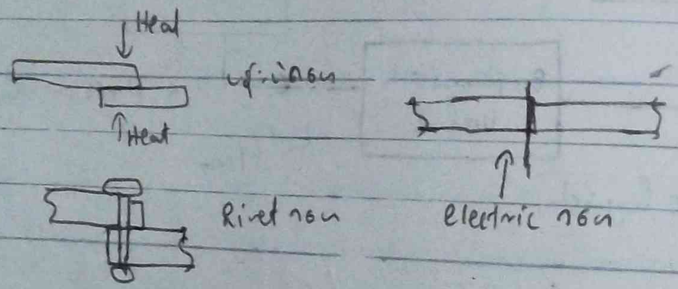
Welding

- ...
- ...

1. ... (Electric welding)
2. ... (Gas welding)
3. ... (cutting with gas)



metallurgy
Electrical
drawing
maths
machine
} + welding

{ fitting - ...
welding - ...
machine - ... }

... 7000°F → 10000°F

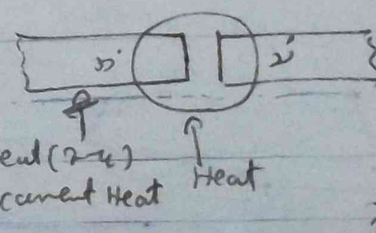
1. ... (Arc welding | Electric welding)
2. ... (Gas cutting)
   Oxygen + Acetylene
3. machine cutter
   ... filler

3. ... (Gas welding)

$O_2 + C_2H_2$

(...)

Electrical

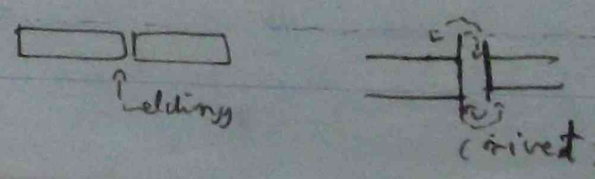


(Electric welding)

7000°F → 10000°F

- welding electrode ... current (ampere) ...
- ... welding ... pressure oil pipe ...

(...)



welding machine

(1) AC welding machine

(2) DC welding machine

(3) Motor welding machine

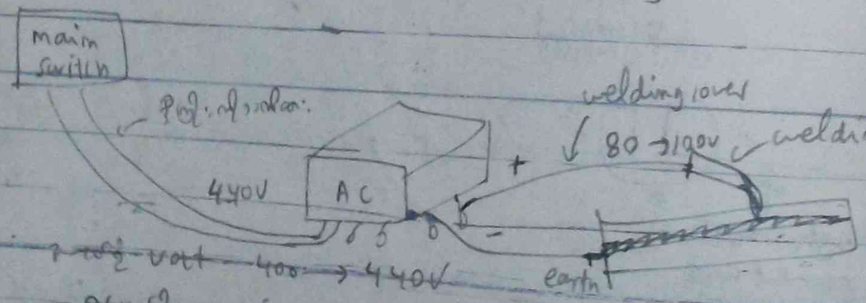
(4) Engine welding machine

(5) Petrol welding machine

(6) Diesel welding machine

(1) AC welding machine

- 440V AC supply ⇒ 80 → 100V welding power



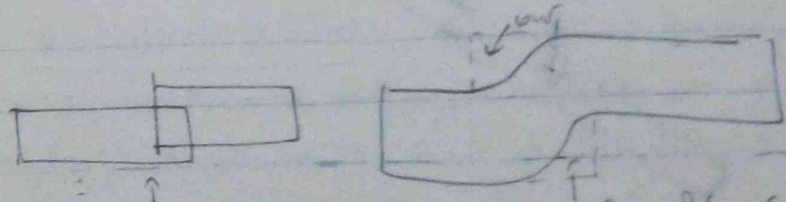
- welding cable - { copper wire - current ⇒ { wire ⇒ rubber tape ⇒ wire
  cover - rubber

main switch → welding machine
440V → 60/80

welding machine → welding holder
80 → 100V

(2) DC welding machine

- AC → DC
- DC → AC

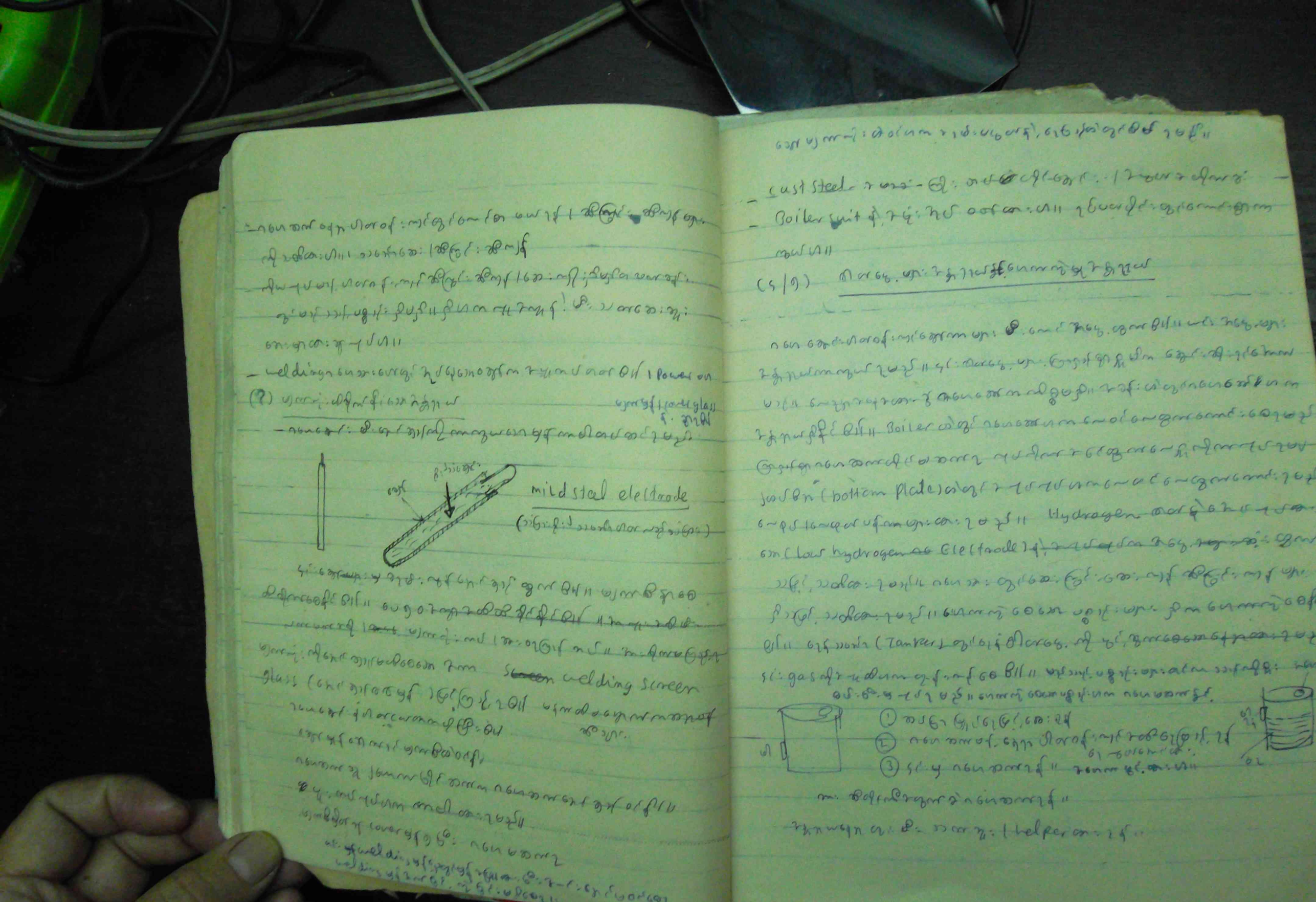


- welding machine ⇒ volt ⇒ 60 ⇒ 80, amp ⇒ 200 ⇒ 300
- bottom | Engine ⇒ motor ⇒ DC welding machine
  { ⇒ ⇒
  ⇒ ⇒
- motor ⇒ Engine ⇒ | Engine ⇒ diesel ⇒
  petrol ⇒

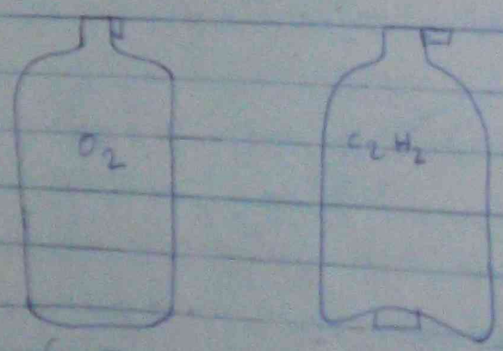
(3) welding holder

welding ⇒ ⇒ ⇒ ⇒ ⇒ ⇒

- ⇒ ⇒ ⇒ ⇒ | Boiler suit | ⇒ ⇒ ⇒
  ⇒ ⇒ | ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒
  ⇒ ⇒ ⇒ ⇒ | ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒
  hand ~~sheet~~ shoe
  head shoe -



O_2 C_2H_2



(ii) (i)

