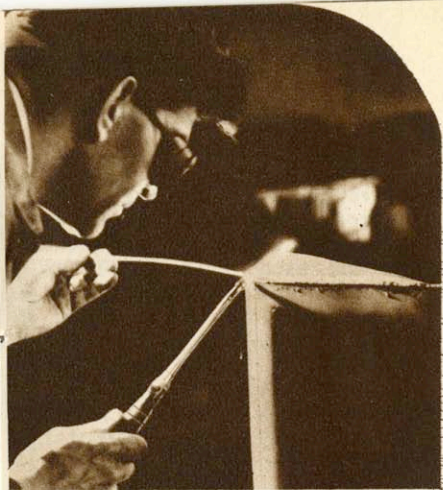
Acetylene generators are merely devices for bringing calcium carbide (Union Carbide) and water together to produce acetylene. Although they are simple, they must be well designed and equipped with adequate safety appliances. The Linde Air Products Company manufactures several excellent brands (Oxweld, Carbic, Purox, and Prest-O-Weld), all of which are listed as standard by Underwriters' Laboratories, Inc. For best results, a high grade of carbide is essential. Union Carbide, which is sold by The Linde Air Products Company, is accepted as the standard of quality.

## Dissolved Acetylene

If the welder prefers to buy his acetylene ready-made, it comes to him in black Prest-O-Lite cylinders. Because of its nature, acetylene is not simply pumped into an empty cylinder, like oxygen. Acetylene cylinders are filled with a porous solid material. This porous material is then saturated with a liquid which has the property of absorbing many times its own volume of acetylene gas. Acetylene supplied in this way is called "dissolved acetylene".

## Blowpipes

The oxy-acetylene welding blowpipe is a device for mixing oxygen and acetylene together in the right proportions to produce the flame for welding. It is an



arrangement of metal tubes of special design and construction with valves to control the flow of the gases. The oxygen and acetylene enter separately at one end. Inside, they are mixed in a complicated mixing device. At the other end, the oxy-acetylene mixture flows out and can be ignited to form a hot flame. This flame is played upon the metal that is to be welded. Blowpipes for cutting are slightly different in construction from those for welding. This is because an extra passage and valve for the cutting oxygen jet have to be provided.

The Oxxweld, Prest-O-Weld, and Purox blowpipes, which are marketed by The Linde Air Products Company, are the products of scientific research, skillful engineering design, and careful manufacturing. All these blowpipes are simply, ruggedly, and efficiently made. Almost any good mechanic can learn to use one in a few hours.

### Regulators

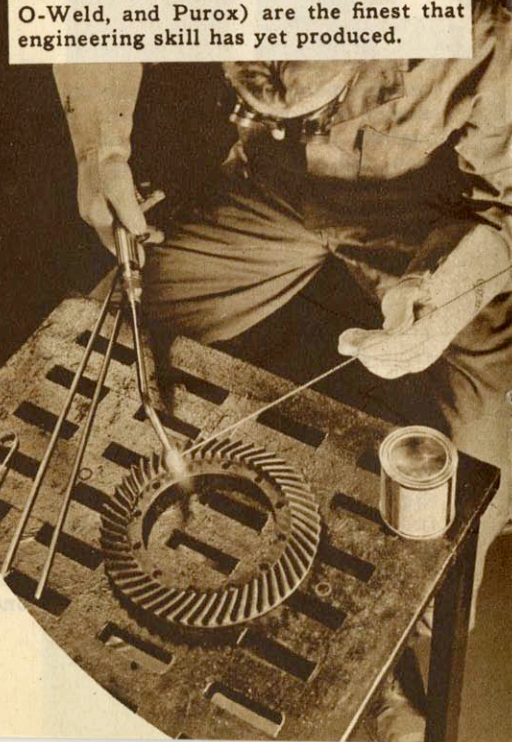
To control the flow of oxygen and acetylene from the cylinders to the blow-pipe, oxygen regulators and acetylene regulators are used. These regulators must be very carefully designed and practically perfect in operation. Otherwise, good work cannot be done, and the gases will be wasted. The Linde Air Products Company regulators (sold under the brand names of Oxweld, Prest-O-Weld, and Purox) are the finest that engineering skill has yet produced.

### Welding Rod

When pieces of metal are to be welded together, it is usually necessary to cut away or bevel one edge of each piece, in order to have all parts of the edges exposed to the flame.

Therefore to replace the metal cut away, a welding rod is melted into the pieces being joined. The material being welded is usually called the "base metal."

