

EARTHING SYSTEM

G003+G004 / FIRE PROT HEATING TESTING EARTHING. ZIP
PART (1)

EARTH FAULTS

- ON SUPPLY SYSTEM TO THE INSTALLATION
- ON AN ADJACENT BUILDINGS
- IN WIRING ACCESSORIES
- WITHIN APPLIANCES
- IN LUMINAIRES OR SWITCH BOARDS

SUPPLY SYSTEM FAULTS

- REVERSED POLARITY OF SUPPLY
- OPEN CIRCUIT ON SUPPLY NEUTRAL

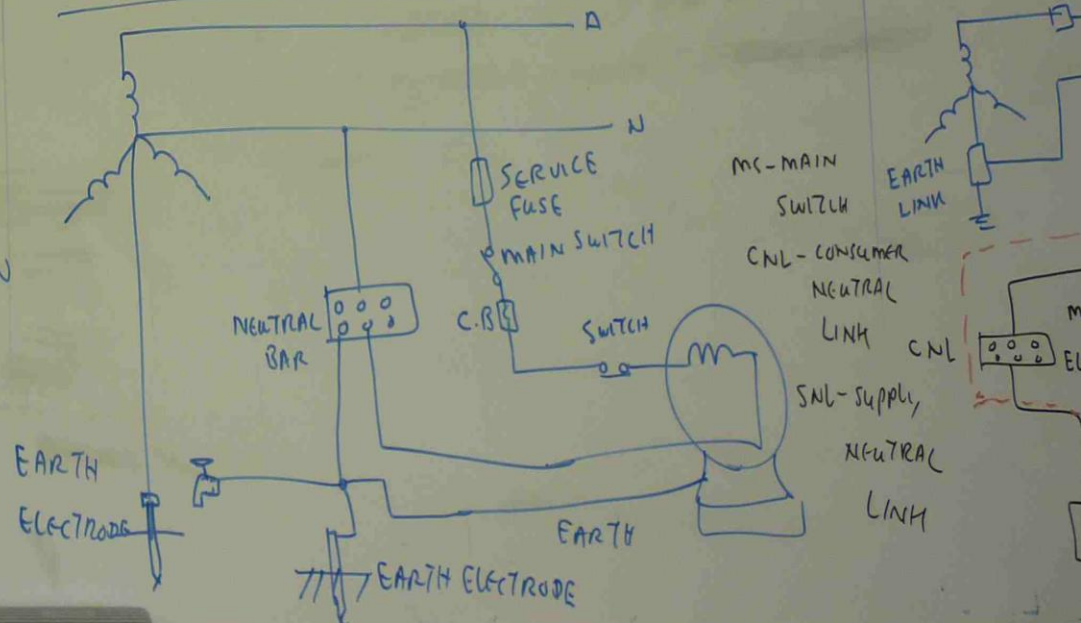
PROTECTION AGAINST OVERLOAD

FUSE OR CIRCUIT BREAKER INSTALLED ON
ACTIVE CONDUCTOR.

FACTORS INFLUENCING THE MAGNITUDE OF FAULT CURRENT

- LOW IMPEDANCE SUPPLY SOURCE
- LOW IMPEDANCE SUPPLY MAIN AND INSTALLATION
- RESISTANCE OF EARTH FAULT
- RESISTANCE OF EARTHING SYSTEM

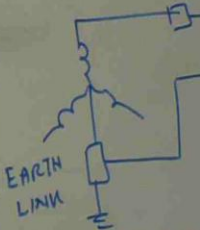
INSTALLING THE EARTHING SYSTEM



MAIN SYSTEM

A CONNECTION BETWEEN THE EARTHING SYSTEM AND THE INSTALLATION.

