EMERGENCY TAPPING CODE

3.3.3	Opening communication by tapping.
1	Yes or agree
3	No or disagree
2.2	Repeat please
2	Stop
5	have you got a seal
6	Standby to be pulled up
1.2.1.2	Get ready for through water transfer, open hatch
2.3.2.3	You will not release ballast
4.4	Release ballast in 30 minutes
1.2.3	Increase your pressure
3.3.3	Closing communication by tapping.

GOOD LUCK

A GUIDE TO DDC CHECKS

INTERNAL, MAIN LOCK AND T.U.P.

Valves

L.P. Blowdown	Open
Main Exhaust	Open
H.P. Blowdown	Open
H.P. Emerg. Blowdown	Open
BIBS Overboard Dump	Closed
BIBS Supply	Closed
Pilotage to reducer (if any)	Open
Analysis	Open
DDC Depth	Open
Chiller/Heater in + out 2 VVs	Open
Relief Valve	Open
Bilge Drain	Closed
Medical lock equalization optional	Depends on system
Equalizing VVs DDS/TUP =Alternatively	Open/Closed
Oxy makeup	Open
Toilet and shower VVs	Closed

Equipment

- Aerovap Evaporator
- Medical Kit
- Emergency CO^2 Re-breathers
- Fir Extinguishers
- Drinking Water
- Panacide/Panaclean
- Hyperbaric Evacuation kit. if available
- CO^2 Calibration Kit
- Oxy Portable Analyser
- lights
- CO^2 Emerg. Scrubbers
- Power Coms.
- Sound Power Coms.
- Hygrometor

EXTERNAL

LP Blowdown	Optional
Main Exhaust	Open
HP Blowdown	Open
Emerg HP Blowdown	Open
BIBS Dump	Open
BIBS Supply	Open
Analysis	Open
DDC Depth	Open
Reducer Pilotage, if any	Open
Chiller/Heater inlet/out 2 VVs	Open
Regen inlet/out 2 VVs	Open
Bilge VVs	Closed
Safety Relief	Open
Medical Lock Equal	Closed
Oxy make up	Open
Toilet and shower VVs	Closed

BASIC REFRIDGE CIRCUIT

A) The compressor pumps freon at high press turning it into a liquid.

B) The condenser cools the freon after being compressed.

C) The liquid receiver acts as an expansion tank.

D) The sight glass should be clear no bubbles or gas.

E) Filter dryer removes unwanted contaminants

F) In the heat exchanger the freon exchanges its coolness and absorbs heat. This absorbing heat makes it into a gas reduces press.

G) Exp. VV sensing the temp of freon leaving exch. it monitors how much freon to let through heat exchange.

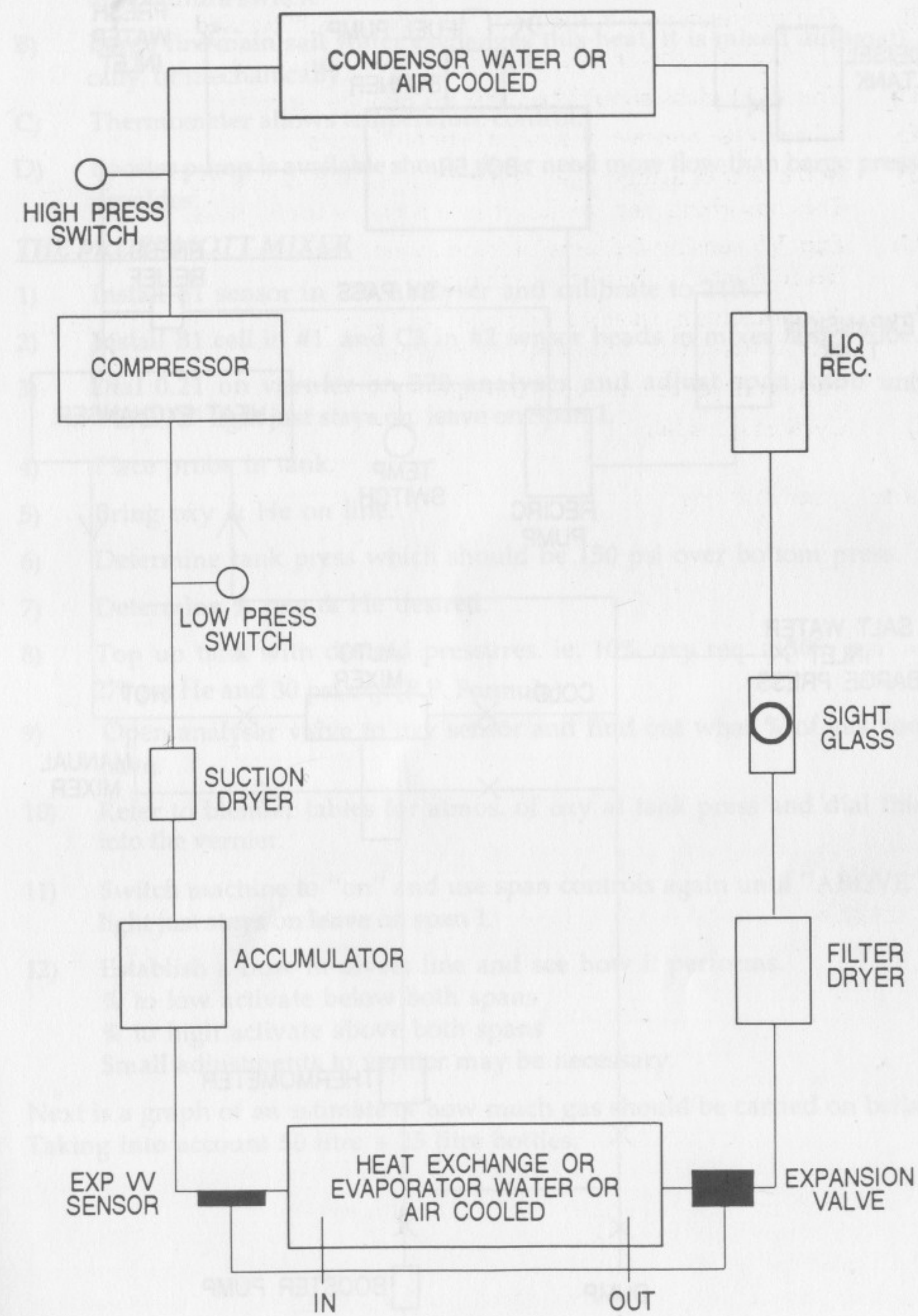
H) Accumulator is usually a long cylinder. Gas passes through, heavy liquid still in freon will drop and accumulate.