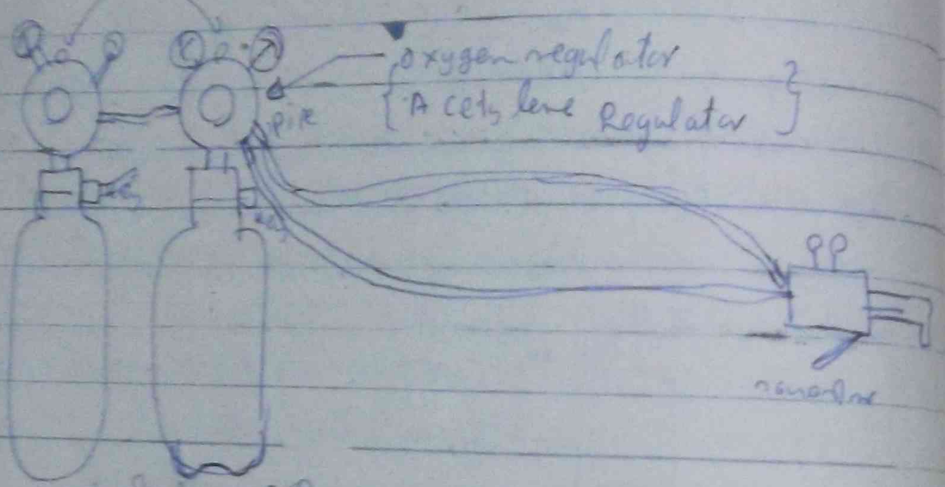
(f)

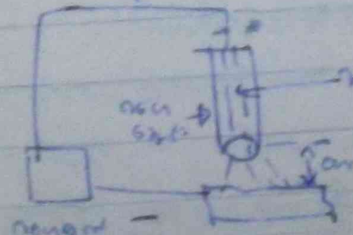
(g) *

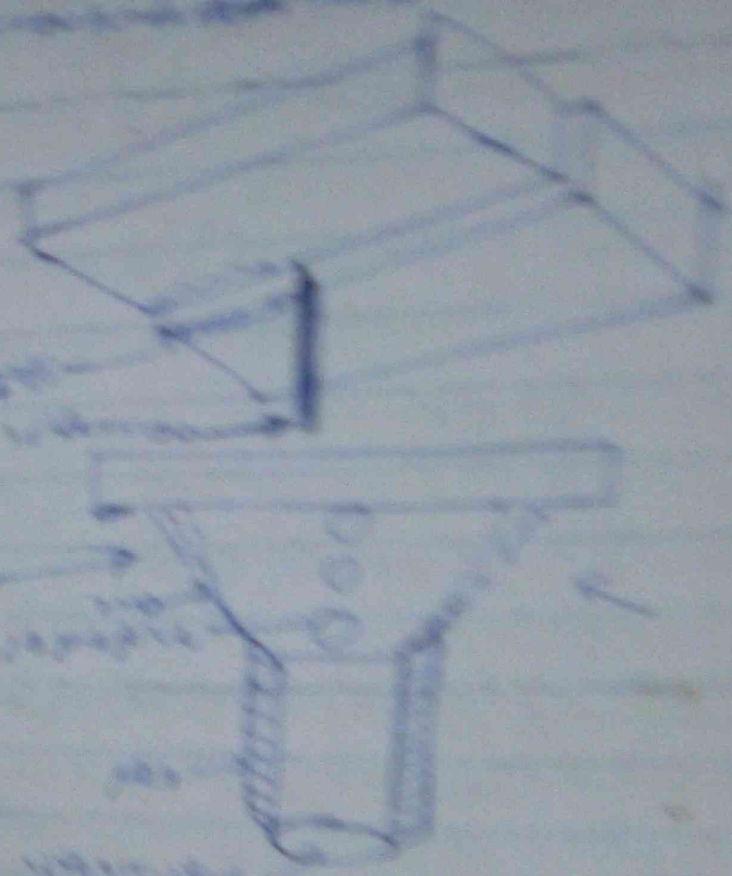
(h)

(i)

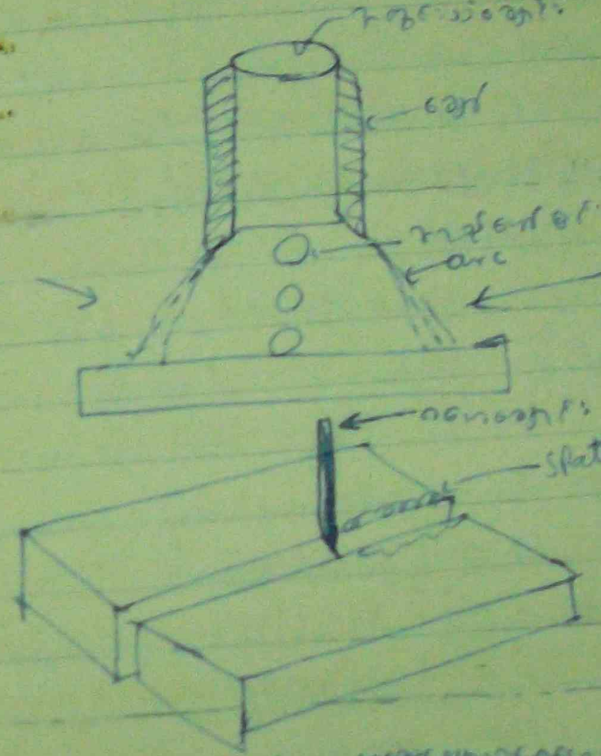
(j)


Safety valves
Oxygen regulator
Acetylene Regulator
Pipe
Hose pipe
Torch


Arc
Work
Earth



Spatter



(1) Arc blow
(2)
(3)
(4)

[illegible]

(၁) [illegible]

(၂) [illegible]

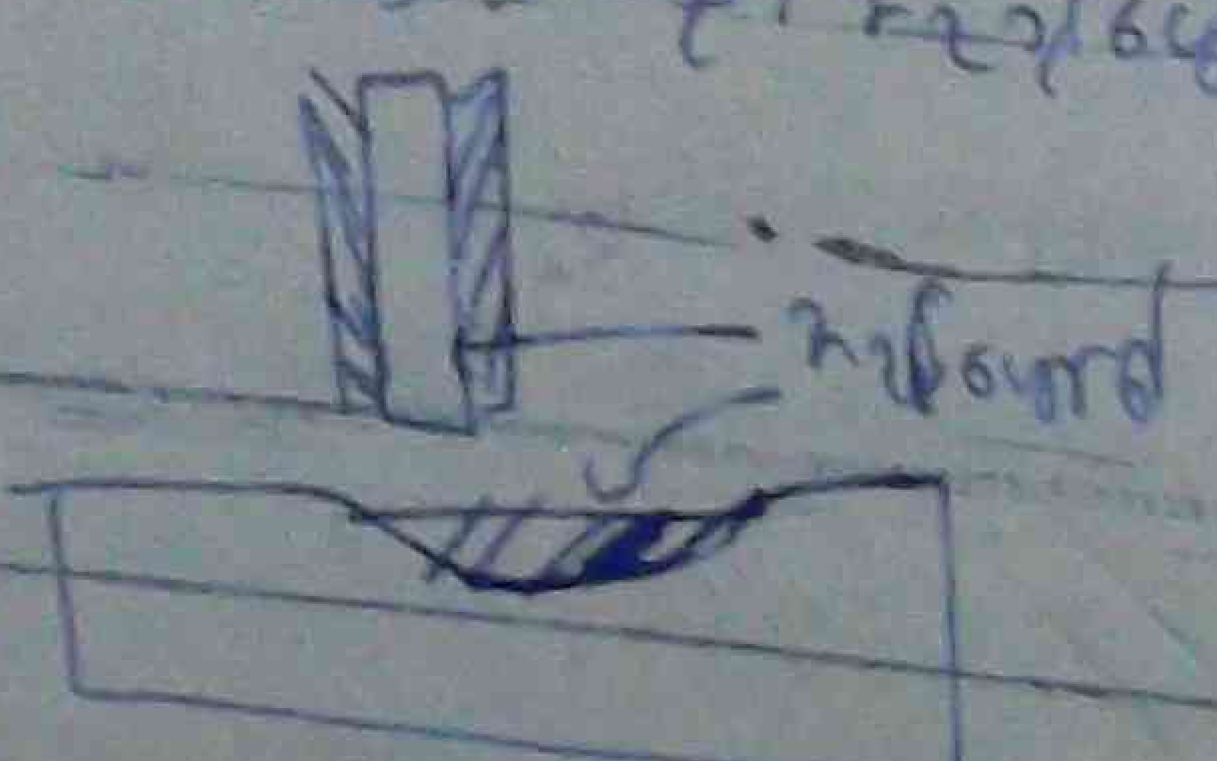
(၃) [illegible] (Short arc)

([illegible])

[illegible]

(၁) [illegible]

(၂) [illegible]



(၃) [illegible]

(၄) [illegible]

(၅) [illegible]

[illegible]

(၆) [illegible] (cover coating [illegible])

([illegible])

(၇) [illegible]

(၈) [illegible] overhead [illegible]

([illegible])

အခန်း (၃)

လျှပ်စစ် ဂဟေဆော်စက်များ

(Electric welding machines)

[illegible]

(၁) [illegible]