It takes great care to make exactly the right kind of rods for welding steel, iron, copper, brass, aluminum, and the various alloys of these metals. The Linde Air Products Company employs expert metallurgists and welding engineers to perfect its Oxweld and Purox welding rods, because it realizes how important first-class welding rod is.



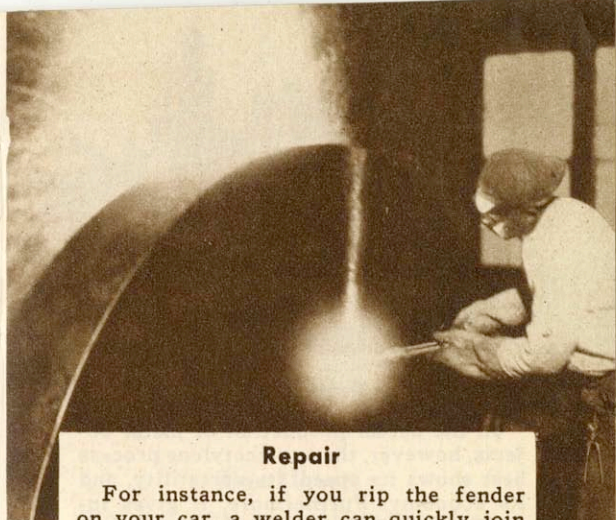
## Accessories

The Linde Air Products Company sells all the various accessories used in welding. These include goggles, spectacles, and gloves to protect the welder from sparks, light, and heat; blowpipe lighters; hose for the gases; trucks and manifolds for the cylinders; fluxes; and other useful parts. All of these are made with the same care and skill that go into the other pieces of Linde equipment.

## How Oxy-Acetylene Process Is Used in Industry

It should be plain that a process which swiftly joins metals with a strong leak-proof joint, and which cuts heavy iron and steel as easily as scissors cut cloth, must be a great boon to everybody who has to shape or repair metal products.

The oxy-acetylene process is such a boon. It is used every day in hundreds of industries, both for repairing worn or broken parts (thereby saving the price of new ones) and for building metal products.



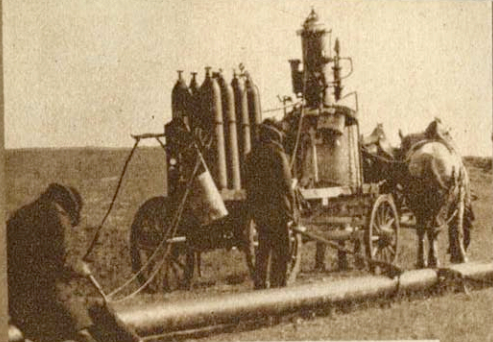
## Repair

For instance, if you rip the fender on your car, a welder can quickly join the broken parts. They will be as good as new, and the job will cost much less than a new fender.

In most factories today, there is an oxy-acetylene welding and cutting outfit always ready to repair damaged machinery or to remodel machines. This process saves millions of dollars every year, and it is not uncommon for a single welded repair to save a two- or three-thousand dollar replacement.

More important, welding often saves more than this by preventing a shutdown that would be necessary if a new part had to be made to order or shipped from a distant city. In seasonal industries, such a shutdown might be disastrous; and many a prosperous plant would sooner part with any other repair tool than with its oxy-acetylene equipment.



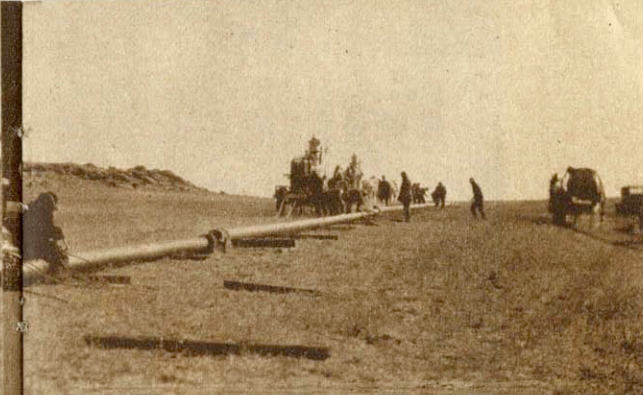


### Production

In the actual production of metal objects, however, the oxy-acetylene process best shows its speed, its versatility, and its economy. Furthermore, it gives industry a method of making strong joints in metal, without screws, bolts, fittings, and couplings—and of cutting or shaping metal into patterns that used to require expensive machining or special castings.

