



SAFETY PRECAUTIONS : OXY-GAS CUTTING COURSE.

OBJECT OF THE COURSE.

To give operators a better understanding of the importance of observing and carrying out Safety Precautions and also the Assembly Care-Use of Oxy-Gas Cutting Equipment.

Cylinders

Show Class Colour Chart of Cylinders

Identification

Colour - Shape - Type of Thread.

Acetylene)

Maroon - Flat Base - L.H.Thread

Propane)

Red - Large Diameter - L.H.Thread

Fuel Gas)

Inflamable.

Oxygen

Black - Long - R.H.Thread.

Acetylene

Supplies are provided either from generators in which water and calcium carbide re-act to form Acetylene - or from steel cylinders in which the Acetylene is dissolved in Acetone under a maximum pressure of 225 lb^o.

Propane

is a hydro-carbon by product in the fractional distillation of crude oil by a high temperature process - it is stored in lightweight steel cylinders. Propane is free from sulphur, but in the interests of safety, a small concentration of a sulphur odorant is added, by this means a leak is easily detectable - Propane vapour if inhaled has an anaesthetic effect. Propane is highly inflammable and the vapour can form explosive mixtures with air or oxygen - the vapour is 1.5 times as heavy as air and can flow considerable distances in still air along the ground.

Oxygen

is supplied as a gas under pressure in long drawn steel cylinders. Pure Oxygen will not burn or explode, but Oxygen supports combustion, it causes other substance to burn fiercely when they are raised to kindling temperatures, Oxygen should not be used as a substitute for compressed air.

Care of Cylinders

1. Always handle cylinders with care
2. Keep hot slag & flying sparks away from cylinders.
3. Blow out cylinder valves before connecting regulators.
4. Never allow grease or oil to come into contact with cylinder valves.
5. Grease & oil are instantly combustible in the presence of oxygen under pressure.
6. If cylinders are damaged in any way, notify the suppliers when returning.

Cont'd.

Storage & Use

Always store and use fuel gas cylinders in the upright position.

Overheating of Cylinders

1. Never allow cylinders to come into contact with electrical apparatus .
2. Do not allow blowpipe flame to touch upon the cylinder walls.
3. Do not use cylinders alongside a Rivet-hotter's fire or Blacksmith's forge.
4. If a cylinder becomes overheated, it can be cooled down with cold water.
5. Failure to carry out these precautions may cause cylinders to heat up internally and burst.
6. Welding in close proximity -
Heat increases Pressure
Cold reduces Pressure.

Cylinder Valves must be closed

- a) When finishing work for more than a few minutes
- b) When changing cylinders
- c) When moving from job to job
- d) When any defect occurs.

Pressure Regulators

are provided to control the output pressure from the cylinders, the rate of gas flow from the cylinders and to prevent a reverse flow of gas back to the cylinders and are usually fitted with a Safety Valve designed to prevent a build-up of pressure in the regulator.

1. Treat regulators as precision instruments.
2. Do not use regulators with broken gauges.
3. Release pressure on Control spring when shutting off.

Clock Gauges tell us

- a) Contents of the cylinder
- b) Shows working pressure.

Standard Type Regulators

are manufactured for B.R. by British Industrial Gases Ltd.

- a) Jumper indicates Content of Cylinders
- b) There is no jumper on a propane regulator (insufficient pressure)
- c) Nut shaft shows working pressure
- d) Notch in the nut indicates L.H.Thread

Safety Note

Do not handle regulators with oily or greasy hands.

Rubber Hose Identification

Acetylene	-	Red	-	L.H.Thread
Propane	-	Red (Orange)	-	L.H.Thread
Oxygen	-	Black (Blue)	-	R.H.Thread

Cont'd

Non-Return Valve

is fitted to one end of the hose & marked FIT TO BLOWPIPE on the nut.

Acetylene

Pipes & connections made from copper & high copper content alloys must not be used with Acetylene (Chemical reaction-Acetylide).