ELCB - EARTH LEAKAGE CIRCUIT BREAKER
IF THE POTENTIAL IS 20V TO 26V,



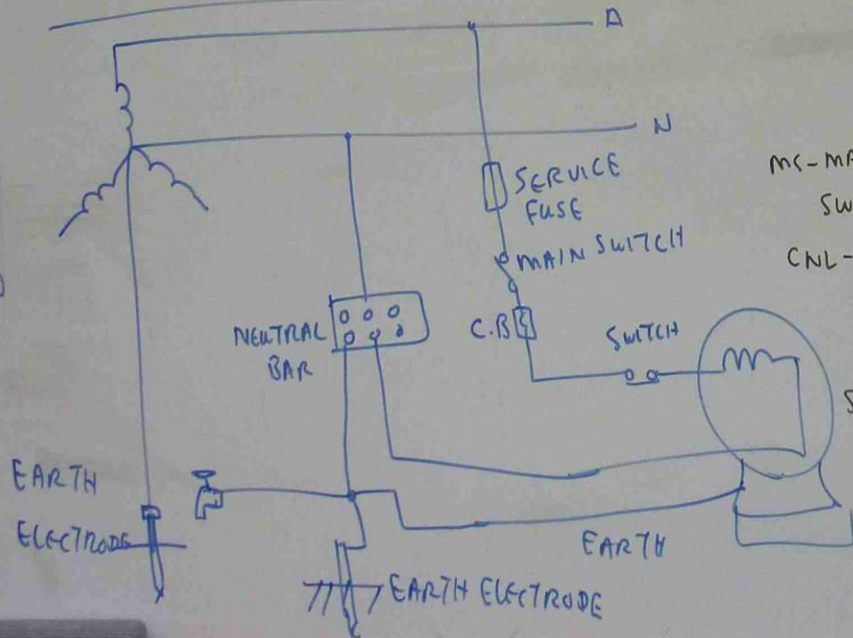
TESTING EARTHING. ZIP

PART (1)

FACTORS INFLUENCING THE MAGNITUDE OF FAULT CURRENT

- LOW IMPEDANCE SUPPLY SOURCE
- LOW IMPEDANCE SUPPLY MAIN AND INSTALLATION
- RESISTANCE OF EARTH FAULT
- RESISTANCE OF EARTHING SYSTEM

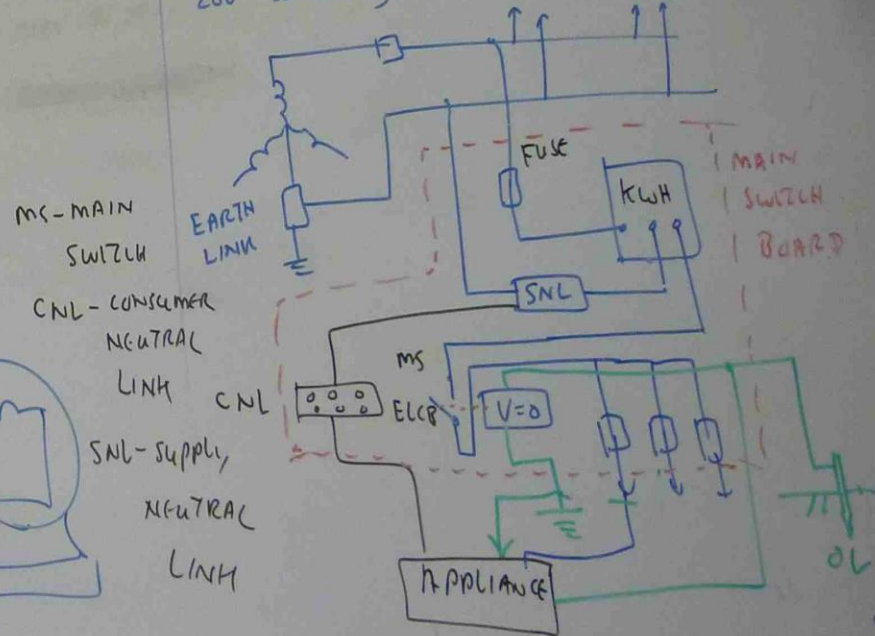
INSTALLING THE EARTHING SYSTEM



MEN SYSTEM

A CONNECTION BETWEEN THE NEUTRAL AND THE EARTHING SYSTEM AT EACH CONSUMER'S INSTALLATION.

ELCB - EARTH LEAKAGE CIRCUIT BREAKER
IF THE POTENTIAL OF EARTHING SYSTEM REACHES 20V TO 26V, TRIP COIL OPERATES.



WIRING RULE PRACTICE

FIND THE CLAUSES FOR THE FOLLOWING

ELCB, MCB, MAIN SWITCH, CONSUMER NEUTRAL LINK

SUPPLY NEUTRAL LINK, EARTHING

EARTH LEAKAGE VOLTAGE, EARTH LEAKAGE CURRENT

EARTH ELECTRODE, RESISTANCE OF EARTH ELECTRODE

SIZE OF EARTH WIRE, SIZE OF EARTH ELECTRODE

WIRING RULES RELATED TO EARTHING.

EARTH FAULTS

CAUSES OF ACTIVE TO EARTH FAULT

FAULTS THAT AFFECT THE OPERATION OF EARTHING SYSTEM MAY OCCUR

- * ON THE SUPPLY SYSTEM TO INSTALLATION
- * ON AN ADJACENT INSTALLATIONS
- * IN WIRING (OR) ACCESSORIES
- * WITHIN APPLIANCES
- * IN LUMINARIES (OR) SWITCH BOARDS.