For example, the largest producer of gas refrigerators uses oxy-acetylene welding on almost every part of the refrigerators. The coils that contain the refrigerating solution have to be 100 per cent leakproof. Therefore, they are oxy-acetylene welded at all joints.

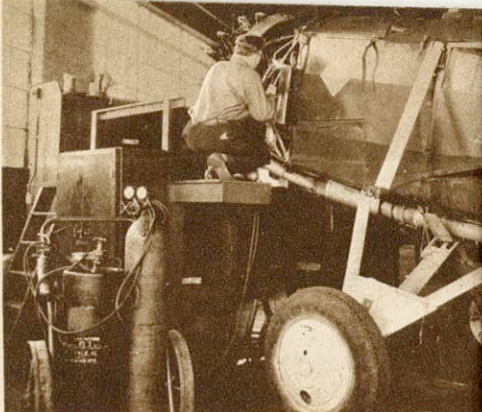
The metal cabinets and liners of these refrigerators are also welded into light but strong one-piece units. The welded joint—because it leaves no spaces between the pieces of metal that it joins—can be ground smooth and enameled just as successfully as any other part of the cabinet. The joints can never work loose and chip the enamel; and no dirt or germs can get between the pieces of metal and endanger the housekeeper's health.



### Pipe Lines

Pipe lines that carry oil and gas from the fields to the refining plants or city mains are sometimes a thousand miles long. They are huge pipes, sometimes 20 inches in diameter. They are buried in ditches on land, but frequently they have to be laid across river-bottoms or swamps. Needless to say, the thousands of joints in these lines have to be absolutely leakproof. Otherwise, valuable gas and oil would be lost, and miles of pipe would have to be dug up for repairs.

Today, practically every important pipe line is welded. The builders know that once a pipe joint has been welded and tested, it will last as long as the pipe itself. Striking proof of this has been found when terrific floods or earthquakes have torn and broken the pipe itself without so much as cracking the welded joints. Many times welded pipe lines were the only ones not completely ruined and torn apart.



### Aircraft

If strength and absolute dependability are priceless anywhere, it is in airplane construction. Here human life depends directly upon flawless materials and flawless workmanship.

Today, practically all American airplanes have all-welded fuselages or frameworks. What better proof is there of oxy-acetylene welding's merit than this?

Great strength, however, is not the only consideration in airplane design. This great strength must be combined with utmost lightness. This is another reason why welding has found favor with the aircraft industry. The welded joint can be made as strong as, or stronger than, the base metal itself; yet it does not depend upon sheer bulk—sheer piling up of metal—for this strength. There is no other process in the world that offers the same advantages.

### Used Everywhere

These examples represent but a tiny fraction of all the jobs that the oxy-acetylene process is doing in the world today. There are welded joints, or oxy-acetylene cut parts, in scores of familiar articles that you use—automobiles, metal furniture, radio tubes, household utensils, factory appliances, railroads and ships, plumbing and heating systems, bridges and buildings, and office equipment.

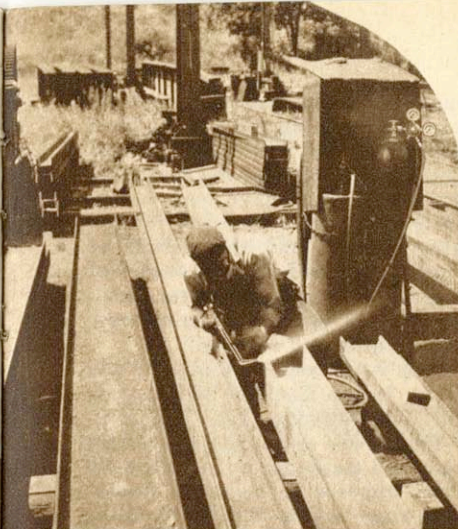
Oxy-acetylene cutting is equally important in industry. For example, it is always used when skyscrapers are being built. The speed with which these modern buildings are erected would not be possible without the oxy-acetylene blowpipe, which is used to trim the steel members to make them fit in place.

When the steel-frame building has outlived its usefulness, this versatile tool is again called into service. The oxy-acetylene blowpipe is used now to cut apart the steel members for removal.

There are countless other applications for oxy-acetylene cutting. It is used on pipe, plate, castings, steel shapes—in fact, on anything made of iron or steel. Huge masses of steel as much as eight feet thick have been cut with ease by this process, and hundreds of manufacturers use it as a routine production method.