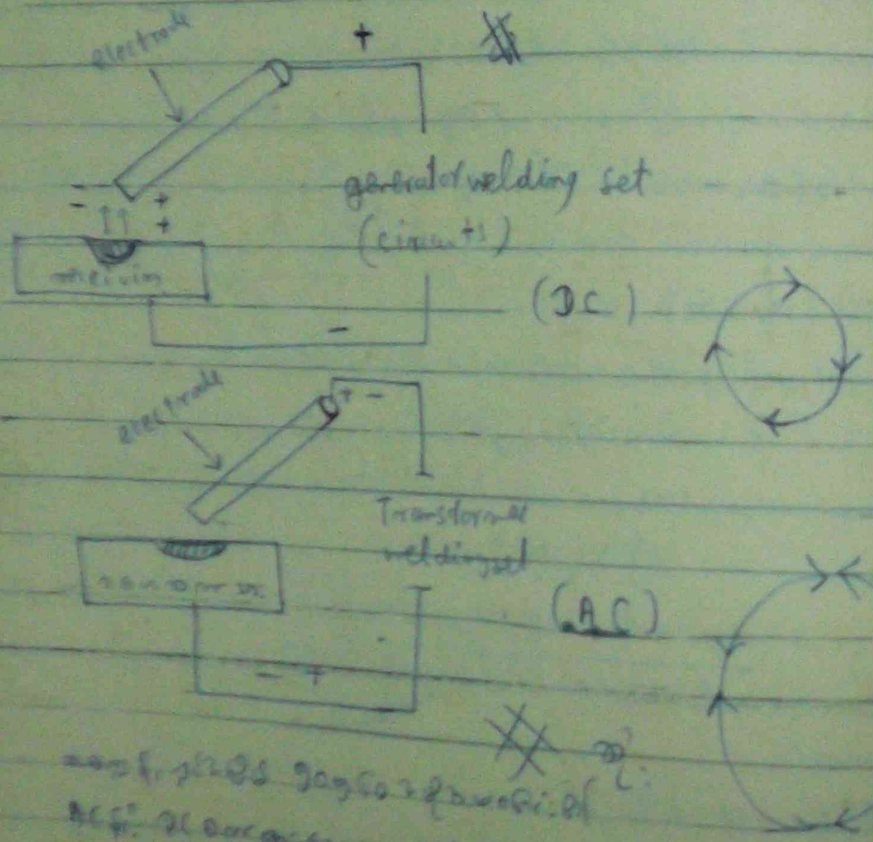
(၂) [illegible]

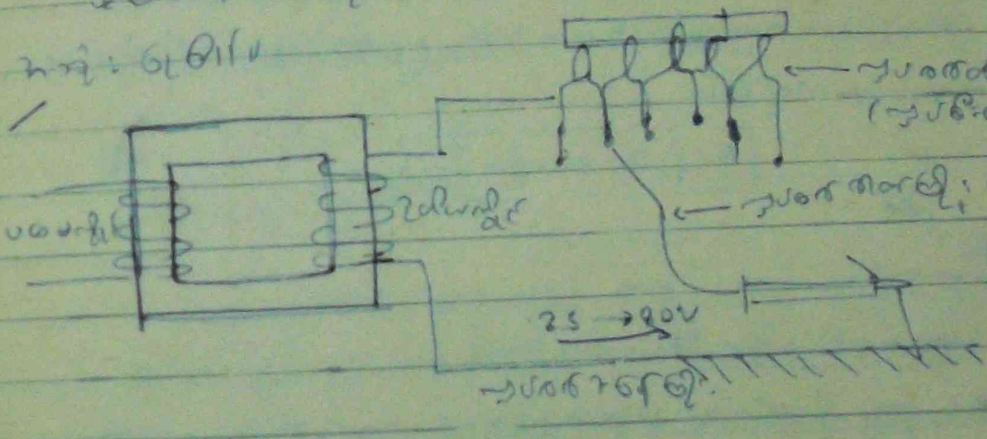
[illegible] — Petrol engine

— Diesel engine

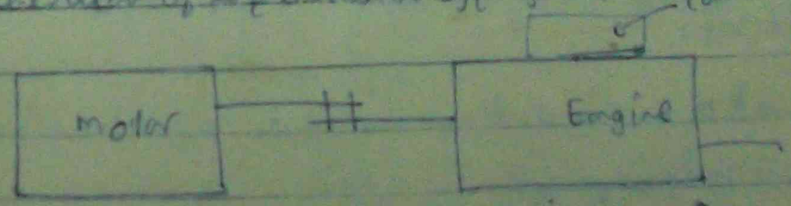
[illegible] — [illegible]

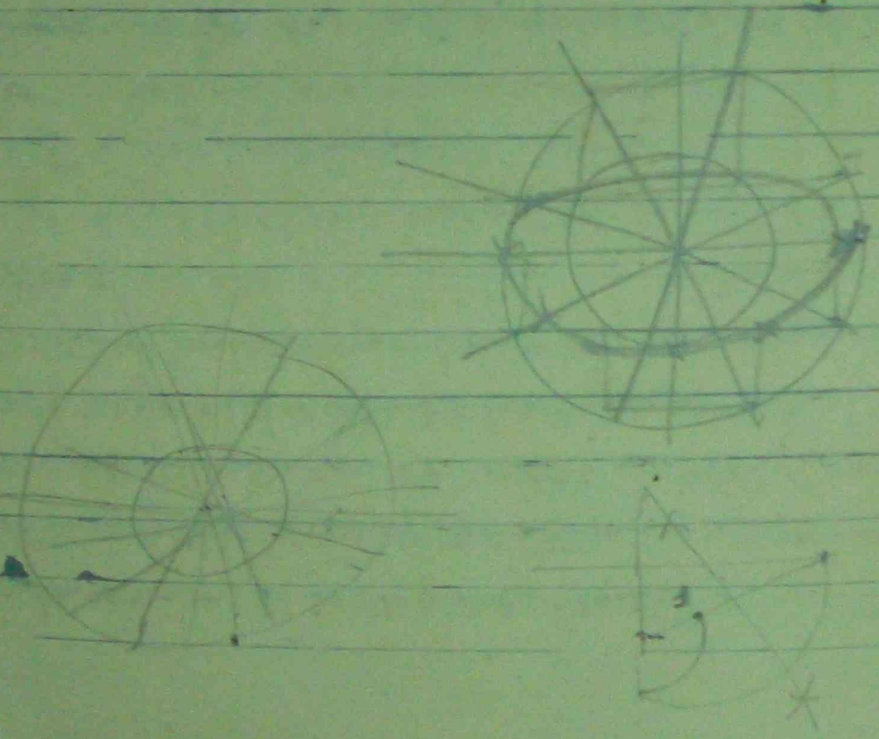
[illegible]





AC Transformer





[illegible]

[illegible] generator [illegible] Diesel [illegible]
[illegible]

[illegible] AC [illegible] AC [illegible]
[illegible]

[illegible] generator [illegible]
[illegible]

[illegible]

[illegible]

[illegible]

[illegible] AC [illegible]

[illegible] DC [illegible]

DC [illegible]

AC [illegible]

welding machine, lathe machine

AC – [illegible]

DC – [illegible]

[illegible] (၄)

[illegible]

[illegible]

① mild steel electrode (M.S electrode) * *

② Bronzoid electrode

③ cast Iron electrode

④ Aluminium electrode

⑤ [illegible], hardening [illegible]

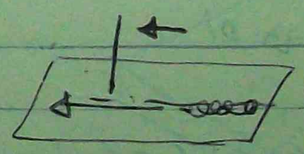
⑥ [illegible]

M.S electrode

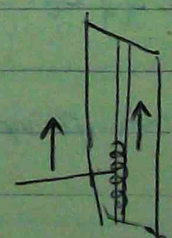
* [illegible] electrode [illegible] Basic coded electrode [illegible]

* [illegible] coded electrode [illegible]

(3) Horizontal (Down hand) (Flat hand) D ফ্ল্যাট, F electrode



(4) Vertical ✓ electrode



(5) Overhead OH electrode

Bronzoid — ব্রঞ্জ shaft এ ব্যবহার করা হয়

Cast Iron — Cast Iron এর তৈরি

AL — ব্যবহার করা হয়।

function of coating

- cover coated electrode

core rod: mild steel দ্বারা তৈরি।

core rod এর উপর coating দেওয়া হয়। mild steel এ C কম থাকে। High carbon steel এ C বেশি থাকে। এ-ও mild steel electrode এ ব্যবহার করা হয়। Stainless steel — core rod এ Cr, Ni থাকে।

Bare electrode এর উপর কোন coating থাকে না।

coating electrode এর ৩ টি কাজ।

(ج) ما هي أنواع الحركة الموجية التي تعرفها؟ اذكر مثالاً لكل منها.

(د) ما المقصود بالموجة المستعرضة؟ وضح ذلك بالرسم.

(هـ) ما المقصود بالموجة الطولية؟ وضح ذلك بالرسم.

(و) ما المقصود بالموجة الدورية؟ وما الفرق بينها وبين الموجة غير الدورية؟

(ز) ما المقصود بالموجة الجيبية؟ وما الفرق بينها وبين الموجة غير الجيبية؟

(ح) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

(ط) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

(ي) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

(ك) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

(ل) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

(م) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

(ن) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

(س) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

(ع) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

(ف) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

(ق) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

(ر) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

(ش) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

(ت) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

(ث) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

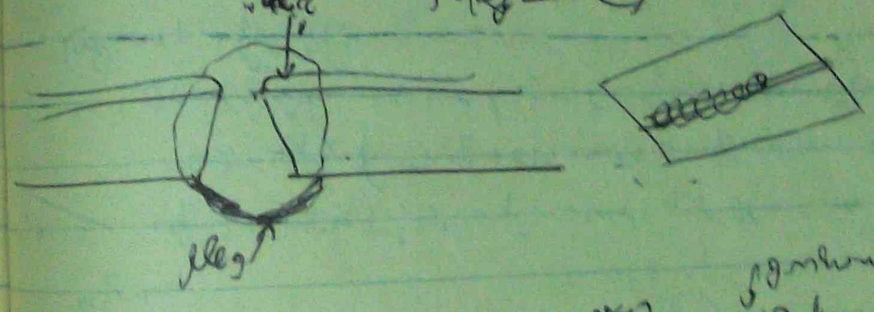
(خ) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

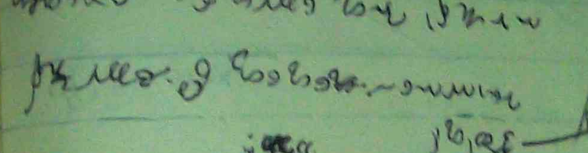
(ذ) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