Oxygen

Adhesive tape must not be used to wrap around the Oxygen hose to prevent a leak.

Visual Aids

Show Class bad connections on hose.

Leaks

OXYGEN
FUEL GAS

A hissing sound
Smell

Cutting Blowpipes
Standard Type Cutters

Milne - General
" - Spitfire

Spitfires are fitted with Centica-Jet nozzles - these nozzles comprise of- (a) Outer Nozzle; (b) Inner Nozzle; (c) Adaptor.

Explain to Class about Inner Nozzle

- (a) Different shapes for Propane & Acetylene
- (b) Size of bore
- (c) Flutes

Outer Nozzle

S1 for small bore Inner Nozzles
S2 for large bore Inner Nozzles.

Heating Nozzle

can only be used with Propane. Remove outer and inner nozzles and the adaptor, fit heating nozzle to the propane cutter.

Lighting the Heating
Torch

Turn on fuel gas valve, press down oxygen for cutting valve -
Do not use the oxygen for heating valve.

Lighting the Cutter

Turn on fuel gas valve
" " oxygen for heating valve
Adjust for correct flame.

Beware of

- | | |
|-------------------------|-----------------------------|
| 1. Flame snap-out | } See Page 7
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| 2. Unsustained Backfire | |
| 3. Sustained " | |
| 4. Flashback | |

Cutting Pressures

Propane - 5 lb	Acetylene - 3 lb
Oxygen - 40 lb	Oxygen - 40 lb

Heating Pressures

Propane - 15 lb
Oxygen - 30 lb.

Protective Clothing

It is at all times the duty of the operator to protect his clothing and person from sparks, hot slag etc., by wearing protective clothing and goggles.

Overalls

Must be treated with Flame-resistant chemical

Goggles

Must be correct shade:- Shade 3 for cutting
Shade 5 for welding

Gloves

Leather - Gauntlets if possible.

Cont'd

Apron

Leather - Secondary precaution.

Accessories

Cylinder Key - multi-purpose spanner.
Flint Gun or matches, bucket of water,
fire extinguisher.