I) Suction dryer removes contaminants.

J) Cycle starts again.

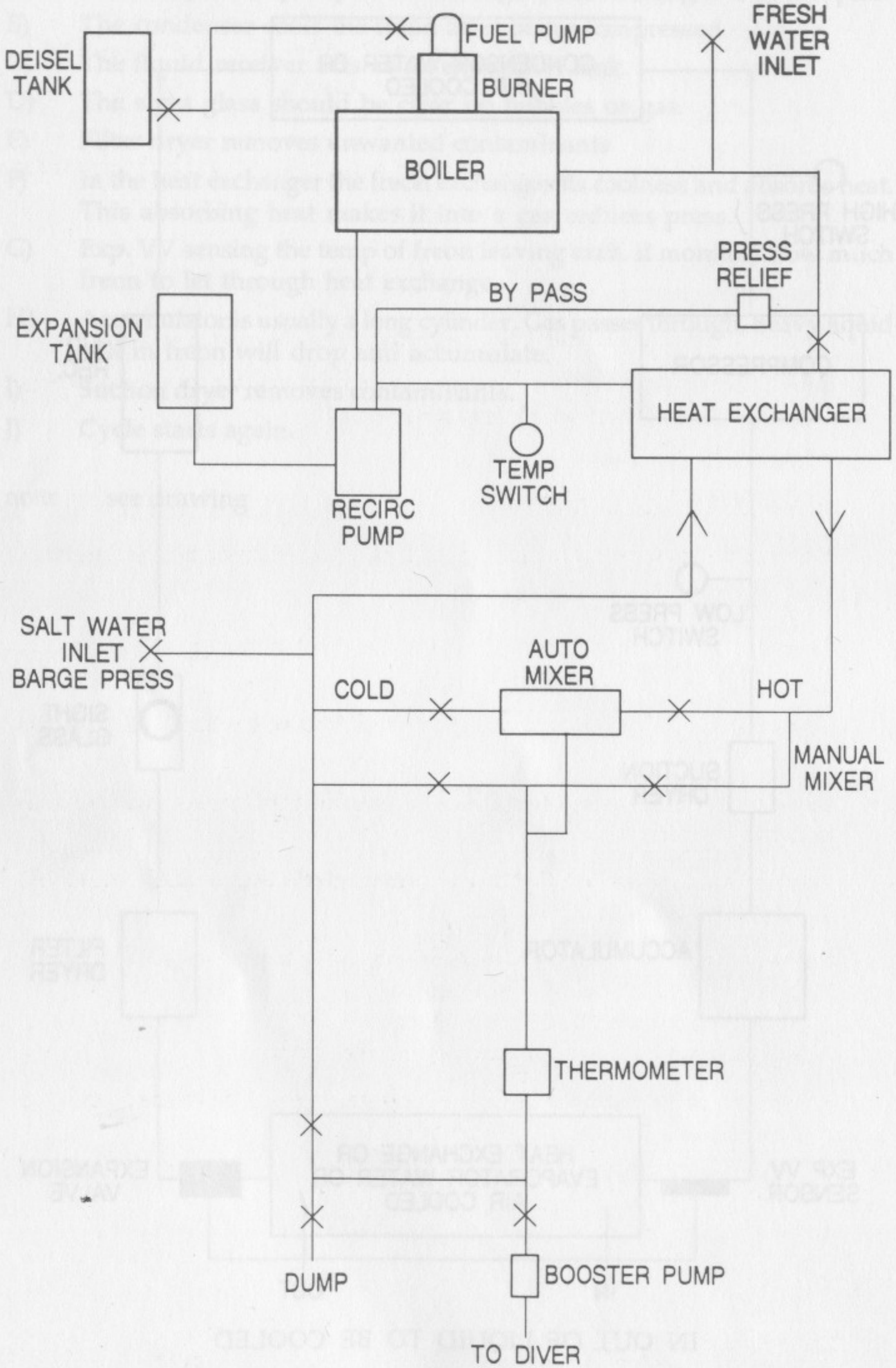
note: see drawing

BASIC REFRIDGE CIRCUIT



IN OUT OF LIQUID TO BE COOLED

BASIC HOT WATER CIRCUIT



A) The heart of a hot water machine is the fresh water circuit. A completely closed circuit with the burner switched on and off by a high and low temperature switch.

