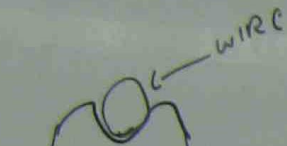
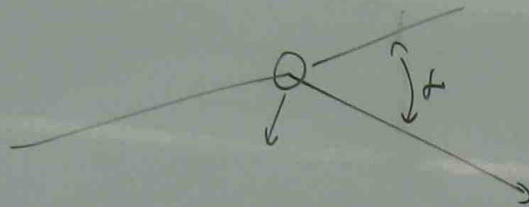


## LINE DEVIATION



CROSS ARM



$$\text{RESULTANT FORCE ON PIN} = 2T \sin \frac{\alpha}{2} + w_t l \cos \frac{\alpha}{2}$$

$$w_t = \text{WIND LOAD ON CONDUCTOR} \frac{\text{N}}{\text{m}} = \text{WIND PRESSURE} \times \text{DIAMETER OF CONDUCTOR} \times 1 \text{m LENGTH}$$

$$l = \text{LINE SPAN (m)}$$

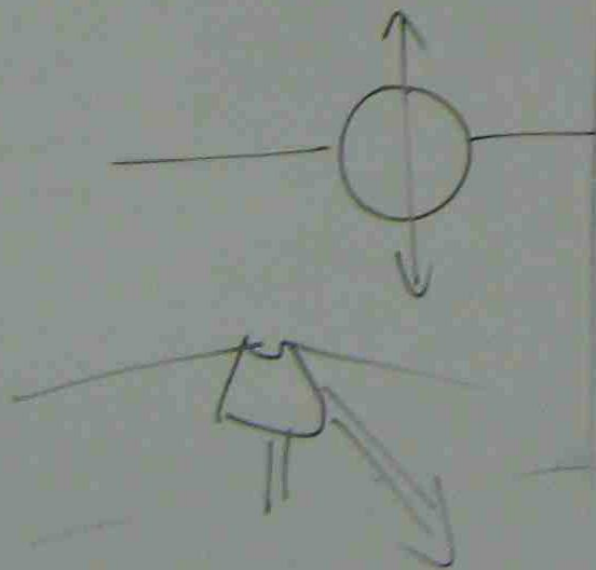
$$\alpha = \text{ANGLE OF LINE DEVIATION (PERMISSIBLE)}$$

## REG (2) PROTECTION AGAINST CORROSION

ALL IRON AND STEEL FITTINGS MUST BE PROTECTED BY GALVANIZING (OR) OTHER SUITABLE MEANS. IT IS NECESSARY TO HAVE A MINIMUM DEPOSIT OF 160 gms OF ZINC/Sq.m AND HOT DIP GALVANIZING SHOULD BE CALLED FOR ANY SPECIFICATION FOR LINE.

## REG (3) INSULATOR

PIN INSULATOR MUST NOT BE USED FOR TERMINATION OR STRAIN CONSTRUCTION.



pb  
 DETERMINE THE MAXIMUM DEVIATION ALLOWED ON 11 kV PIN INSULATOR FOR A 7/3.50 HARD DRAWN COPPER CONDUCTOR WITH A SPAN OF 150m. THE ULTIMATE STRENGTH OF THE CONDUCTOR IS 26600 N. THE WIND LOAD IS TO BE TAKEN AS 500 PA AND THE DIAMETER OF CONDUCTOR IS 10.5 mm.

TENSION IN CONDUCTOR MUST NOT BE MORE THAN 50% OF ULTIMATE STRENGTH. TRANSVERSE LOADING ON PIN INSULATOR IS NOT TO EXCEED 40% OF ULTIMATE STRENGTH.

WIND LOAD = WIND PRESSURE  $\times$  DIAMETER  $\times$  1 m LENGTH

$$W_t = 500 \times 10.5 \times \frac{1}{1000} \times 1 \text{ m} = 5.25 \text{ N/m}$$

$$\text{PIN LOAD} = 2T \sin \frac{\alpha}{2} + W_t l \cos \frac{\alpha}{2}$$

$\alpha$  IS SMALL  
 $\cos \frac{\alpha}{2} \approx 1$

$$\text{PIN LOAD} = 2T \sin \frac{\alpha}{2} + W_t l$$

$$\frac{40}{100} \times 11000 = 2 \times 0.5 \times 26600 \times \sin \frac{\alpha}{2} + 5.25 \times 150$$