SUPPLY SYSTEM FAULTS

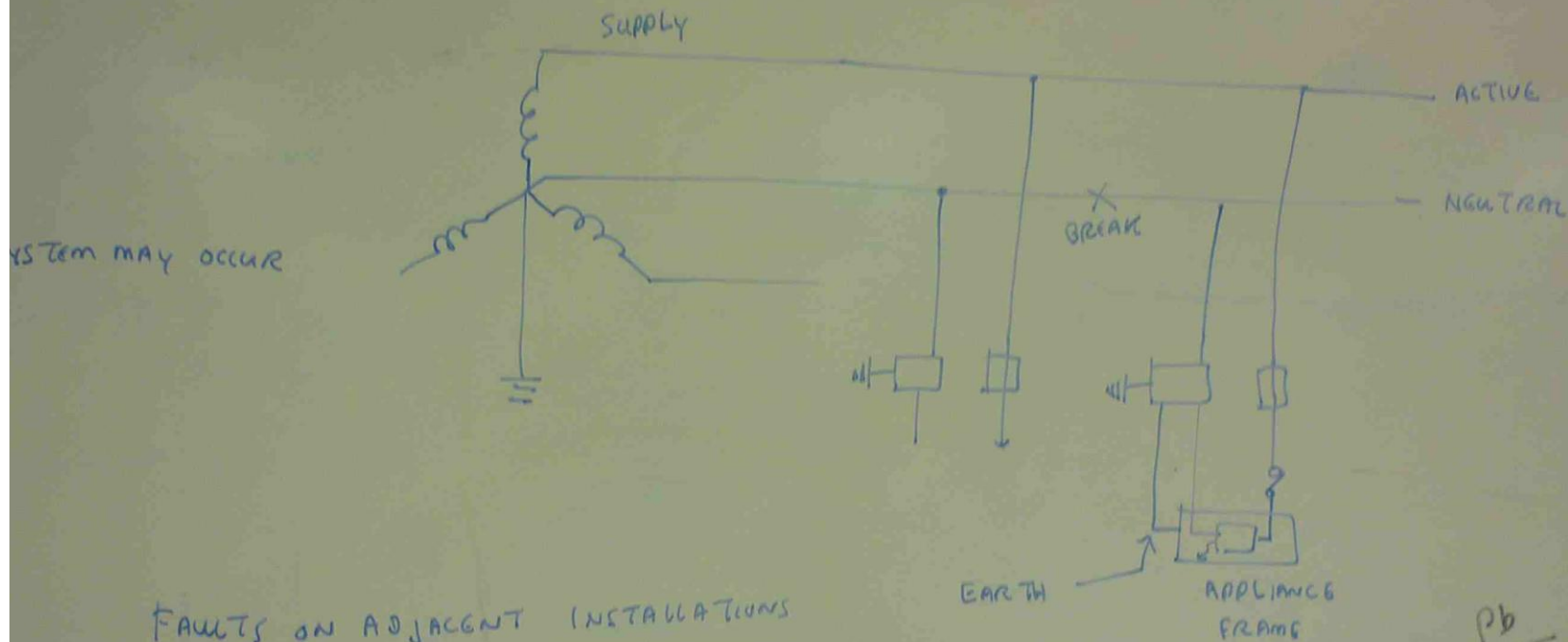
- OPEN CIRCUIT ON SUPPLY NEUTRAL
- REVERSED POLARITY OF SUPPLY

FAULTS

FAULT
ADJACE

FAULT

CAR

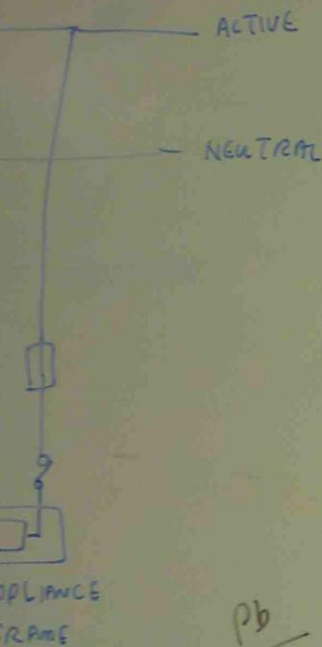


FAULTS ON ADJACENT INSTALLATIONS

FAULT OCCURRING ON ONE INSTALLATION MAY EFFECT,
ADJACENT INSTALLATION.