General Instructions

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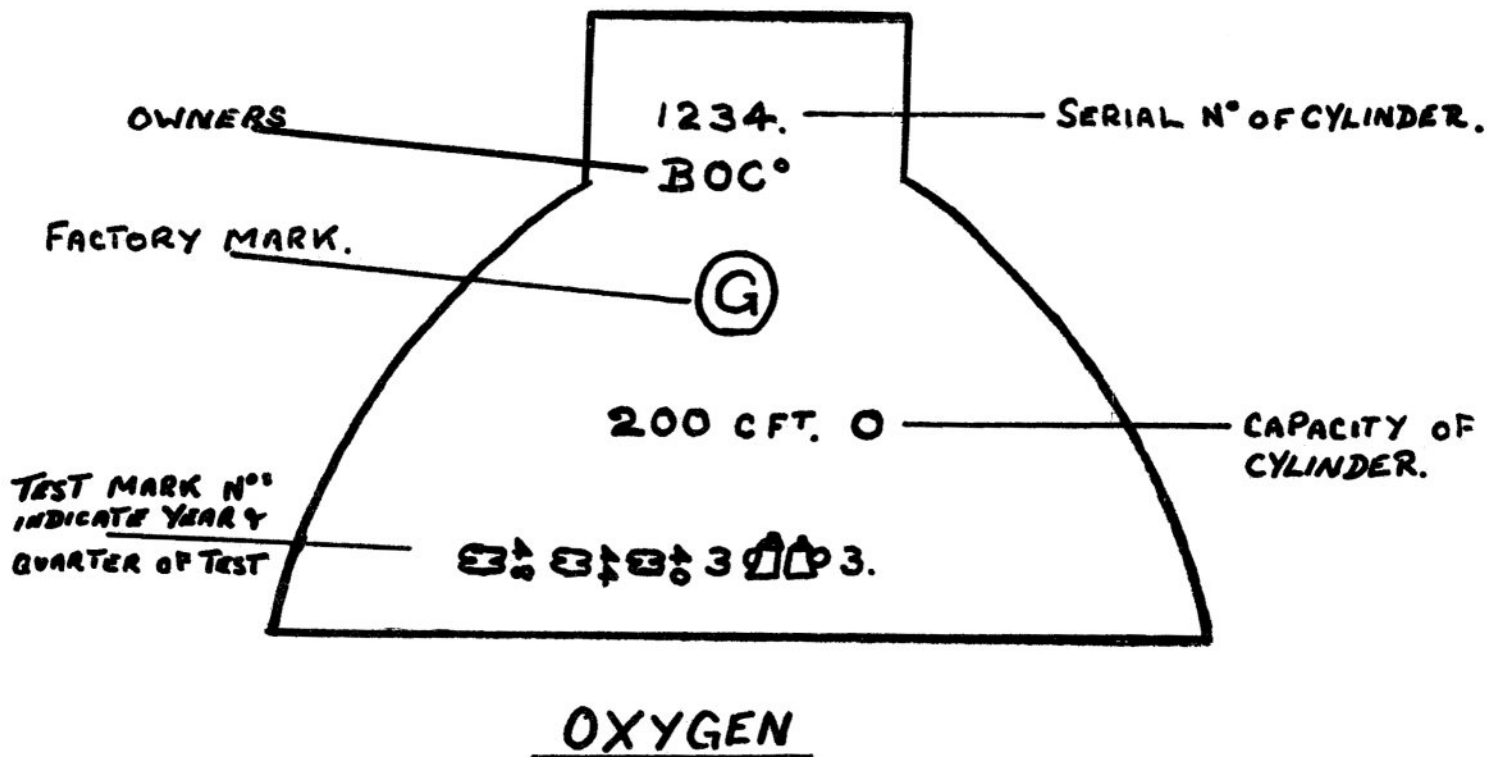
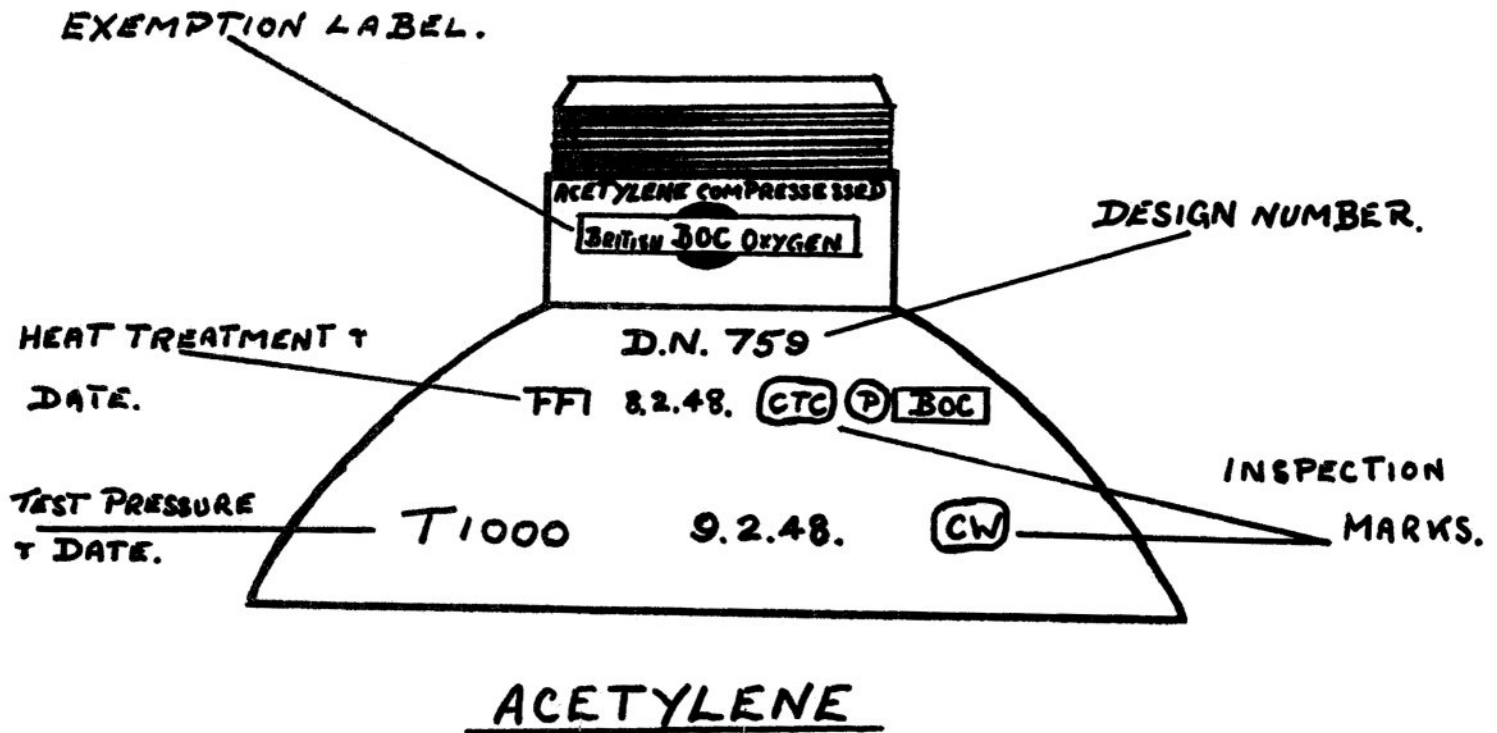
WORKS WELDING SCHOOL