$$\sin \frac{\alpha}{2} = \frac{3612.5}{26600}$$

$$\frac{\alpha}{2} = \sin^{-1} \frac{3612.5}{26600} = 7.8^\circ$$

$$\alpha = 15.6^\circ$$

REG 14

LOADING CONDITION

WIND LOAD = 500 PASCAL

REG 15

AERIAL CONDUCTOR

ALL CONDUCTORS MUST BE STRANDED AND  
ALL NORMALLY AVAILABLE MATERIALS ARE  
ALLOWED

REG. 16

SAG & TENSION

THE CONDITION SPECIFIED IN THIS MUST BE  
KNOWN

REG 17

FOUNDATION

THE FOUNDATION FOR SUPPORT FOR  
AERIAL CONDUCTORS MUST BE CAPABLE OF  
BEARING ANY LOAD TO WHICH THEY  
ARE LIKELY TO BE SUBJECTED.

## STAYING OF POLE

STAYING OF pole is usually necessary on high voltage lines and terminations and all intermediate poles where there is a large deviation in the line.

Similar staying may also be needed for poles with lines up to 650 V if the soil is of poor bearing quality.

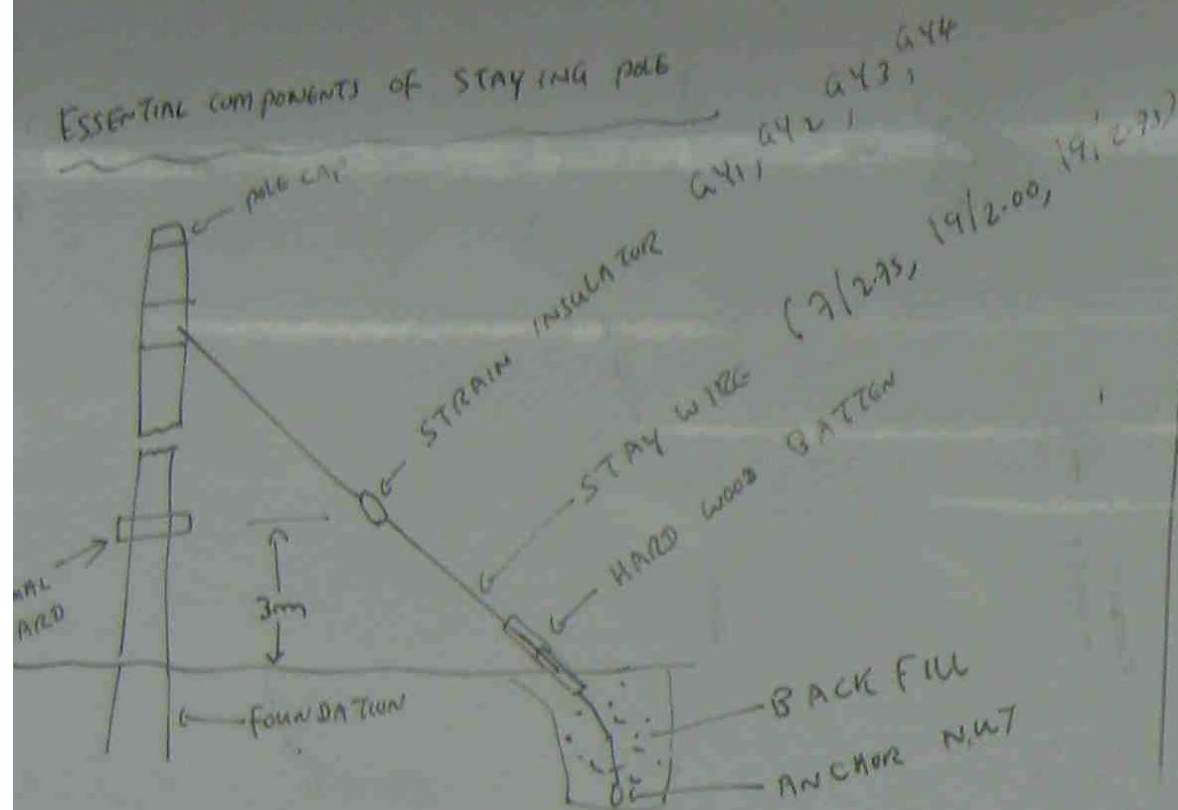
## SUPPORT

% of ultimate strength of various parts of over head line

STEEL = 50% , WOOD = 25% , STAY WIRE = 40%  
INSULATOR



## ESSENTIAL COMPONENTS OF STAYING POLE



## DIFFERENT CIRCUIT

SHOULD NOT BE LESS THAN 0.6m UP TO & INCLUDING 650V AND 1.2m UP TO & INCLUDING 33KV.