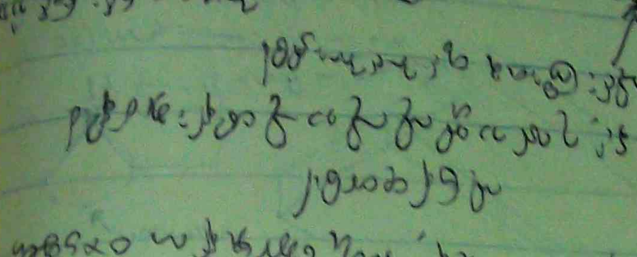
(ض) ما المقصود بالموجة الصوتية؟ وما الفرق بينها وبين الموجة الضوئية؟

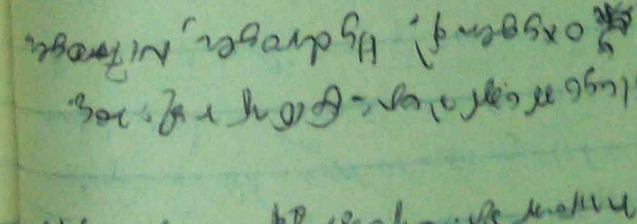
(ظ) ما المقصود بالموجة الكهرومغناطيسية؟ وما الفرق بينها وبين الموجة الميكانيكية؟

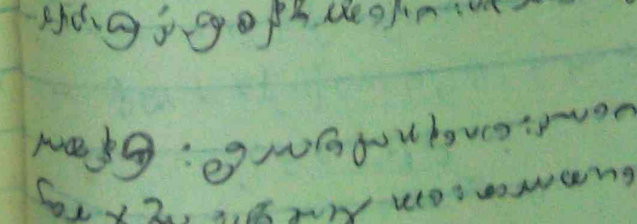
(غ) ما المقصود بالموجة المستقرة؟ وما الفرق بينها وبين الموجة المتحركة؟

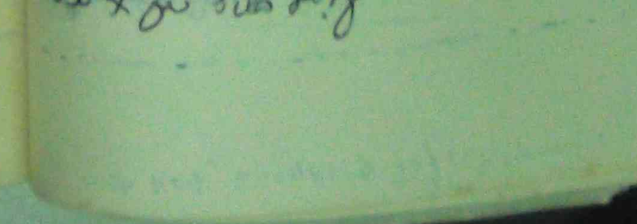


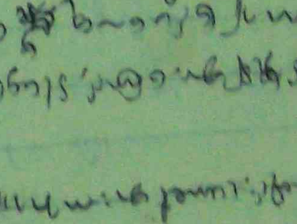


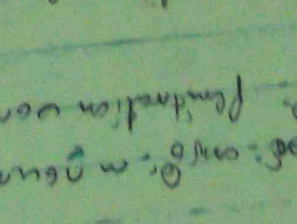












[illegible] line [illegible] x ray [illegible]

[illegible]

[illegible] plinitration [illegible]

[illegible]။

[illegible]

[illegible] cunel [illegible]

[illegible]

(၁) [illegible] slug [illegible]

[illegible] oxygen [illegible] Hydrogen, Nitrogen

[illegible]

(၂)

oxygen [illegible]

[illegible] oxygen [illegible]

(၃) [illegible]

[illegible] - [illegible]

[illegible] [illegible] cover [illegible]

[illegible]

[illegible]

[illegible]။

[illegible]

[illegible]။

[illegible]

[illegible]။

[illegible]

[illegible]။

(က) [illegible]။

Irron oxside, hematite, magnesetite ([illegible]

(ခ) [illegible]

[illegible]

arc steabliser [illegible]

(calcareous spur) [illegible]

(ဂ) oxygen [illegible] (~~ferro magnese~~)

Ferro magnese (20% Fe - 80% mn)

Ferro siliken (55% Fe - 45% Si)

Ferro Titanium (75% Fe - 25% Ti)

(c) [illegible]

(d) [illegible]

Steel wire gauge 10 (3.25mm)
SWG NO8 (4mm size)
SWG NO6 (5mm)

Standard wire gauge size.

SWG size [illegible]

(a) [illegible]

(b) [illegible]

(c) [illegible]

Kinds of Electrodes

(a) [illegible]

(b) [illegible]

(c) [illegible]

(d) [illegible]

(e) [illegible]

Acid Type

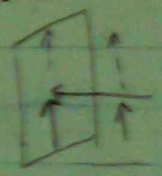
(a) [illegible]

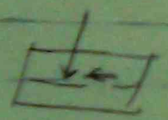
down hand → [illegible]
horizontal fillet - [illegible]

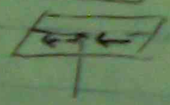
ఇది వెల్డింగ్ యంత్రంలో AC - DC లలో దేనిని వెల్డింగ్ చేయవచ్చు Straight polarity (నెగటివ్ కి ఎలక్ట్రోడ్ మరియు పాజిటివ్ కి వర్క్ పీస్) లలో A.W.S (American welding society) ని "E" "E6020 or 7020 మొదలగు 7 digit నంబర్ ఉంటుంది"

③ Cellulose

Vertical మొదలగు అన్ని పొజిషన్లలో చేయవచ్చు



① Down hand,  (పై నుండి క్రిందకు)

② over head  (క్రిందనుండి పైకి)

④ All Position - ఎటువైపుకైనా వెల్డింగ్ చేయవచ్చు

వెల్డింగ్ current

AC (లేదా) DC

AWS NO → E 6010 (లేదా) E 6011

② Rutile

wet vertical, down hand, overhead All position

DC పోలారిటీ లో straight (నెగటివ్) polarity

AWS NO E6012 (లేదా) E 6013

వెల్డింగ్ చేసేటప్పుడు quick setting, slow setting (వెంటనే గట్టిపడటం, ఆలస్యంగా గట్టిపడటం) ఉన్నవి

④ Low Hydrogen

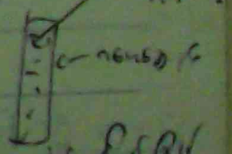
Hydrogen వెలువడటం తక్కువ. AC DC లలో వెల్డింగ్ చేసుకోవచ్చు. పై నుండి క్రిందకు, క్రింద నుండి పైకి overhead లో చేయడం vertical పొజిషన్లలో చేయవచ్చు All positions లో చేయవచ్చు

DC పోలారిటీ reverse (Re) polarity ఇవ్వాలి (నెగటివ్ electrode కి, వర్క్ పీస్ కి)

AWS NO E 6015 and E 6016

Boiler లలో ఎక్కువగా వాడతారు. starting ఎక్కువగా వెల్డింగ్ చేసిన చోట మళ్ళీ వెల్డింగ్ చేసినట్లయితే starting ఎక్కువగా ఉండదు

⑤ Iron Powder Contact



ఎలక్ట్రోడ్ coating లో ఐరన్ పౌడర్ 50% ఉంటుంది coating లావుగా ఉంటుంది. AC DC లలో వెల్డింగ్ చేయవచ్చు (All position) వెల్డింగ్ చేయవచ్చు

AWS NO E 6024 and E 6027

A.W.S, ASTM (American society of testing of material)
BS (Dutch, Japan, German
A.W.S का Electrode:
A.W.S की E Electrode X X X X (Flux से Wire को)
Coating Extrude करके Electrode बनाते हैं

E → E | X X X X | ① ② ③ ④
Position
Position → ① - सभी Position (all position)
2 → Horizontal और Down hand (Horizontal) (H) and Down hand (D)
3 → Down hand (only)
60 → 60000 Psi Tensile strength
70 → 70000 Psi
80 → 80000 Psi
60, 70, 80 Higher

E 60 | 2 0
3

Ques ① E 6010 { Tensile strength: 60000 Psi
Coating: Cellulose, DC reverse polarity, }

② E6030 { Tensile strength: 60000 Psi Coating: Rutile (AC or DC)

③ E6027 { Tensile strength: 60000 Psi, Position: all position
Down hand, for AC, DC (Steel) Fillet welding

60000 Psi Electrode Coating: Cellulose is %. Titanium 30%.
E 60 1 ① → ① Coating: Cellulose { AC or DC, DC reverse

E 6012 → ② Coating: Rutile titanium, sodium { AC or DC, DC straight polarity }

E 6013 → ③ → Coating: Rutile Titanium, Calcium { AC or DC, DC straight polarity }

E 6014 → ④ Coating: Rutile Titanium { All position, Titanium AC, DC

E 6015 → ⑤ Low hydrogen sodium AC ; DC (Reverse)

E 6016 ⑥ Low hydrogen, potassium AC-DC (DC → Reverse)

⑦ All position, all current

E 60 11 { Tensile strength: extraction, 60000 Psi tensile strength) all position Cellulose; AC or DC, DC reverse }

E6013 → mild steel (only) / BS-E207

Approved company -

E → electric electrode

60 → 60000psi

1 → all position

3 → Rutile Titanium dominant

Ac - Dc (St) Dc(+) -ve

size 4mm (size ভেদে current পরিবর্তন)

Flat → Down hand flat এ size 6mm এর current - 105 → 130

vertical overhead এ এর current 120 → 130

Chinese Electrode

Heavy coating, Moisture এর প্রভাব নিরোধ করে।

size		Flat	vertical (F)	O (overhead
3.2 mm (1/8")	→	90 → 130	80 → 100	80 → 100
4 mm (5/16")	→	130 → 190	120 → 170	110 → 130
5 mm (3/16")	→	190 → 240	160 → 210	160 → 210