In emergencies too, the cutting blow-pipe is useful. Fire departments use it to cut away wreckage or to free people trapped in metal buildings. In the famous Eastland disaster in Chicago years ago—when hundreds of people were trapped in an overturned ship—oxy-acetylene blow-pipes were used to cut the steel hull and set them free.

Every year, the number of articles wholly or partly made by the oxy-acetylene process is growing—for this process is the modern metal-working tool of all industry, and as important to this Age of Metal as the hammer and saw were to our fathers.



### Development and Research

The Linde Air Products Company is proud to be the sponsor of such a process—and gratified to see the whole-hearted acceptance that the industrial world has given it. The part that Linde—and its affiliated companies in Union Carbide and Carbon Corporation—have played in developing the oxy-acetylene process from a laboratory curiosity into a modern tool of service has been tremendous.

The founders of this Corporation early envisioned the tremendous usefulness of this process and were quick to develop apparatus for making it industrially feasible.

Through persistent research, correct procedures for welding and cutting have been developed and proved. Through constant demonstration of the merits of these processes, these have been established as indispensable methods for the production, repair, and demolition of metal products. Today, thousands of manufacturers are making better products and greater profits by using oxy-acetylene welding and cutting.

The Linde Air Products Company and its affiliate, Union Carbide and Carbon Research Laboratories, Inc., are constantly improving welding and cutting equipment and methods. If, in your business, there appears to be some money-saving or time-saving use for welding or cutting, please feel free to call upon The Linde Air Products Company for suggestions or assistance. The Linde organization is always ready to serve you in this way and to give you the practical benefits of its 27 years' experience in developing and perfecting the oxy-acetylene process.

## **LINDE TECHNICAL LITERATURE on Oxy-Acetylene Welding and Cutting**

Available without cost by writing to  
Union Carbide and Carbon Corporation,  
30 East 42nd St., New York, N. Y.

- L-OA—OXY-ACETYLENE TIPS
- L-100—Airplane Fuselage Welding—How to Weld Duralumin
- L-105—Cutting Cast Iron with the Oxy-Acetylene Blowpipe
- L-107A—Fabrication of Oxwelded Piping
- L-108—Destructive and Non-Destructive Tests
- L-112—Oxwelded Piping
- L-116—Oxwelded Construction for Modern Piping Services
- L-119—Oxweld No. 23 Aluminum Welding Rod
- L-120—Oxwelding Aluminum and Its Alloys
- L-122—The Oxygen Lance in Blast Furnace and Steel Plants
- L-123—Production Welding
- L-133—How to Bronze-Weld Cylinder Blocks
- L-135—Oxweld No. 25 M. Bronze Patented Welding Rod
- L-136—Oxweld Portable Tensile Testing Machine
- L-137—Oxweld Extensometer Type TM-3
- L-138—High Test Welding Rod
- L-140—Simple Tests for Identifying Metals
- L-141—Repairing for Profit
- L-143—Oxweld Welding Rod
- L-145—The Progress of Bronze-Welding
- L-146—Oxwelding for General Maintenance
- L-147—The Principles of Bronze-Welding
- L-148—How to Figure Oxwelding and Cutting Costs
- L-149—The Design of Jigs and Fixtures
- L-150—Welding Corrosion-Resisting Steels
- L-152—The Testing and Qualification of Welders
- L-153—The Bronze-Welding of Cracked Cast Iron Boiler Sections
- L-154—Flame Machining

## Read These Books Too

If you have found this booklet interesting, you will undoubtedly enjoy the others in this series:

- A - UCC Products for Oxy-Acetylene Welding and Cutting
- B - UCC Products for Oxygen Therapy
- C - UCC Lighting Carbon Products
- D - UCC Industrial Carbon Products
- E - UCC Pyrofax Gas
- F - UCC Synthetic Organic Chemical Products
- G - UCC Vinylite—The Thermoplastic
- H - UCC Products for Alloy Steels and Irons
- I - UCC Carbon and Graphite Electrodes and Specialties
- J - UCC Haynes Stellite Products
- K - UCC Eveready Flashlights and Batteries
- L - UCC Eveready Prestone
- M - UCC Eveready Layerbilt "B" Battery
- N - UCC Condensed List of Technical Literature
- O - UCC Condensed List of Products and Principal Subsidiary Companies
- P - UCC Story of Air and Linde Liquid Air Demonstrations
- Q - UCC Story of the Electric Furnace

Ask for these booklets at the Union Carbide and Carbon Corporation exhibit at *A Century of Progress*, or write for them to:

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