B) Barge fire-main salt water exchanges this heat, it is mixed automatically, or mechanically.

C) Thermometer allows temperature control.

D) Booster pump is available should diver need more flow than barge press provides.

THE McDERMOTT MIXER

1) Install B1 sensor in 320 Analyser and calibrate to 21%.

2) Install B1 cell in #1. and C3 in #2 sensor heads in mixer tank probe.

3) Dial 0.21 on vernier on 320 analyser and adjust span knob until "ABOVE" light just stays on, leave on Span 1.

4) Place probe in tank.

5) Bring oxy & He on line.

6) Determine tank press which should be 150 psi over bottom press.

7) Determine % oxy & He desired.

8) Top up tank with desired pressures. ie. 10% oxy req. at300 psi = 270 psi He and 30 psi oxy (P.P. Formula).

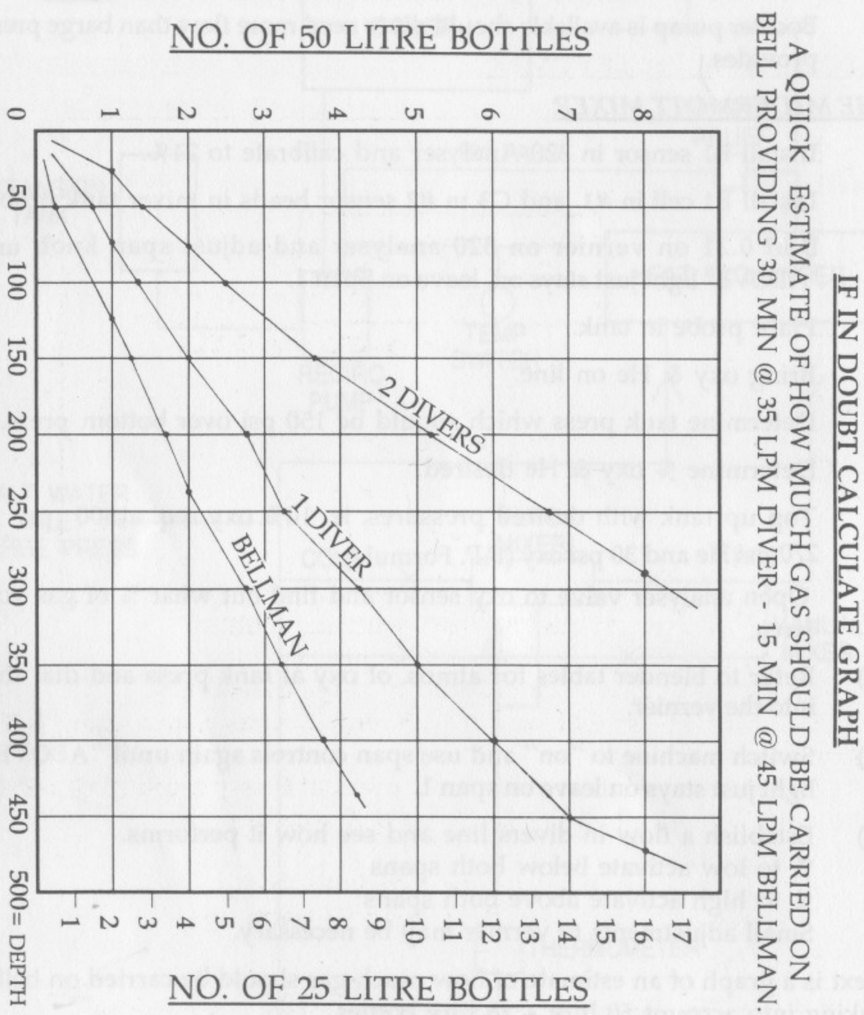
9) Open analyser valve to oxy sensor and find out what % of gas you have.

10) Refer to blender tables for atmos. of oxy at tank press and dial this into the vernier.

11) Switch machine to "on" and use span controls again until "ABOVE" light just stays on leave on span 1.

12) Establish a flow in divers line and see how it performs.
% to low activate below both spans
% to high activate above both spans
Small adjustments to vernier may be necessary.

Next is a graph of an estimate of how much gas should be carried on bells. Taking into account 50 litre + 25 litre bottles.



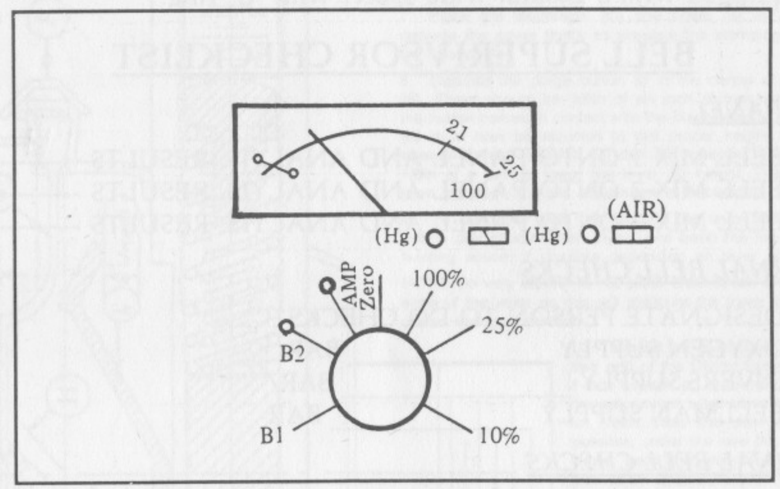
DIVERS BAILOUT SHOULD CONTAIN
40 LPM x P.ABS. FOR EVERY 10M OR 33FT
1.5FT3
MINIMUM OXY CARRIED = 1000 NORMOLITRES
PER MAN

OXY AND CO^2 ANALYSERS
(IN GENERAL)

OXY SERVOMEX

Oxy is a paramedic gas which is attracted to a magnetic field. The measuring cell = a quartz dumbell suspended on a taut platinum wire. Deflection in the field is measured by a beam of light across a photocell.