FAULTS IN WIRING ACCESSORIES

CARELESSLY INSTALLED WIRING (OR) WIRING ACCESSORIES
CAUSE METAL WIRING ENCLOSURES TO BECOME LIVE

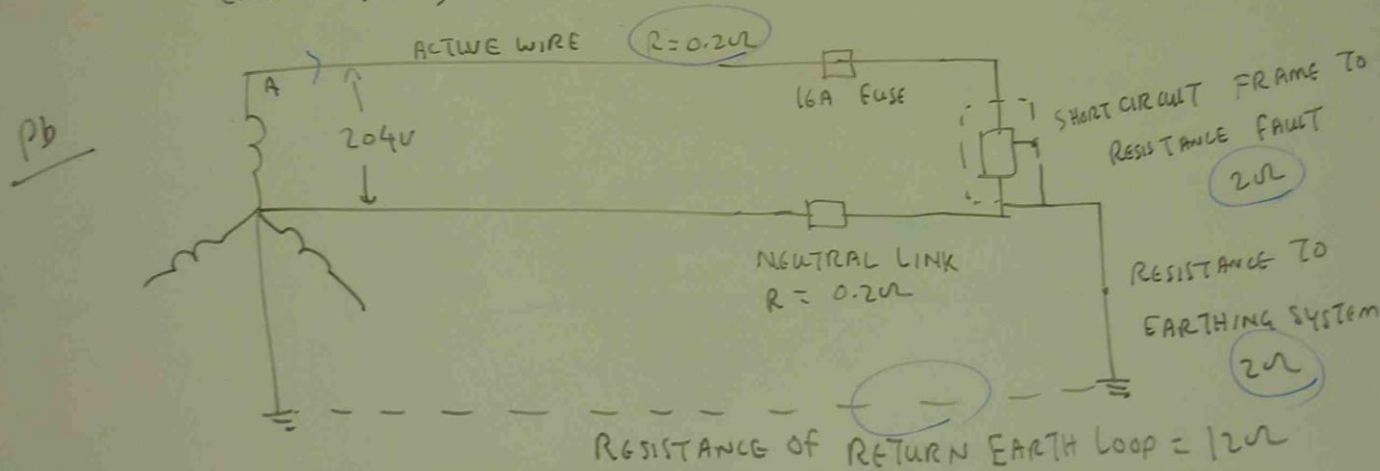


WIRING RULE BOOK EXERCISE

FIND THE FOLLOWING TERMS IN AS 3000.

DEAD, DIRECT EARTHING SYSTEM, EARTHED, EARTHED SITUATION, EARTHING CONDUCTOR

EARTHING SYSTEM, EARTH LEAKAGE CIRCUIT BREAKER VOLTAGE OPERATED (ELCB), EXPOSED METAL, LIVE (ALIVE), MULTIPLE EARTHED NEUTRAL (MEN) SYSTEM, RESISTANCE AREA.

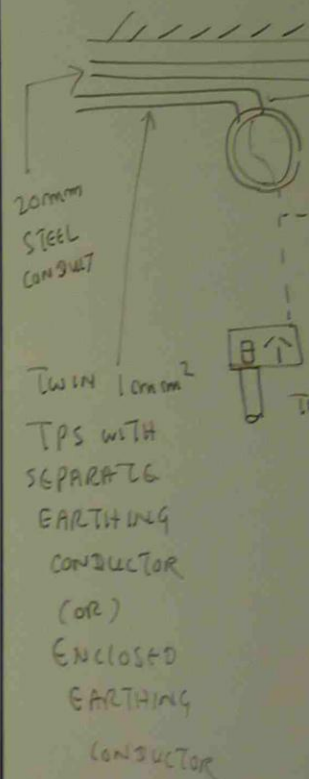


IN ABOVE SYSTEM, FIND THE EARTH FAULT CURRENT.

$$\text{EARTH FAULT CURRENT} = \frac{204}{0.2 + 2 + 2 + 12} = \frac{204}{16.2} = 14.8 \text{ Amp.}$$