THE FOLLOWING COLOUR CODE IS USED FOR CYLINDERS TO
BRITISH STANDARD - 349

GAS OR MIXTURE	COLOUR CODE
Oxygen	Black
Acetylene	Maroon
Propane	Red with name Propane
Hydrogen	Signal Red
Hydrogen-Nitrogen	Red with wide grey band round middle and named
Nitrogen	Grey with black top
Carbon Dioxide	Black grey strip indicates syphon tube
Argon	Blue
Argon-Oxygen	Blue with wide black band round middle and % of oxygen indicated
Argon-Carbondioxide	Blue with wide green band round middle and % of CO ₂ indicated
Helium	Brown
Air	Grey
Oxygen-free-Nitrogen	Grey with black top and name in white circle

The cylinder outlet union is screwed lefthand for combustibile gases and right hand for non-combustible gases, the thread being $\frac{5}{8}$ "/16 mm B.S.P. except for CO₂ which is 21.8mm, 14 T.P.I. male outlet.

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WORKS WELDING SCHOOL
SAFETY PRECAUTIONS OXY-GAS CUTTING
NOTICE TO ALL OXY-GAS CUTTING OPERATORS.

PRESSURE REGULATORS

Pressure Regulators are provided to control both the output pressure from the cylinder and the rate of gas flow from the cylinder, and also to prevent a reverse flow of gas back to the cylinder. They are usually fitted with a safety valve designed to prevent the building up of an excessive pressure in the regulator.

1. Treat regulators as precision instruments.
2. Do not use regulators with broken gauges.
3. Release pressure on control spring when shutting off.

CYLINDER VALVES MUST BE CLOSED:-

1. Immediately any defect develops in the apparatus or any unusual incident occurs.
2. When finishing work for more than a few minutes.
3. When cylinders are empty or being changed.
4. When cylinders are being moved from one place to another.

DO NOT USE EXCESSIVE GAS PRESSURES

DO NOT LEAVE EQUIPMENT IN CONFINED SPACES, E.G. TORCHES IN WAGONS

SAFETY CONSIDERATIONS IN THE USE OF OXY-ACETYLENE EQUIPMENT.