CALIBRATION OF SERVOMEX



1) Check B1 - should read 80 - 100 (electrical fault).
2) Check B2 - should read 80 - 100 (adjust screw).
3) Check `AMP ZERO' should read 0 - 10 (adjust screw).
4) Use pure HE should read 0 - 3% on all scales adjust using (HE) calibration screw.
5) Use air pumped through by hand, check 21% only check 100% + 25% scales not 10% adjust by right hand screw if necessary.
6) Check again.
7) Repeat every two hours during recompression.
8) N.B. The Servomex takes three hours to warm up.

OXY FUEL CELL ANALYSER

A battery which generates electricity in proportion to oxy present.

CO^2 ANALYSERS

CO^2 Analysers rely on infra red absorption. Each gas absorbs specific wavelengths of radiation. By comparing wavelengths of cal gas and pure He one calibrates. It involves measuring temp. increase and corresponding expansion of pure CO^2 in a detector cell.

I.U.C. FLY AWAY DDC

SPECS

It needs a Hansen quick connect HK-ML4-K26 with compatible I.U.C. fittings on other end of hose $^1/_2$" - $^3/_8$"

Electrical supply 24V - 30V AC or DC. (Preferably D.C.) 32 amps at 28V DC through a 4 core 6mm wire fitted with plug NATO ANAENOC 24-225-4511.

DDC has a smooth flange and a 20mm wing to fit a 600mm door or hatch. It is equipped with a 200mm wide spacer with 'O' ring.

BELL SUPERIVSOR CHECKLIST

BELL PANEL

BELL MIX 1 ONTO PANEL AND ANALYIS. RESULTS --------- %
BELL MIX 2 ONTO PANEL AND ANALYIS. RESULTS --------- %
BELL MIX 3 ONTO PANEL AND ANALYIS. RESULTS --------- %

EXTERNAL BELL CHECKS

DESIGNATE PERSON TO DO CHECKS
OXYGEN SUPPLY _______________ BAR
DIVERS SUPPLY _______________ BAR
BELLMAN SUPPLY _______________ BAR

INTERNAL BELL CHECKS

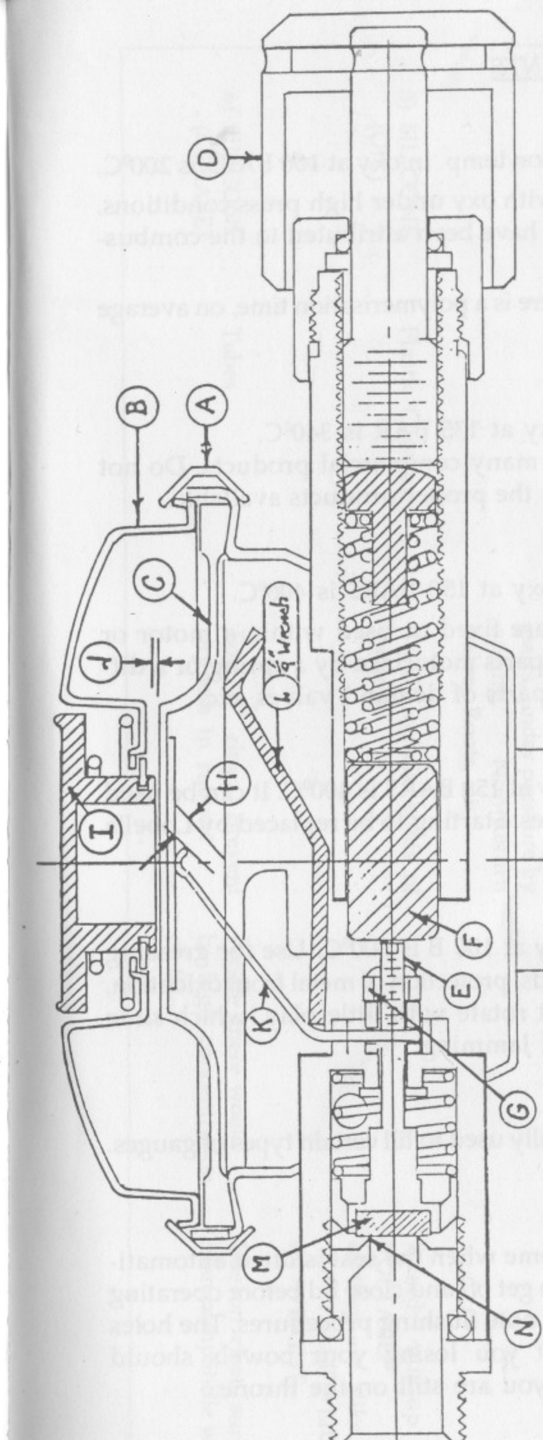
BELL INTERNAL CHECK DONE WITH BELLMAN

STANDBY DIVER

DESINATE STANDBY DIVER
CHECK OUT STANDBY DIVING EQUIPMENT
GAS ON LINE TO STANDBY --------- %
COMMUNICATION TO STANDBY
BAILOUT PRESSURE --------- BAR