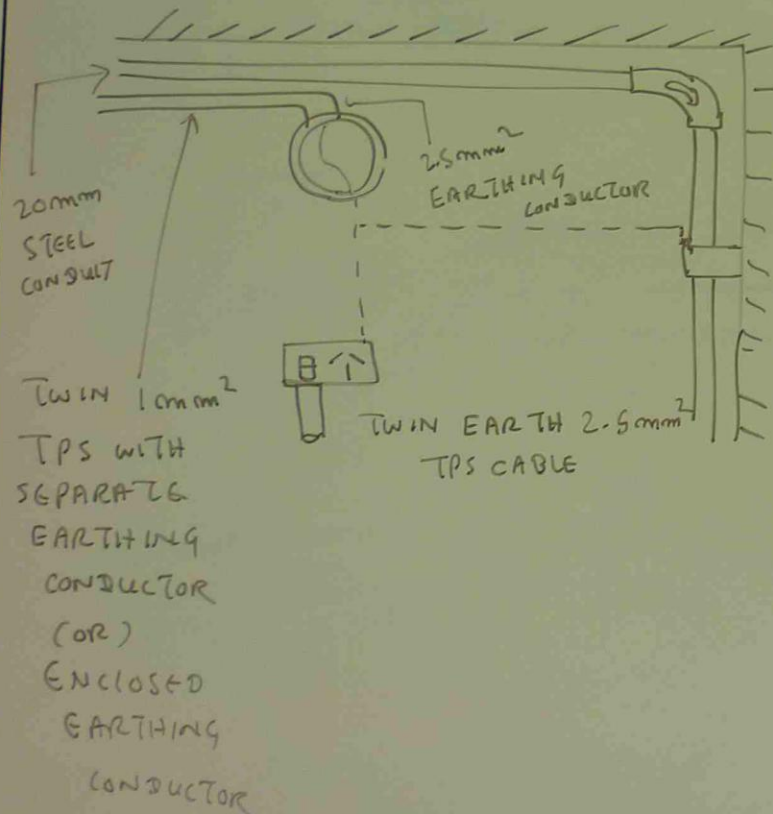
INSTALLATION OF

ELCB



INSTALLATION OF EARTHING SYSTEM

ELCB



SUPPLEMENTARY SYSTEMS OF EARTH PROTECTION

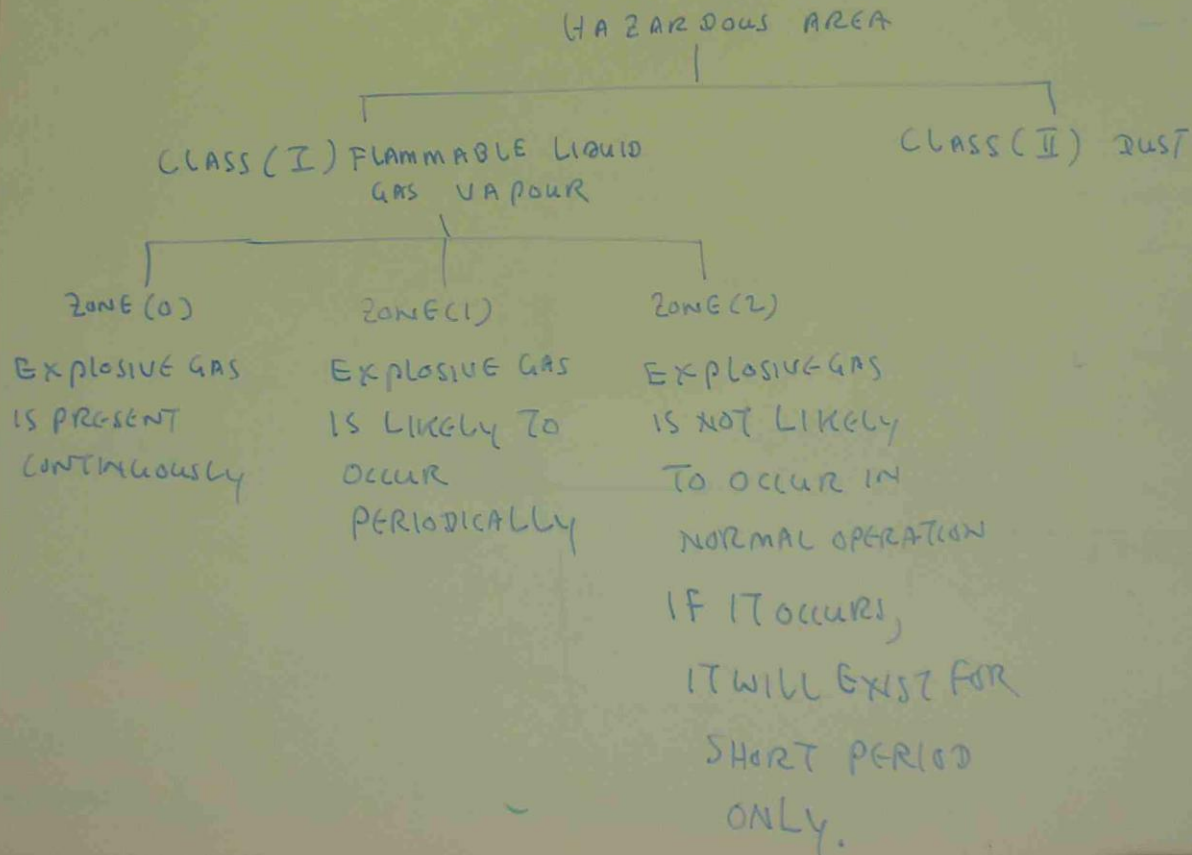
- ISOLATION OF LIVE PARTS
- EARTH LEAKAGE DEVICES

ISOLATION OF LIVE PARTS

- * THE USE OF ALL INSULATED EQUIPMENTS
- * THE USE OF DOUBLE INSULATED EQUIPMENTS
- * ISOLATION FROM SUPPLY USING ISOLATING TRANSFORMER.