1. Never allow copper or copper alloy with a copper content of more than 70% to come into contact with acetylene.
2. Never allow acetylene to mix with air or oxygen, the exception being under carefully controlled circumstances as in a welding or cutting blowpipe.
3. Remember propane is one and a half times heavier than air and will settle at lowest level, sewers, basements, etc.
4. Never allow oil or grease to come into contact with 0.2 (oxygen).
5. Always 'sniff' cylinder valve to remove foreign particles before fitting the regulator.
6. Always release regulator pressure adjusting screw before opening cylinder valve gently with the correct spindle key.
7. Never take cylinder key away from cylinders.
8. Use regulators for the gas they are designed for and nothing else.
9. Use only best quality hose and observe the colour code.
10. Home-made hose fittings invariably leak. Do not use them.
11. Never test for leaks with a flame - use a 0.5% solution of Tepol in water.
12. Do use recommended gas pressures.
13. Do use correct lighting up and shutting down procedures.
14. Do avoid obstruction of the nozzle during use.

OXYGEN ENRICHMENT.

1. Always bear in mind that 0.2 (oxygen) can be a life saver but can also be a life taker!
2. Never take cylinders into confined spaces, i.e. tanks, containers, vessels etc.
3. Always remove torch from confined spaces if work is interrupted for any time at all.
4. Make a habit of closing cylinder valves when equipment is not in use.
5. Do not leave clothes where there is the remotest chance of 0.2 (oxygen) impregnation.
6. Use a fume extractor for air freshening - not 0.2 (oxygen).
7. Never use 0.2 (oxygen) as a substitute for compressed air for blowing dust from clothes or workbench.
8. Never cool down the body with 0.2 (oxygen).

TO IGNORE THE ABOVE COULD HAVE FATAL CONSEQUENCES

WORKS WELDING SCHOOL

IMPORTANT NOTICE

If the Blow pipe flashes back on lighting it up it is because -

1. The Regulators are not set to the correct pressures

or

2. A light has been applied before the flow of gas is established.

FOLLOW THIS PROCEDURE - ALWAYS

Set regulators to the recommended working pressure.
Keep blowpipe away from any source of ignition until the fuel gas is flowing freely from the nozzle. The use of a spark lighter is recommended for lighting blowpipes.

If the Flame snaps out when the Blowpipe is in use it is because -

1. The regulator pressure and/or gas flow are incorrect, either too high or too low.
2. The nozzle has been obstructed.
3. The nozzle is held too close to the work.
4. The nozzle has become overheated.

WHEN THIS HAPPENS -

Completely shut both blowpipe valves, check regulator setting, cylinder pressures and relight in accordance with procedure given above.

In the case of 4 : plunge nozzle and blowpipe head into cold water. Make sure that the nozzle is tight before re-lighting the blowpipe.

TABLE OF CUTTING SPEEDS, CONSUMPTION, etc. FOR MINE SPIRTYPE ACETYLENE HAND CUTTER.

Material Thickness	Nozzles		Oxygen Pressure lbs. per sq.in.	Distance of nozzle from work	Cutting Speed ins per min.	Consumption :	
	Inner	Outer				Cu.ft.per ft.run of cut Oxygen	Acetylene
1/8" to 5/16"	4/32"	small bore	20 to 30	3/16"	23" to 14"	.4 to .8	.04 to .08
3/8" to 5/8"	1/32" or 3/64"	" "	30 to 40	3/16" to 1/4"	15" to 12"	.9 to 2	.1 to .3
3/4" to 1"	3/64"	" "	35 to 50	3/16" to 1/4"	13" to 10"	2 to 3	.3 to .5
1.1/8" to 2"	1/16"	" "	45 to 70	1/4" to 5/16"	10" to 9"	4 to 6	.5 to .75
2.1/4" to 3/	1/15" or 5/64"	Large	65 to 75	1/4" to 5/16"	9" to 7"	7 to 12	.7 to 1.2
3.1/4" to 4"	5/64" or 3/32"	" "	70 to 90	1/4" to 5/16"	7" to 6"	13 to 18	1 to 1.5
4.1/4" to 6"	3/32"	" "	85 to 110	5/16" to 3/8"	6" to 5"	19 to 23	1.4 to 1.8
6.1/4" to 9"	3/32" or 7/64"	" "	110 to 130	3/8" to 7/16"	4 1/2" to 3 1/2"	25 to 35	1.6 to 2
9.1/4" to 12"	1/8"	" "	120 to 150	7/16" to 1/2"	3 1/2" to 2 3/4"	40 to 60	2.4 to 2.7