BEFORE THE DIVER LEAVES THE BELL

- IF USING KIRBY 17 SUPERLITE, SAFETY PIN IS IN PLACE.
- IF USING BAND MASK SPIDER IS CORRECTLY ADJUSTED.
- UMBILICAL IS SECURED TO HARNESS.
- HOTWATER IS CONNECTED.
- BAILOUT ON AT BOTTLE OFF AT HAT/MASK.
- FINS ON.
- KNIFE ON.
- MASSDAM PULLER READY.
- FLOOD BELL TO ALLOW DIVER OUT EASY.



INSTRUCTIONS
FOR REGULATOR ADJUSTMENT
USING DIVING SYSTEMS INT.
(Regulator Adjustment Tolls) K.M.B.

1. Remove clamp (A), cover, (B) and diaphram (C).
2. Unscrew the adjustment knob all the way out (D).
3. Insert the inlet valve holder wrench between the inlet valve stem (E) and the piston (F), aligning the blade of the wrench with the small slot in the end of the stem. This prevents stem rotation.
4. Tighten the adjustment knob (D) all the way in and then open it four full turns.
5. Pressurize the regulator to between 120 and 150 lbs. of supply pressure.
6. Adjust the nut (G) until there is 1/8th of an inch of freedom at the end of the lever (K).
7. Place the diaphragm (C) and cover (B) in place and depress the cover tightly to simulate the clamping action of the clamp (A).
8. Depress the purge button (I) in the center of the cover (B). There should be 1/8th of an inch of free travel before the button comes in contact with the diaphragm (J). The lever (K) must now be adjusted to this proper height if it is not already correct. The nut (G) can be loosened no more than 1/8th of a turn to lower the lever (K) height. The lever (K) must be bent if more adjustment is necessary.
9. To bend the lever (K) up, grip the lever from the side with a pair of lon-nosed plyers and bend the lever using a twisting action, if possible depending on lever styles.

NOTE: Be very careful to not place undo stress on the lower arms of the lever as this will disfigure the lower blades and cause spongy operation.

10. To bend the lever down, place the disk end of the Diving Systems Int. 1/4-inch wrench (L) onto the flat area of the adjustment tube within the regulator. Next slide the disk, as far as possible, under the leve (K). With your finger, bend the lever down over the disk to the desired height. "Be careful not to bend the lever too far".
11. Replace the diaphragm (C) and the cover (B) and test the purge button (I) once more.

IMPORTANT

1.1 It is permissible to loosen the nut (G) no more than 1/8th of a turn to adjust the lever height. If the nut (G) is loosened beyong this amount, the regulator will not flow to its maximum rate due to insufficient leverage between the lever (K) and the bearing washers on the inlet valve stem. If the nut (G) is adjusted too tight the regulator will leak.

1.2 For maximum regulator performance allow the regulator to sit for 24 hours with the adjustment knob (D)screwed in before adjusting. This will allow the rubber in the inlet alve stem (M) to take a set against the inlet nipple (N). If this is not possible then adjust the lever (K) to favor the looser limit of 1/8th of an inch so as to compensate for the inward travel of the stem (E) after the rubber (M) has compressed.

1.3 All regulator parts should be free of damage and dirt.

1.4 All rubber components should be in excellent condition.

1.5 All internal parts should be lubricated with silicone.

1.6 The two opposing blades on the bottom of the leve (K) must be in perfect alignment with each other and be free of tool marks or burrs.

1.7 Normally, if the regulator leaks gas, the nut (G) is too tight, and should be loosened until the lever (K) has 1/8th of an inch of freedom at the end.

1.8 If the regulator continues to leak either the inlet valve (M) should be canged or the regulator needs a thorough cleaning and lubricating.

THREAD SEALANTS AND LUBRICANTS

LOCTITE

Group - acrylic resins (anaerobic) ignition temp. in oxy at 100 BARS is 200⁰C.

There is no guarantee of the product with oxy under high press conditions. However I do not think any accidents have been attributed to the combustion of Loctite.

Its sealing capacity is not immediate. There is a polymerisation time, on average 1 hour.

TEFLON

Group - PTFE. Ignition temp. with oxy at 135 BAR is 340⁰C.

Beware under the heading Teflon are many commercial products. Do not confuse ordinary plumbers teflon with the proper products available.

VOLTALEF GREASE

Group - P.T.F.C.E. Ignition temp. in oxy at 150 BARS is 400⁰C.

It must be used on "O" rings which are fixed or used within a motor or manually. It is not advisable to use on parts motorized by a spring or a difference in two pressures, or movable parts of demand valves, etc.

VOLTALEF OIL

Group - P.T.F.C.E. Ignition temp. in oxy at 150 BARS is 400⁰C. It can be used with movable parts in high oxy pressures. Starting to be replaced by Lobella FM 68.

SILICONE GREASE

Group - Silicones. Ignition temp. in oxy at 100 B is 300⁰C. Use for greasing "O" rings, large diameter valves, hose ends, protection of metal from oxidation. Try and avoid the use on all parts that rotate with little play, which slide or screw together etc there is a risk of Jamming.