HAZARDOUS AREA

- AN AREA IN WHICH AN EXPLOSIVE ATMOSPHERE IS PRESENT OR MAY BE EXPECTED TO BE PRESENT.
- SPECIAL PRECAUTION IS NEEDED FOR CONSTRUCTION, INSTALLATION AND USE OF ELECTRICAL EQUIPMENTS.



METHODS OF EXPLOSION PROTECTION

- EXCLUSION METHOD
- EXPLOSION CONTAINMENT METHOD
- ENERGY LIMITATION METHOD
- DILUTION METHOD
- AVOIDANCE OF IGNITION SOURCE METHOD

TYPES OF EXPLOSION PROTECTION

CLASS (I)

DUST EXCLUSION IGNITION PROOF (DIP) AS 2236

HERMETIC SEALING (EX.h)

ENCAPSULATED AS 2431 (EX.m)

NON SPARKING AS 2380.9 (EX.m)

OIL IMMERSION (EX.o)

PRESSURISED ROOM (AS 2380.4) (EX.p)

SAND FILLED (EX.s)

FLAME PROOF ENCLOSURE (EX.d)

INTRINSIC SAFETY AS 2380.7 (EX.L)

VENTILATION
AS 1482 (EX.V)

SPECIAL
PROTECTION
AS 1826 (EX.s)

INCREASED
SAFETY
AS 2380.6
(EX.e)

WIRING RULE PRACTICE

FIND THE FOLLOWING CLAUSES IN RULE BOOK

- PROTECTION TECHNIQUES FOR CLASS I AREA
- PROTECTION TECHNIQUES FOR CLASS II AREA

CLASS II

USE VENTILATION

EQUIPMENTS & WIRING SYSTEMS NOT PERMITTED
IN HAZARDOUS AREA

- BATTERY CHARGER
- LOW PRESSURE - SODIUM VAPOUR DISCHARGE LAMP
- EQUIPMENTS CONTAINING LIQUID DIELECTRIC WITH
A FLASH POINT LESS THAN 250°C.
- BARE CONDUCTORS
- OPEN WIRING
- EARTH SHEATH RETURN (ESR) WIRING SYSTEM

- CABLE TRUNKING
- BUSWAYS
- AERIAL WIRING SYSTEMS
- LOW AND EXTRA LOW VOLTAGE TRACK SYSTEM

NOTES

G008 / G008 GENERAL NOTES (1)
PART (2)

G008 / G008 GENERAL NOTES (1)
PART (3)

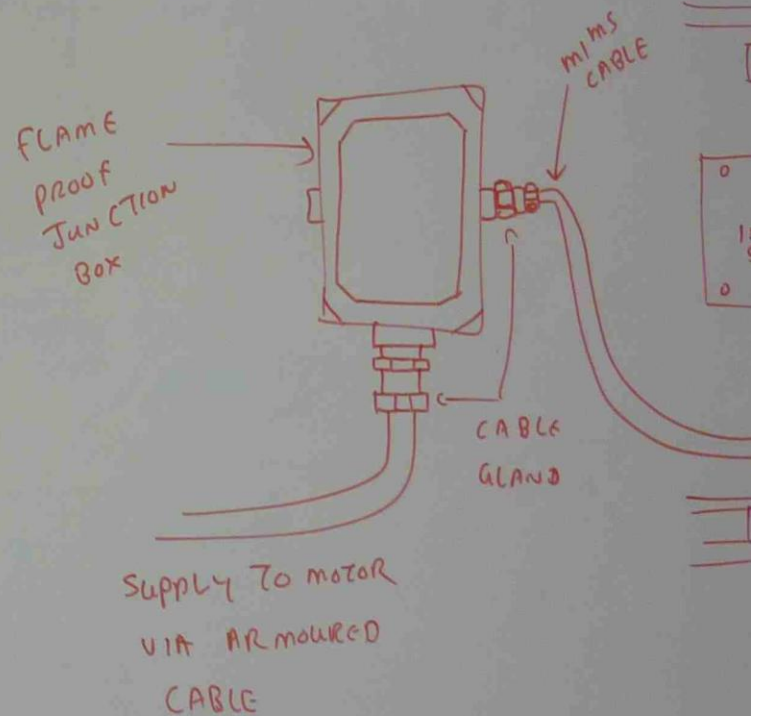
G008 / G008 GENERAL NOTES (1)
PART (4)