90 → 130

↳ 90, 105, 110 → 130

Redry

M. T20 — corresponding to BS E316

for chinese

9-3-1921 এ মেশিন আবিষ্কার করেন। → যে গ্যাস মেশিন Gas এর উপর → যে ধরণের

(1) ঝালাইয়ের পূর্বে ঝালাই করার স্থানটি ভালোভাবে পরিষ্কার করে নিতে হবে।

(2) সবসময় ঝালাই করার উপযোগী চশমা ব্যবহার করতে হবে।

(3) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(4) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

(5) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

(6) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(7) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

(8) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

(9) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(10) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

(11) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

(12) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(13) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

(14) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

(15) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(16) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

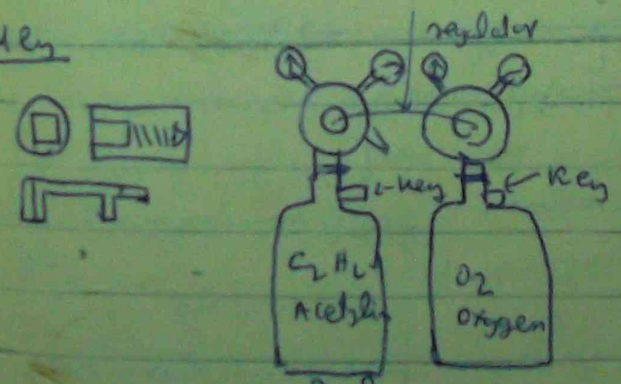
(17) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

(18) ঝালাই করার সময় ঝালাইকারীর শরীর ভালোভাবে ঢেকে নিতে হবে।

(19) ঝালাই করার সময় ঝালাইকারীর হাত ও পায়ে গ্লাভস ও বুট পরিধান করতে হবে।

(20) ঝালাই করার সময় ঝালাইকারীর মাথা ও মুখমণ্ডল ঢেকে নিতে হবে।

Key



ফ্লো মিটার

(၁၂) regulator [illegible]

[illegible]
explosion [illegible]
(၁၃) [illegible] 3/4 [illegible]
(၁၄) [illegible]
(၁၅) [illegible] (wrench by [illegible])

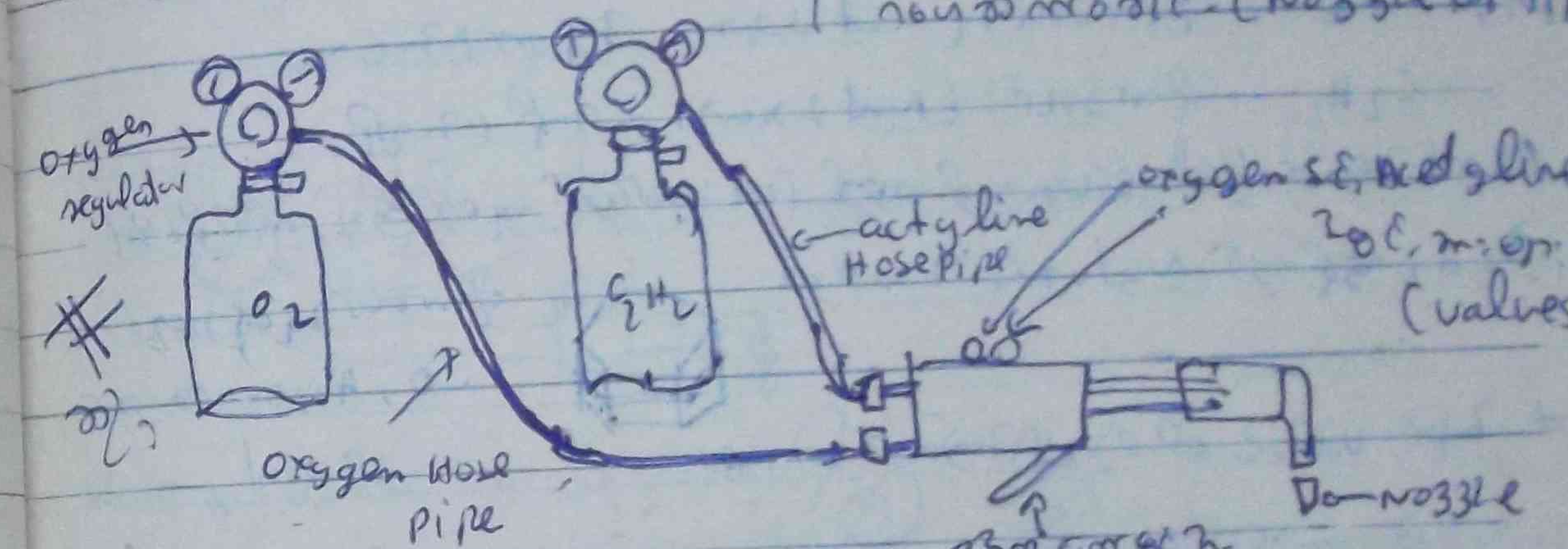
[illegible] O_2 [illegible] 1800psi [illegible]
220, 110 [illegible]
C_2H_2 → 330psi + 220 [illegible]
[illegible] 226 [illegible]

[illegible] (C_2H_2 [illegible])

[illegible]
[illegible] → [illegible] → [illegible] → [illegible]
(1) [illegible]
(2) [illegible] use for Burma
(3) [illegible] C_2H_2 + [illegible]
gas [illegible]

[illegible]
- [illegible] (oxygen cylinder)
- [illegible] (Actyline cylinder)
- [illegible] (oxygen regulator)
- [illegible] (Actyline regulator)
- [illegible] (oxygen hose pipe)
- [illegible] (Actyline hose pipe)
- [illegible] welding blow pipe or torch gas cutter
- [illegible] (Spindle key)
- [illegible] (goggle)

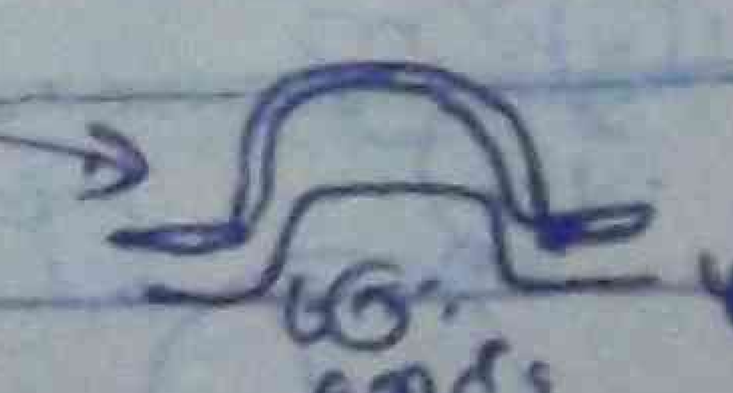
[illegible] spaner
[illegible] (leath hard Glove)
[illegible] (spark lighter)
[illegible] (separater
[illegible]
(Tip or nozzle cleaner
[illegible] (nozzle or tip)



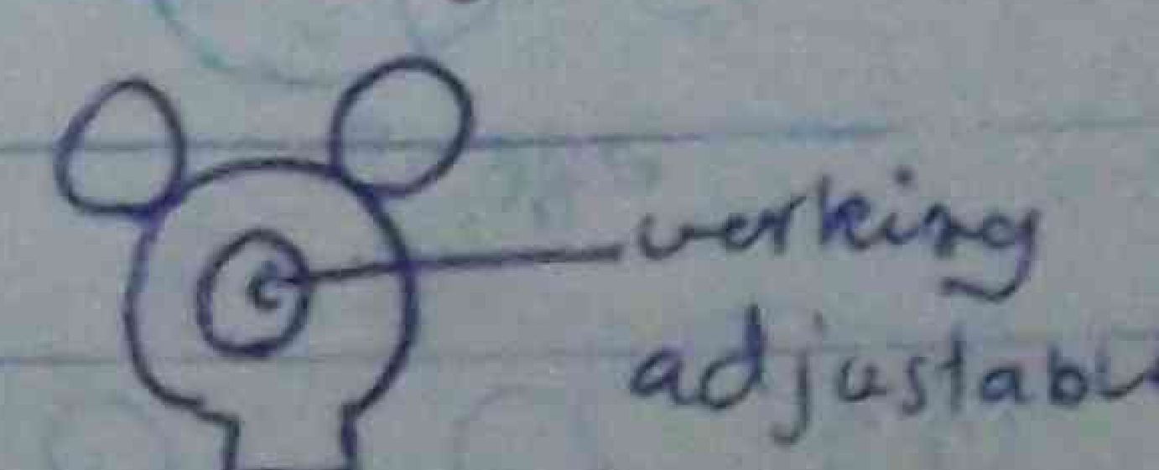
Fitting of oxygen actyline welder.

[illegible]

[illegible] (O_2 - C_2H_2)



Spindle key [illegible] 3/4 [illegible]
[illegible]



oxygen regulator [illegible]
oxygen regulator [illegible] acetylene regulator [illegible]
[illegible] → [illegible] (Nut) [illegible]
[illegible]
[illegible] 1 [illegible]

* ethene and propene are the first two members of the alkene family.