SILICONE OIL

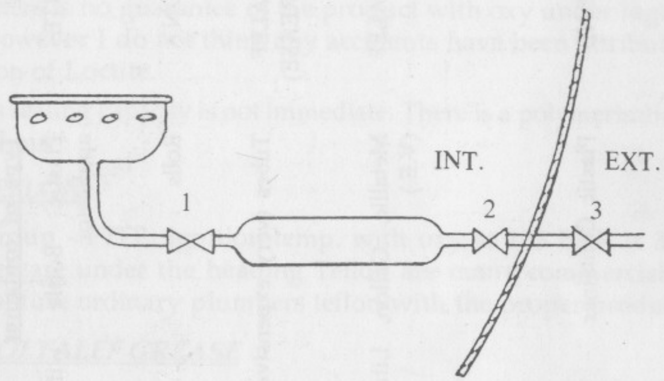
Similar properties to silicone grease. Usually used to fill certain types of gauges.

HYPERBARIC TOILETS

There are many types on the market. Some when the seat is lifted automatically lock the flush valve. Thus one has to get off and close lid before operating valves. Example shown is a basic model note flushing procedures. The holes around the top of the bowl, prevent you losing your bowels should "somehow" all 3 valves be open and you are still on the throne.

Name	Type of container	Applications & Uses	Restriction	Precautions
1) LOCTITE	Plastic Bottle with applicator	To seal threads (permanent used)	On nuts, swivel & Tube fittings	DO NOT use in excess, wipe running solution Use on MALE fitting only.
2) TEFLON	Rolls	To seal threads on fittings	- do -	DO NOT use in excess. Leave ORIFICE FREE.
3) VOLTALEF 90 (GREASE)	Tubes (very expensive)	For Non-Moving Parts, 'O' rings, Manual Operation Parts	Spring, Regulator Moving parts Non Protective - Rust	Surface must be absolutely clean.
4) VOLTALEF (OIL)	Metallic, Gallon, Litre (V.E.)	Lubricate machinery Parts, working in high 02 pressure, all moving parts, under pressure by spring, Non-Return valve, Roots, etc.	Non Protective - Rust	- " -
5) SILICONE (OIL)	Plastic Container	To fill certain kinds of gauges	- " -	Avoid mix-up with VOLTALEF as they are alike. *VOLTALEF IS LIGHTER IN WEIGHT.
6) SILICONE (GREASE)	Tubes	For 'O' rings, prevent dryness in rubber.	Where there would be high concentration of 02.	Use on clean surfaces, Non compatible with 02.

A reminder for the use of the toilet valves.



DDC
A) Let surface know
B) Make sure VV 1 closed & open VV2 then close.
C) Open 1 close
Open 2 close etc.

SURFACE
A) Open VV 3
B) Close VV 3

Always pour Panacide down toilet and bowl.

HANDLING OF OXY ABOARD

To minimize the dangers involved with handling of oxy aboard, the following actions should be taken:

1) All oxy and 50/50 gas should be reduced at source. Max 50 BARS.

2) H.P. transfer of oxy should be avoided as much as possible.

3) All oxy and 50/50 gas storage should be situated above decks in open air with a light weather protection if necessary. Above gases should NOT be stored in holds of ships or in racks held on jobsite, but in gas suppliers bottles or racks.

4) The above mentioned area should be marked with "No Smoking and Gas Storage" signs.

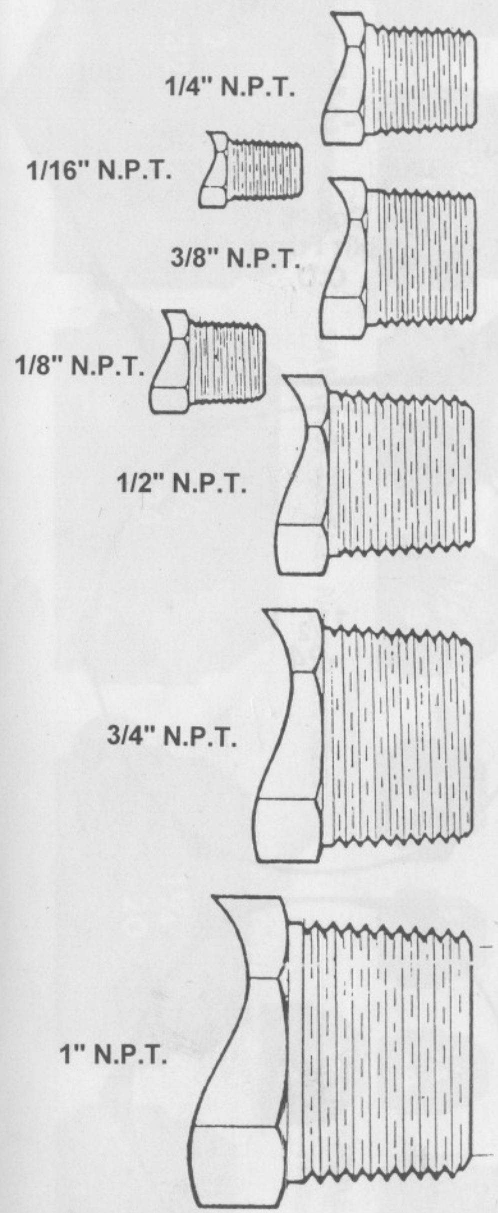
5) Copper piping should be used wherever it is feasible especially in mixing, and control cabins, and to DDC's if they are below decks.