TABLE 20.1 EXPLOSION PROTECTION
TECHNIQUES

TABLE 20.5 GUIDE TO INSTALLATION
DIAGRAMS

GENERAL EQUIPMENTS MODIFICATION AND MAINTENANCE

EXPLOSION PROTECTION



WIRING RULES

FIND THE C

- PROTECTION

- FUSE, CIRCUIT

- CABLE TRUNKING
- BUSWAYS
- AERIAL WIRING SYSTEMS
- LOW AND EXTRA LOW VOLTAGE TRACK SYSTEM

NOTES

G008 / G008 GENERAL NOTES (1)
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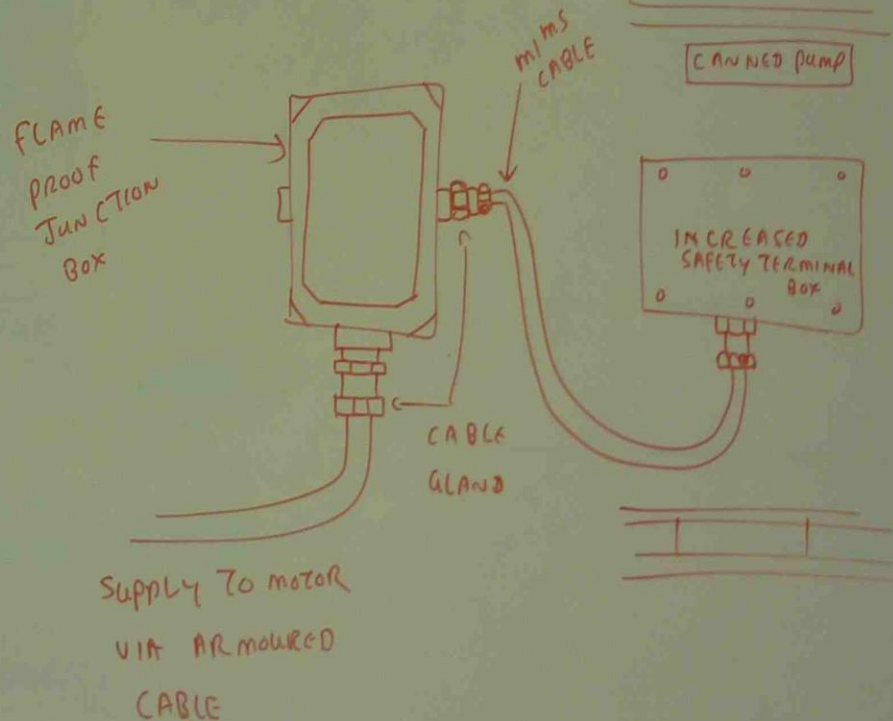
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TABLE 20.1 EXPLOSION PROTECTION
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TABLE 20.3 GUIDE TO INSTALLATION
DIAGRAMS

GENERAL EQUIPMENTS MODIFICATION AND MAINTENANCE

EXPLOSION PROTECTION



WIRING RULE PRACTICE

FIND THE CLAUSES FOR THE FOLLOWING:

- PROTECTION FROM FLAME & MECHANICAL
- FUSE, CIRCUIT BREAKER, T.C.E. A

FUSE

I

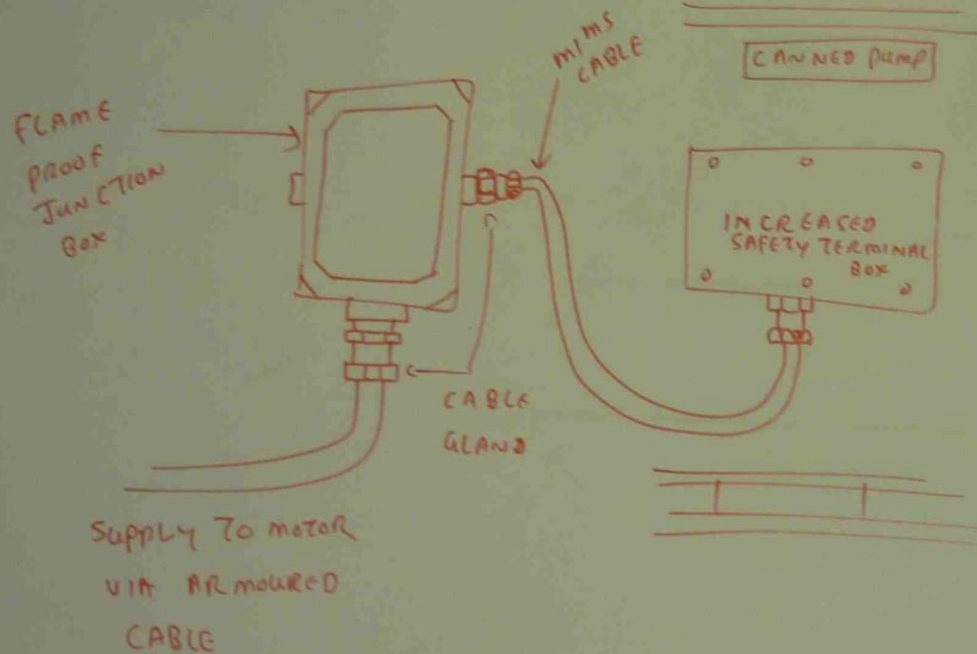
FUSE SHO
CURRENT
MAXIMUM

Types of F

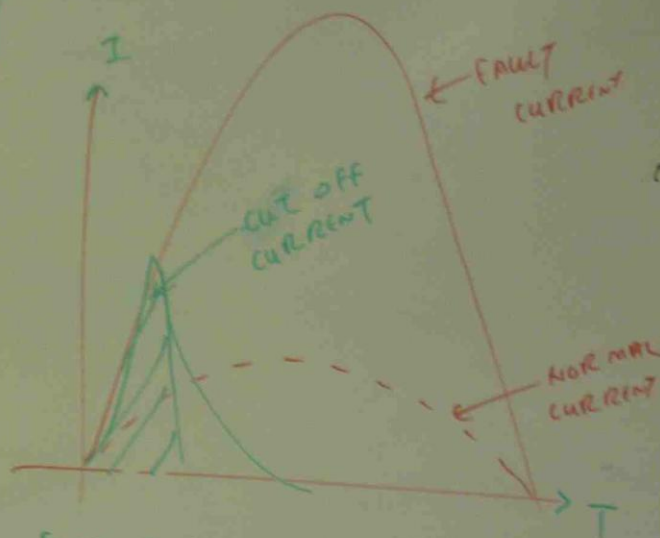
- Semi EN
- HRC F

GENERAL EQUIPMENTS MODIFICATION AND MAINTENANCE

Explosion Protection



FUSE



FUSE SHOULD CUT OFF THE CURRENT WHEN 25% OF MAXIMUM CURRENT HAPPENS

TYPES OF FUSE

- SEMI ENCLOSED REWINDABLE FUSE
- HRC FUSE

WIRING RULE PRACTICE

FIND THE CLAUSES FOR THE FOLLOWINGS:

- PROTECTION FROM FLAME & MECHANICAL DAMAGE
- FUSE, CIRCUIT BREAKER, TYPE, APPLICATION, SELECTION

EOL

ACCIDENT PREVENTION, ACCIDENT INVESTIGATION

RESCUE, FIRST AID

IMPORTANT ASPECTS OF ELECTRICAL INSTALLATION
SAFETY ARE

- EMPLOYEE RESPONSIBILITY
- SAFE INSTALLATION
- SAFE WORK PRACTICE
- EMPLOYEE TRAINING

EMPLOYEES RESPONSIBILITY

- DETERMINE THE NATURE AND EXTENT OF HAZARDS BEFORE STARTING A JOB
- EACH EMPLOYEE MUST BE SATISFIED THAT CONDITIONS ARE SAFE BEFORE BEGINNING WORK ON ANY JOB (OR) PART OF THE JOB
- ALL EMPLOYEES MUST BE THOROUGHLY FAMILIAR WITH AND SHOULD CONSISTENTLY USE THE WORK PROCEDURES AND

- SAFETY EQUIPMENTS REQUIRED FOR THE PERFORMANCE OF THE JOB AT HAND
- WHILE WORKING, EACH EMPLOYEE SHOULD CONSIDER THE EFFECTS OF EACH STEP AND MUST NOT ENDANGER THEMSELVES OR OTHERS.
- THEY SHOULD BE FAMILIAR WITH EMERGENCY PROCEDURES.

INSTALLATION SAFETY

PROPER DESIGN OF ELECTRICAL SYSTEM CONSISTS OF SELECTION, INSTALLATION AND CALIBRATION.

ELECTRIC EQUIPMENT — CHECK MAXIMUM RATING

EQUIPMENTS INSTALLATION — SAFE AND SENSIBLE MANNER.

- ADEQUATE WORK SPACE FOR SAFETY CLEARANCE.
- SAFETY BARRIERS MUST BE PROVIDED AS NECESSARY.

EQUIPMENTS CALIBRATION — PROPER CALIBRATION TO AVOID HAZARDS.

EQUIPMENTS MAINTENANCE — PERIODICALLY INSPECTED AND TESTED. THEY SHOULD BE REPLACED, REPAIRED, ADJUSTED.