C_2H_4 ethene or ethylene

C_3H_6 propene or propylene

* Reagents: ethene, propene

(1) C_2H_4 + Br_2 → $C_2H_4Br_2$ (1,2-dibromoethane)

(2) C_2H_4 + H_2O → C_2H_5OH (ethanol)

(3) C_2H_4 + H_2 → C_2H_6 (ethane)

(4) C_2H_4 + HCl → C_2H_5Cl (chloroethane)

(5) C_2H_4 + H_2O → C_2H_5OH (ethanol)

* Reagents: propene

(1) C_3H_6 + Br_2 → $C_3H_6Br_2$ (1,2-dibromopropane)

(2) C_3H_6 + H_2O → C_3H_7OH (propanol)

(3) C_3H_6 + H_2 → C_3H_8 (propane)

(4) C_3H_6 + HCl → C_3H_7Cl (chloropropane)

(5) C_3H_6 + H_2O → C_3H_7OH (propanol)

* Reagents: ethene, propene

(1) C_2H_4 + Br_2 → $C_2H_4Br_2$ (1,2-dibromoethane)

(2) C_2H_4 + H_2O → C_2H_5OH (ethanol)

(3) C_2H_4 + H_2 → C_2H_6 (ethane)

(4) C_2H_4 + HCl → C_2H_5Cl (chloroethane)

(5) C_2H_4 + H_2O → C_2H_5OH (ethanol)

* Reagents: propene

(1) C_3H_6 + Br_2 → $C_3H_6Br_2$ (1,2-dibromopropane)

(2) C_3H_6 + H_2O → C_3H_7OH (propanol)

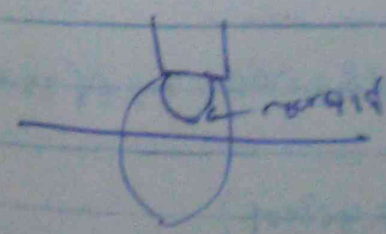
(3) C_3H_6 + H_2 → C_3H_8 (propane)

(4) C_3H_6 + HCl → C_3H_7Cl (chloropropane)

(5) C_3H_6 + H_2O → C_3H_7OH (propanol)

Lecture five (Pressure regulator)

- Pressure regulator → Pressure control valve
- Pressure control valve (outlet pressure control valve)
- Flash back (Pressure control valve)
- Regulator
- Nozzle
- Nozzle on tip



- Nozzle
- Nozzle

Nozzle

- Nozzle
- C_2H_2
- Nozzle
- Nozzle

ব্লাড প্রেসার: (Blood Pressure)

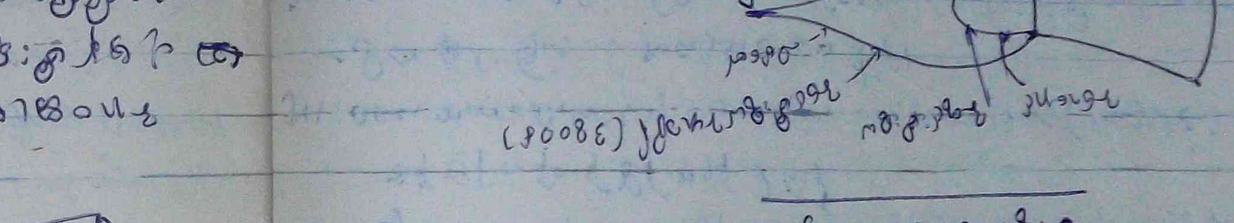
হৃৎপিণ্ড থেকে রক্ত ধমনীর মধ্য দিয়ে প্রবাহিত হওয়ার সময় ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে ব্লাড প্রেসার বলে।

* ব্লাড প্রেসার মাপার যন্ত্রের নাম স্ফিগমোম্যানোমিটার।

* ব্লাড প্রেসার দুই প্রকার যথা- (ক) সিস্টোলিক প্রেসার (খ) ডায়াস্টোলিক প্রেসার।

(ক) সিস্টোলিক প্রেসার: হৃৎপিণ্ড যখন সংকোচন করে তখন ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে সিস্টোলিক প্রেসার বলে। এর গড় মান ১২০ মিলিমিটার পারদ চাপ।

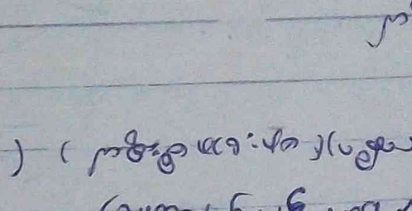
(খ) ডায়াস্টোলিক প্রেসার: হৃৎপিণ্ড যখন প্রসারণ করে তখন ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে ডায়াস্টোলিক প্রেসার বলে। এর গড় মান ৮০ মিলিমিটার পারদ চাপ।



ব্লাড প্রেসার মাপার যন্ত্রের নাম স্ফিগমোম্যানোমিটার।

ব্লাড প্রেসার মাপার যন্ত্রের নাম স্ফিগমোম্যানোমিটার।

(1) ব্লাড প্রেসার: হৃৎপিণ্ড থেকে রক্ত ধমনীর মধ্য দিয়ে প্রবাহিত হওয়ার সময় ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে ব্লাড প্রেসার বলে।

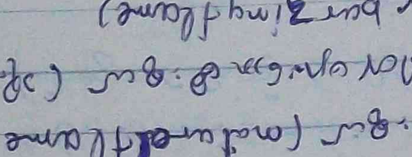


(ক) সিস্টোলিক প্রেসার (Systolic Pressure): হৃৎপিণ্ড যখন সংকোচন করে তখন ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে সিস্টোলিক প্রেসার বলে।

(খ) ডায়াস্টোলিক প্রেসার (Diastolic Pressure): হৃৎপিণ্ড যখন প্রসারণ করে তখন ধমনীর দেয়ালের উপর যে চাপ সৃষ্টি করে তাকে ডায়াস্টোলিক প্রেসার বলে।

(2) রক্তচাপ মাপার যন্ত্র: (Sphygmomanometer)

রক্তচাপ মাপার যন্ত্রের নাম স্ফিগমোম্যানোমিটার।



[illegible] - High carbon steel, Alloy steels, Stainless steel
[illegible] Nickel & Chromium.
[illegible] (cast steel) [illegible]
[illegible]

? [illegible]

~~[illegible]~~ - [illegible] (bronze) [illegible]
(copper + zinc) (brass) ([illegible])

Gas [illegible]
Gas [illegible]

[illegible]
(1) [illegible] 3000°F [illegible]
[illegible] 5550°F [illegible]
[illegible]
(2) [illegible]

[illegible]
(1) [illegible]
[illegible]
(oxy + iron → iron oxide + [illegible])
[illegible]

oxy - acet oxy - Hydro oxy - [illegible] oxy - natural gas	oxy + petrol = petrol gas

U Hlay Aung's lecture

Electric arc welding of mild steel plate in ship building has superseded riveting as the main form of structural attachment. The main advantages are

① A substantial saving in steel weight
② Economy of construction
③ Greater fabrication potential.
④ better continuity of strength
⑤ Greater freedom of design and
⑥ The provision of water tightness without caulking

On other hand, the efficiency of joint depends upon the weld and the position in which operating. Also the rapid heating and cooling tend to distort the plate and locked up stresses occur to the construction

There can be minimized if the structure is suitably prepare and the correct sequence of welding is follow.

Usual welding Process

① manual metal arc welding

A fusion weld is one where there is actual melting of the material being joined although the weld metal is composed very largely of added material which generally has the same characteristics as the parent metal. The heat necessary for making fusion welds is usually supply by electrical means. The most common of welding processes is still the one in which a manual metal arc welding with coated steel electrode.

② Automatic Arc welding.

Early effort at automation of the metal arc welding process included devices which deposited consult electrode in a prepared joint, and the limitation of the above Technique for continuous welding is the difficulty of transferring the arc from one electrode to the next without incurring corosity in the weld. The answer to the problem was found by using a coated electrode in coil form and this is usually the commonly done.

submerged arc process

This method employ a coiled bare wire and welding flux which is supply separately, as a free flowing powder. The flux is deliver from a hopper and deposited on the joint to be welded ahead of the electrode wire. The arc is completely shielded and hidden from view and is very quite and there is no alloy and no from fume or glare.

welded connections

The two basic types of welded connection are. Butt and fillet and variation of these type weld be described.

fig(1) shows a general type of butt weld and the preparation of this one shows in fig: (2) The angle of chamfer and the gap between the plates and the nosing may be sliding and different yards, These are generally prove by local Surveyors of the classification societies are before work) design began. The preparation of plate edges is done by either planning or by burning machine in the shop butt on the ship during construction the chamfer are either hand machine chipped or burned.

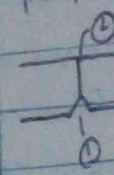
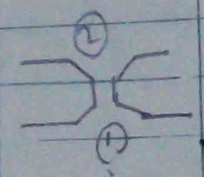
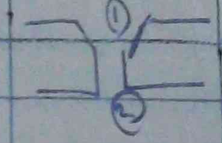
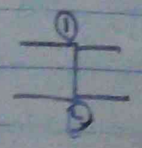
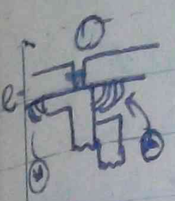
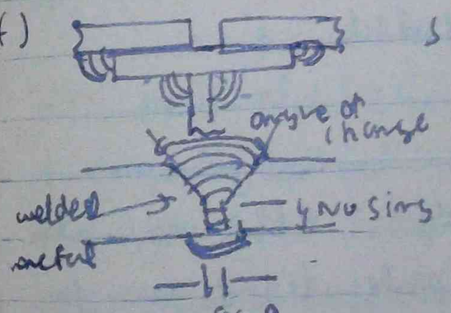
	Preparation	Plate thickness	Job	Method
a		under 0.63"	Plate at bottom shell seams and butts to plate deck beams bulk head beams and butt	weld (1) and (2) manual or machine.
b		over 0.63"	Bottom shell and side seams or butts bulk head deck seam and butt Tank Top seams	"
c		under 0.63"	Shell seams and butt marking and tank top centre line strake butt Bulk head seams and butts	weld (1) manual.
d		under 0.28 manual under 0.36" machine	Bulk head deck and any seams or butts to be completed with Plates Horizontal	weld (1) and (2) manual or machine.