6) When mixing into racks using over 25% oxy, the rack should be fitted with an oxy approved non-return valve.

7) Oxy clean all hoses. Use Difrex or N.D. 100 or compatible solution.

PIPE AND TUBE END SIZE CHART

PIPE THREAD SIZE NPT

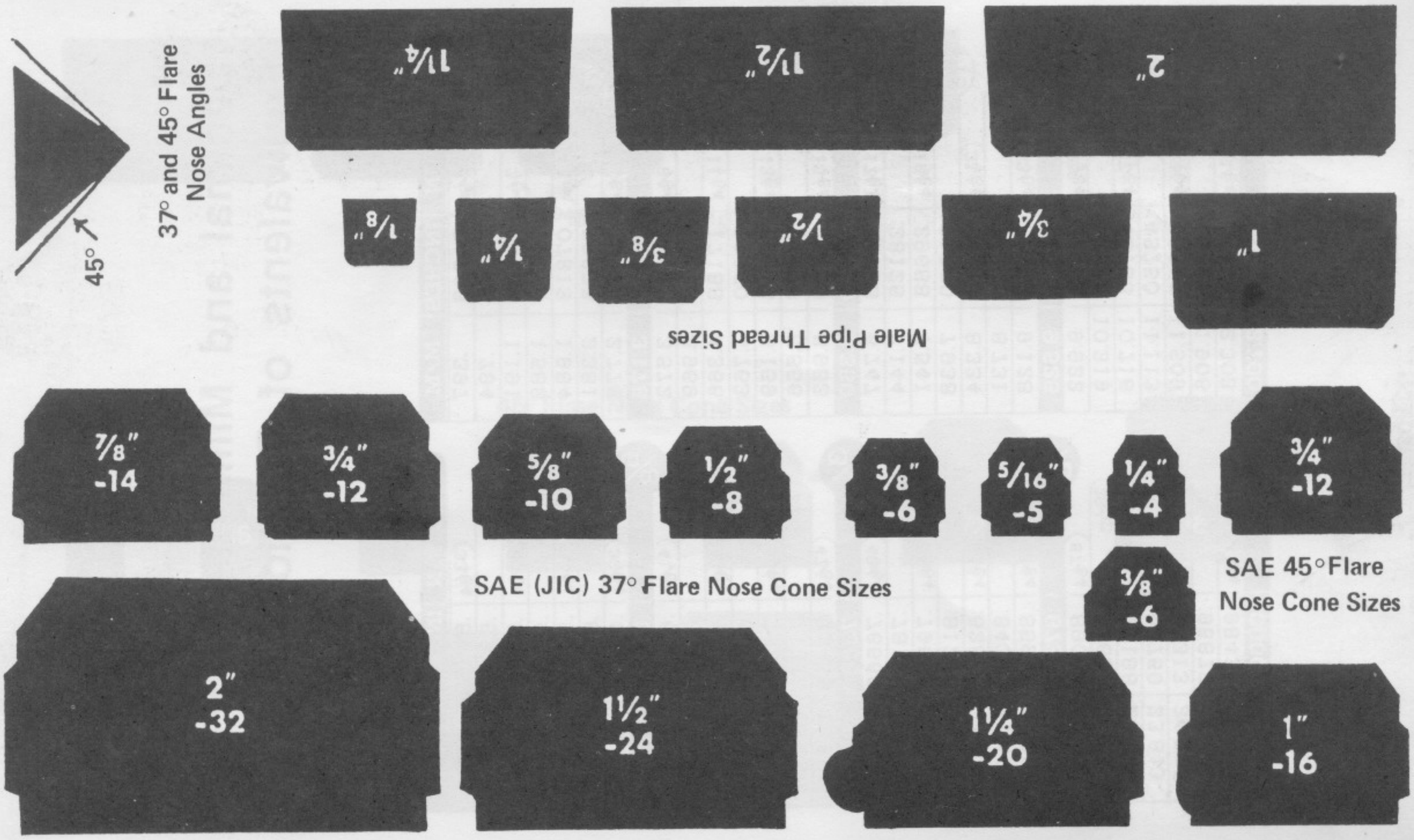


TUBING O.D. SIZE	SWAGELOK FITTING SIZE
1/16"	100
1/8"	200
3/16"	300
1/4"	400
5/16"	500
3/8"	600
1/2"	810
5/8"	1010
3/4"	1210
7/8"	1410
1"	1610