TABLE OF CUTTING PRESSURES.

Plate Thickness	Size of Bore Inner Nozzle	lbs per square inch		Distance of Nozzle from Work.
		Propane	Oxygen	
1/8" to 3/16"	1/32"	2	20 to 30	3/16"
3/8" to 5/8"	1/32" or 3/64"	3	30 to 40	3/16" to 1/4"
3/4" to 1"	3/64"	5	35 to 50	" "
1.1/8" to 2"	1/16"	5	45 to 70	1/4" to 5/16"
2.1/4" to 3"	1/16" or 5/64"	5	65 to 75	" "
3.1/4" to 4"	5/64" or 3/32"	5	70 to 90	" "
4.1/4" to 6"	3/32"	5	85 to 110	5/16" to 3/8"
6.1/4" to 9"	3/32" or 7/64"	5	110 to 130	3/8" to 7/16"
9.1/4" to 12"	1/8"	5	120 to 150	7/16" to 1/2"

EXCESSIVE PRESSURES CAN CAUSE ACCIDENTS

BEWARE OF FIRES.

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OPERATING INSTRUCTIONS FOR
"AMBASSADOR" SUPER HEATING TORCH

Series 2290 Propane and Natural Gas Multi-flame Heating Tips

Tip No.	Oxygen p.s.i.g.	Fuel Gas p.s.i.g.	Flame cone Length inches.
1	10-30	2-7	$\frac{1}{4}$ - $\frac{3}{4}$
2	15-35	3-8	"
3	25-70	4-15	$\frac{1}{2}$ -1
4	35-80	5-18	"
5	50-125	12-30	$\frac{5}{16}$ - $1\frac{1}{4}$

To ensure proper gas supply use $\frac{3}{8}$ in. bore hose.

Always use manifold cylinders when using tips 4 and 5 continuously.

CENTRAJET OXY-PROPANE HEATING NOZZLE

NOT TO BE USED WITH ACETYLENE.

INSTRUCTIONS

1. Set Regulators to 30 lb Oxygen & 15 lb Propane.
2. Shut heating Oxygen Valve and keep it shut.
3. Open Gas valve one turn, light nozzle holding tip upwards, or down wind.
4. Press down Cutting lever and adjust by altering regulator pressures.

In the event of a backfire, release cutting Oxygen lever.

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OPERATING DATA - FOR USE WITH PROPANE.

Heating Tip Number	Oxygen Pressure lbs./sq.in	Propane Pressure lbs/sq.in	Flame Cone Length	Oxygen cu.ft./hour	Propane cu.ft./hour
1 - H	10 - 30	2 - 7	$\frac{1}{4}$ - $\frac{3}{4}$	120 - 265	35 - 80
2 - H	15 - 35	3 - 8	$\frac{1}{4}$ - $\frac{3}{4}$	130 - 290	40 - 90
3 - H	25 - 70	4 - 15	$\frac{1}{4}$ - 1	230 - 565	70 - 170
4 - H	35 - 80	5 - 18	$\frac{1}{4}$ - 1	300 - 805	95 - 245
5 - H	50 - 125	12 - 30	$\frac{5}{16}$ - $1\frac{1}{4}$	550 - 1210	165 - 365

To ensure proper gas supply use $\frac{3}{8}$ " hose with this torch, also manifold cylinders when using heating tips Nos.4 and 5.