Plate thickness | Preparation



under 0.36" Plate edges are strength over 0.36" Plate are chamfered.	Tank top butts deck butts deck house side butts	weld (1) manual or machine continuous weld if floors are watertight or oil tight intermediate otherwise.

(f)



some as (e)

MS (e)

as e.

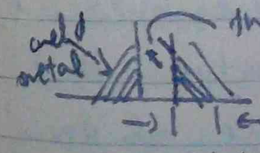


fig (3)

fig (1)

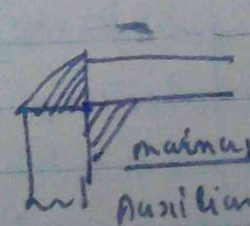


fig (4) (a) corner fillet

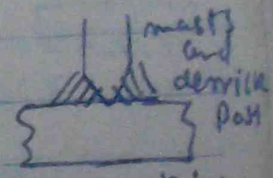


fig 4 (c) Heavy plate fillet

fig 4 (b) Inaccessible fillet

manhole pillar heads and keels

Plate chantered to allow deep fine fration.

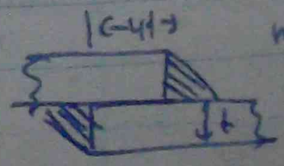


fig 4 (d) top weld.

Fig (1) Shows the basic fillet weld and weld is generally done by hand vibration of the are Shown in fig (4) The factor governing the leg length of the type of weld is the thicker of the two plate making the joint join the rules of the classification societies give the leg length in relation (important of connection and state also whether the weld is continuous or intermitted width intermitted weld the spacing of weld also stated.

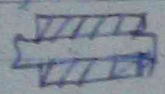
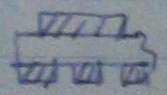
Plan of weld	Type	Job
(a) 	continuous weld both sides of plate	All main water tight strength work eg bulkhead Tank top vertical centre keel Beam knees etc
(b) 	continuous weld one side inter mittent weld the other	Secondary watertight and gas tight work eg wcs galley Deck houses retri: space.
	Intermittent weld both sides - staggered	Girders, Beams bulkhead, stiff frame, floor etc.
	Intermittent weld both side - Chain.	

fig (5) fillet weld spacing

Fig 5(a) to (d) show the various continuous and intermittent weld and where they are used. Before a fillet weld is begin it should be seen that the gap between the plate is never greater than $\frac{1}{16}$" If a larger gap occur one side of the gap should be sealed by welding and then the opposite side gouged to meet the weld, before before completing the weld of the second side

The strength of welded joint depend particular (y upon the skill and reliability of the welder who must be ~~must~~ careful in cleaning the joint keeping it dry, and clearing away the slag or flux in a multirun weld. The tight, sides and shape of weld also are important. If all these points are considered, there is no reason while a first class attachment should not be produced. If there

excessive loading of any particular welded joint brake down usually occur in the plating adjacent to joint and only in the weld itself if the above points have not been followed. In both butt and fillet weld it is important that they are run towards where end, otherwise locked up stresses occur which calls cracking of weld and distortion of plating. Therefore it is important the machine joint is suitably prepared and fastened and the sequence of welding decided before the operator allowed to begin.

welding ಪ್ರಾಮುಖ್ಯತೆಗಳು:

Ship building, Railways, Motor car & aircrafts, pressure vessels, repair & maintenance

fussion welding (F.F.E.C)

ಇದರಲ್ಲಿ ಎರಡು ಲೋಹಗಳನ್ನು ಜೋಡಿಸಲು ಅವುಗಳ ಅಂಚುಗಳನ್ನು ಕರಗಿಸಲಾಗುತ್ತದೆ. ಇದನ್ನು ಎರಡು ವಿಧಗಳಲ್ಲಿ ವಿಂಗಡಿಸಲಾಗಿದೆ. (1) Fussion without mechanical press (2) fusion with mech: press ಈ ವಿಧಾನದಲ್ಲಿ ಬೆಸುಗೆ ಮಾಡಬೇಕಾದ ಲೋಹಗಳನ್ನು ಒಂದಕ್ಕೊಂದು ಸೇರಿಸಿ ಇಡಲಾಗುತ್ತದೆ.

Fusion without pressure ವಿಧಾನಗಳು:

(I) gas Process (a) oxy acetylene (b) oxy Hydrogen (c) oxy-Hydrocarbon (d) Air Acetylene

ಈ welding ಗೆ ಬಳಸುವ ಉಷ್ಣತೆ ಸುಮಾರು 3200°C ಇರುತ್ತದೆ.

(II) Arc process

(1) metal arc (3) Atomic arc (5) Submerged arc

(2) carbon arc (4) Inert gas arc (6) Electro slag.

Arc welding ನಲ್ಲಿ ಬಳಸುವ Electrode ಗಳು: electric Arc or arc ಉತ್ಪಾದಿಸಲು. ಸಾಮಾನ್ಯವಾಗಿ ಬಳಸುವ ಲೋಹಗಳು, ಇದನ್ನು ತಯಾರಿಸಲು ಬಳಸುವ ಲೋಹಗಳು: ಮೃದು ಉಕ್ಕು. ಕಾಸ್ಟ್ ಐರನ್, ಅಲ್ಯೂಮಿನಿಯಂ. ಇದನ್ನು ferrous ಮತ್ತು Non ferrous metal ಗಳಲ್ಲಿ ಬಳಸಲಾಗುತ್ತದೆ.

oxy-acetylene welding

Gas welding ಅಂದರೆ oxy acetylene welding ಆಕ್ಸಿಜನ್, acetylene ಗಳನ್ನು ಬಳಸಿ ಉಂಟುಮಾಡಿದ ಜ್ವಾಲೆಯಿಂದ ಬೆಸುಗೆ ಮಾಡುವುದು. ಈ ವಿಧಾನದಲ್ಲಿ ಸುಮಾರು 3500°C ತಾಪಮಾನ ಉತ್ಪತ್ತಿಯಾಗುತ್ತದೆ. ಇದರಿಂದ metal ಗಳನ್ನು ಕರಗಿಸಿ ಬೆಸುಗೆ ಮಾಡಲಾಗುತ್ತದೆ. ಇದಕ್ಕೆ fusion welding ಅಥವಾ metal Rod ಎಂದು ಕರೆಯುತ್ತಾರೆ.

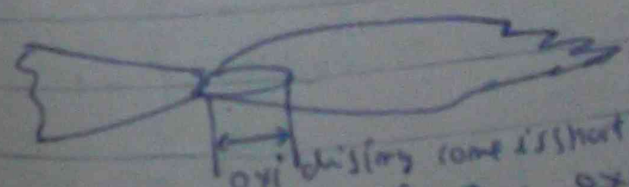
ಈ ವಿಧಾನದಲ್ಲಿ ಕರಗಿದ ಲೋಹಗಳು ಆಕ್ಸೈಡ್ ಆಗದಂತೆ molten metal ಅನ್ನು ರಕ್ಷಿಸಲು, ಅದಕ್ಕೆ ಫ್ಲಕ್ಸ್ ಅನ್ನು ಬಳಸಲಾಗುತ್ತದೆ. ಈ ವಿಧಾನದಲ್ಲಿ metal ಗಳಾದ nitrides & oxides ಗಳನ್ನು ತೆಗೆದುಹಾಕಿ joint ನ್ನು ಸರಿಯಾಗಿ ಬೆಸುಗೆ ಮಾಡಲಾಗುತ್ತದೆ.

(ii) carburising flame -

carburising cone(r)
long with pointed or regged end

Acetylene feather or luminous Intermediate cone
1st combustion stage
feathery outer edge
carbon content

(iii) oxidising Flame

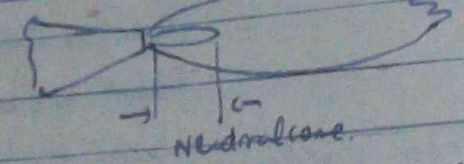


oxidising cone is short

Excess oxygen
Flame
Acetylene
molten metal
oxidising effect
brass, bronze

1st combustion stage
2nd stage flame
oxidising
reducing
Flame
water vapour (steam)
1st stage
2nd stage
oxy: acetylene

(3) Neutral flame

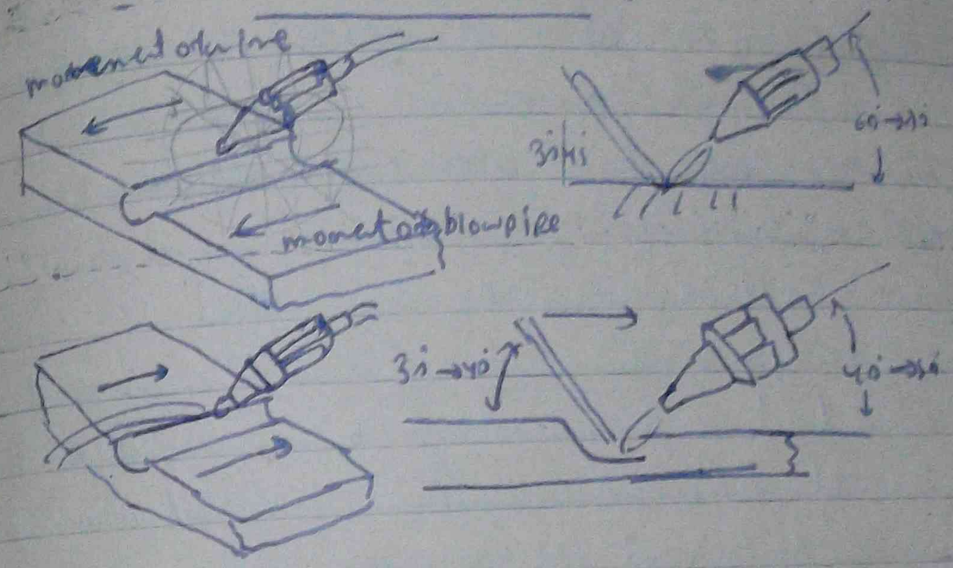


oxygen & acetylene ಅನಿಲಗಳ ಸಮಪ್ರಮಾಣದ ಮಿಶ್ರಣದಿಂದ ಉಂಟಾಗುವ ಜ್ವಾಲೆಯನ್ನು neutral flame ಎನ್ನುವರು. ಇದರಲ್ಲಿ ಆಮ್ಲಜನಕ ಮತ್ತು ಅಸಿಟಿಲೀನ್ ಅನಿಲಗಳು ಸಮಪ್ರಮಾಣದಲ್ಲಿ ಇರುತ್ತವೆ. ಇದರಲ್ಲಿ ಮೂರು ಭಾಗಗಳಿರುತ್ತವೆ.