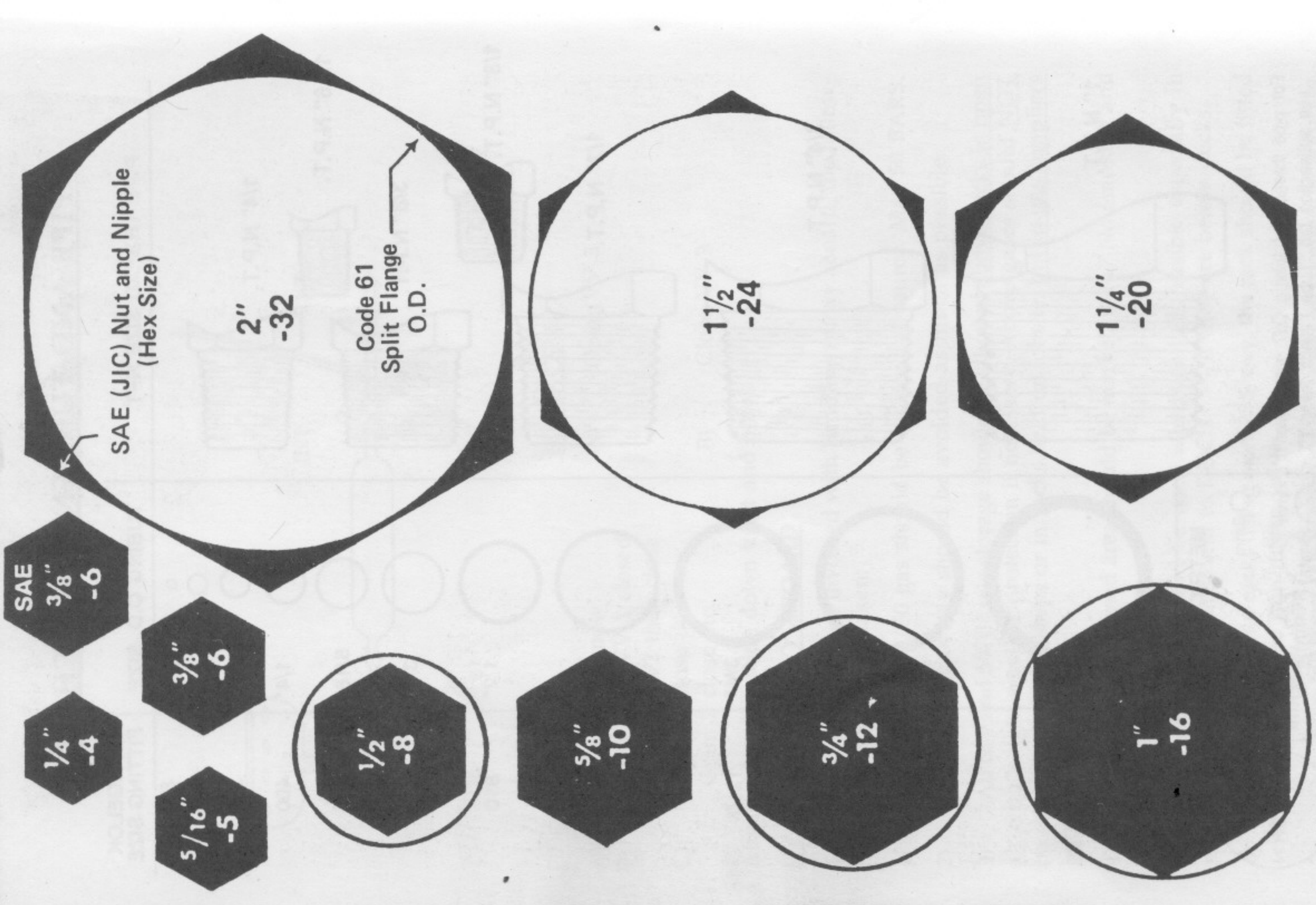
METRIC TUBING O.D. SIZE

3mm, 6mm, 8mm, 10mm, 12mm, 18mm

For pipe thread and tubing O.D. sizes over 1". see subsection tab, Tube Fittings (over 1").



End Fitting Size Chart



Decimal and Millimeter Equivalents of Fractions

FRACTION	INCHES	M/M
1/64	.01563	.397
1/32	.03125	.794
3/64	.04688	1.191
1/16	.06250	1.588
5/64	.07813	1.984
3/32	.09375	2.381
7/64	.10938	2.778
1/8	.12500	3.175
9/64	.14063	3.572
5/32	.15625	3.969
11/64	.17188	4.366
3/16	.18750	4.763
13/64	.20313	5.159
7/32	.21875	5.556
15/64	.23438	5.953
1/4	.25000	6.350
17/64	.26563	6.747
9/32	.28125	7.144
19/64	.29688	7.541
5/16	.31250	7.938
21/64	.32813	8.334
11/32	.34375	8.731
23/64	.35938	9.128
3/8	.37500	9.525
25/64	.39063	9.922
13/32	.40625	10.319
27/64	.42188	10.716
7/16	.43750	11.113
29/64	.45313	11.509
15/32	.46875	11.906
31/64	.48438	12.303
1/2	.50000	12.700

FRACTION	INCHES	M/M
33/64	.51563	13.097
17/32	.53125	13.494
35/64	.54688	13.891
9/16	.56250	14.288
37/64	.57813	14.684
19/32	.59375	15.081
39/64	.60938	15.478
5/8	.62500	15.875
41/64	.64063	16.272
21/32	.65625	16.669
43/64	.67188	17.066
11/16	.68750	17.463
45/64	.70313	17.859
23/32	.71875	18.256
47/64	.73438	18.653
3/4	.75000	19.050
49/64	.76563	19.447
25/32	.78125	19.844
51/64	.79688	20.241
13/16	.81250	20.638
53/64	.82813	21.034
27/32	.84375	21.431
55/64	.85938	21.828
7/8	.87500	22.225
57/64	.89063	22.622
29/32	.90625	23.019
59/64	.92188	23.416
15/16	.93750	23.813
61/64	.95313	24.209
31/32	.96875	24.606
63/64	.98438	25.003
1	1.00000	25.400