In this flame, metal ಅನ್ನು ಕರಗಿಸಿದಾಗ ಉಂಟಾಗುವ ಆಕ್ಸೈಡ್‌ಗಳನ್ನು ಅಥವಾ ಕಾರ್ಬೈಡ್‌ಗಳನ್ನು ಕರಗಿಸಿ ಅವುಗಳ ಪರಿಣಾಮವನ್ನು ತಟಸ್ಥಗೊಳಿಸುತ್ತದೆ.

metal	flame
mild steel	Neutral flame
stainless steel	"
cast Iron	"
copper	"
Aluminium	"
Nickel	"
monel	"
Brass	oxidising flame
Bronze	"
Aluminium Alloy	slightly carburising
magnesium Alloy	"
Zinc Brass Alloy	"

Method of welding



ಪ್ರಾರಂಭದ ಸಲ ಪ್ರಾಯೋಗಿಕವಾಗಿ ಸುಮಾರು ಫಲಕಗಳನ್ನು left ward or forward method (ಅ) rightward or Backward welding method ಮಾಡಿ ನೋಡಿ

left ward or forward ವಿಧಾನದಲ್ಲಿ ಬೆಸುಗೆ ಕೆಲಸವನ್ನು ಬಲಗಡೆಯಿಂದ ಎಡಗಡೆಗೆ ಸಾಗಿಸಲಾಗುತ್ತದೆ. flame ಅನ್ನು unwelded portion ಮೇಲೆ ಹಿಡಿದಿರಬೇಕು. ಇದು ಕರಗಿದ ಲೋಹವನ್ನು ಕಾಪಾಡಲು flame ಅನ್ನು ಸ್ವಲ್ಪ ಹಿಂದಕ್ಕೆ ಸರಿಸಿ ಹಿಡಿಯಬೇಕು. distortion ಕಡಿಮೆಯಾಗಿರುತ್ತದೆ. molten metal ಅನ್ನು ಹಿಡಿದಿಡಲು metal plate ಅನ್ನು 30° ದಿಂದ 60° ವರೆಗೆ ಓರೆಯಾಗಿಸಿ ಇಡಬೇಕು. ಸಾಮಾನ್ಯವಾಗಿ $\frac{1}{4}$" steel plate ಬಳಸಲಾಗುತ್ತದೆ. Non ferrous metal ಗಳಿಗೆ ಇದಕ್ಕಿಂತ ದಪ್ಪವಾದ ಪ್ಲೇಟ್ ಬಳಸಲಾಗುತ್ತದೆ.

Backward ವಿಧಾನದಲ್ಲಿ ಬೆಸುಗೆ ಕೆಲಸವನ್ನು ಎಡಗಡೆಯಿಂದ

[illegible] welded portion of [illegible]
[illegible] joint [illegible] molten
[illegible]

Blowtorch soldering irons can be heated in various ways, but the gasoline blowtorch is one of the most convenient ones aboard ships. As shown in figure 2(6), 1/16" nozzle form
Eight blowtorches are usually equipped with a hook and swivel to hold the soldering iron while the [illegible] exposed to the flame of torch.

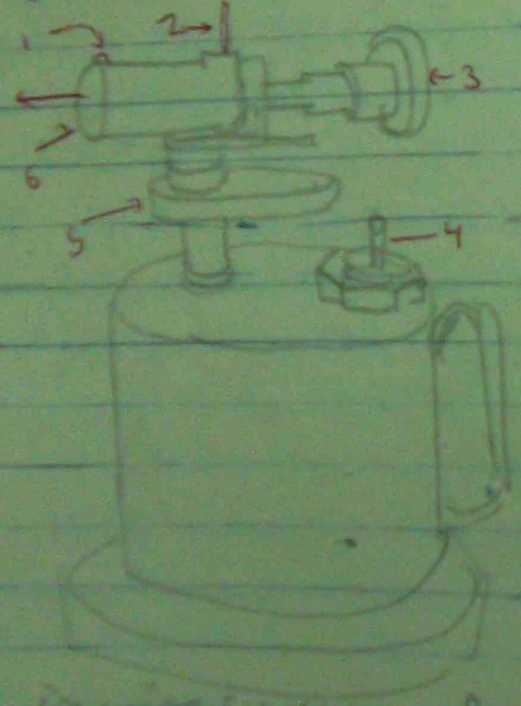
Before using a blowtorch it is advisable to consider the danger of fire. Do not light or use the torch near [illegible] where gasoline has been spilled, or where [illegible] accumulated or may be expected. [illegible] good practice to have a fire extinguisher handy whenever a blowtorch is used.

In order to use a blowtorch, the tank must contain clean, white (unleaded) gasoline. And the pump on the tank must be operated to build up sufficient pressure to cause the gasoline to spray through the burner tube when the valve is opened. A piece of sheet metal or other convenient means is provided to shield the end of the burner tube and the valve is opened slightly, allowing liquid gasoline to collect in fuel pan.

With the valve closed and the blowtorch placed so as not to cause fire or damage to material and not subject to violent currents, ignite the gasoline in the fuel pan and permit the flame from the burning gasoline to envelop and heat the burner tube. When the burner tube is hot, open the valve slightly to permit a fine stream of gasoline to be discharged from the tank. The gasoline should vaporize immediately and burn with an almost colorless, slight blue flame. Before proper heat is [illegible] to permit satisfactory operation, burner torch is burning satisfactorily, valve can be opened or closed slightly in order to adjust the flame to the desired intensity. A blue flame indicates good combustion conditions, while dark [illegible] air is necessary to valve. The pump is [illegible] periodically in order to maintain pressure in tank.

- To extinguish a blow torch, close the v/v after the torch has been extinguished - it is good practice to loosen the filling plug and release the pressure within the tank. When the pressure has been relieved, the filling plug is tightened again.

The v/v is then opened slightly and left open. If the v/v is not left open the metal around the v/v will contract and the v/v spindle is so tight by that it will be damaged



1| soldering iron rest
2| soldering iron hook
3| v/v
4| fuel pump
5| fuel pan
6| burner tube

→ Tin wire solder, paste fluxes, commercially manufactured are available in tins of various sizes. These fluxes when containing corrosive acids, are substitute for

{ Please Pass me ——
may I have ~~tea~~ water
waiter
yes

Fluxes A flux is a chemical preparation (powder, paste or liquid) used to keep chemical clean so that the solder will stick to it. When a flux is heated, the heat will cause oxides to form on the metal surface and prevent the solder from adhering properly. A list of common fluxes and the metals on which they are used is given in the following:-

Metals	Fluxes
Copper, brass	Resin
Lead	Tallow, resin
Iron, steel	Resin, zinc chloride

Fluxes are either corrosive or non-corrosive. The commonly used corrosive fluxes are zinc chloride, and ammonium chloride, made the metal It allowed to remain on it after soldering They should therefore be completely removed by washing after the work is done. It After washing in water, traces of flux left after Incorrect soldering, a non-corrosive flux is used when soldering electrical connections. The

Tinning - Spreading a thin layer of solder on the surface of the metals that are to be soldered together causing the solder to adhere to the metal and make a firm union with it. The purpose of tinning is to prepare the surfaces so that they will unite readily in the process of soldering, and make a firm joint. All recommended that all metals except lead & tin, be tinned before soldering, lead & tin need only to be scraped clean.

Copper brass and ungalvanized iron can easily be prepared to receive solder by cleaning the surface and applying zinc chloride. Galvanized iron or steel should be cleaned with muriatic acid before the solder is applied. Where a metal has become tarnished it is necessary to remove the tarnish and expose the bare, clean metal before tinning it, otherwise the solder ordinarily will not adhere to the metal.

Tinning the soldering iron. The point of a soldering iron must be tinned before it will do a good job of soldering. Tinning in this instance refers to the process of coating the point with solder to prevent oxidation when heated. The general steps in tinning procedure are as follows.

1. File the faces of the point clean with emery cloth and leave smooth and flat.
2. Heat the point hot enough to melt the solder readily, but do not heat it red hot.
3. Rub the faces of the point on sal-ammoniac or block, applying a small amount of solder to the points as it is rubbed on the salt. The solder will form a thin bright film on the faces of the point.
4. If a sal-ammoniac block is not available, the point can be tinned by rubbing it in pulverized rosin and solder. When a soldering iron is over heated the tinning is destroyed. If this happens the point should be allowed to cool and then should be filed and retinned.

Dipping Solution - When soldering is heated the scale must first form on the point can be removed by dipping the point in the dipping solution made of one part of sal-ammoniac powder mixed with 40 parts of water. Only the tip of the point should be dipped in the solution and it should be withdrawn quickly. The tinned point will emerge bright and clean.

A soldering iron should never be dipped into zinc chloride or muriatic acid solution, as the acid during sputter will destroy clothing, and possibly cause blindness or severe burns.