## REG (28) SIZE OF CONDUCTOR

650V  $\rightarrow$  7 / 1.25 FOR COPPER

7 / 1.75 FOR ALUMINIUM / ALUMINIUM ALLOY

## REG (33) SEPARATION OF CONDUCTORS

$$S = 0.0076 + 0.3 \sqrt{D - 2.13} + 0.083 \sqrt{D} \times \frac{d^2}{W_r}$$

S = EQUIVALENT HORIZONTAL SPACING (m)

D = SAG AT S.O.C, NO WIND

d = OVER ALL DIAMETER OF CONDUCTOR (mm)

$W_r$  = RESULTANT LOAD (N/m)

### MINIMUM SEPARATION

Up to 11kV  $\rightarrow$  0.38m

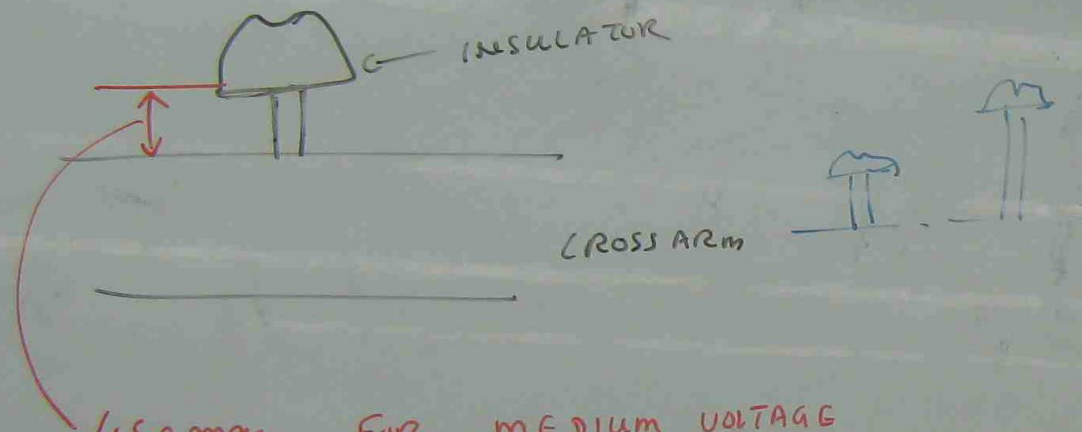
EXCESS 11kV

$0.38 + \frac{10 \text{ mm}}{\text{kV}} \times \text{EXCESS kV}$

FOR 15 kV

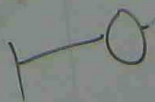
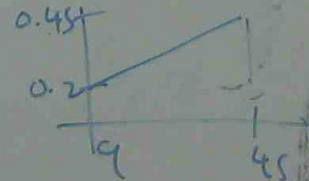
$$0.38 + \frac{10}{1000} \times (15 - 11)$$

# DISTANCE BETWEEN INSULATOR AND CROSS ARM



450 mm FOR MEDIUM VOLTAGE  
600 mm FOR 11KV

SPAN	SPACING
NOT EXCEEDING 9m	0.2 m
EXCEEDING 45m & NOT EXCEEDING 60m	0.45m



REG 35

AUTOMATIC DEVICE SHOULD OPERATE WITHIN

(650 V)

### REVIEW QUESTION 2)

(1) WHAT ARE THE FACTORS THAT DETERMINE THE CURRENT RATING OF A CABLE

(2) HOW WILL YOU REDUCE THE STRESS ON CABLE

(1) THE CURRENT RATING OF CABLE IS DETERMINED BY

(a) THERMAL CAPACITY OF CABLE

(b) THE VOLTAGE DROP

(c) SHORT CIRCUIT CAPACITY

## (2) TO REDUCE STRESS

- (1) STAND PROPERLY
- (2) CAREFUL IN BENDING / CUTTING / REMOVING INSULATION
- (3) PROPER PROCEDURE IN CONNECTION
- (4) TAKE ACCOUNT IN EXTERNAL CONDITIONS
- (5) TAKE ACCOUNT ON TEMPERATURE
- (6) TAKE ACCOUNT ON INSTALLATION CONDITIONS
- (7) SET THE APPROPRIATE TENSION OF CONDUCTOR
- (8) SELECT THE APPROPRIATE MATERIALS TO ENCLOSE CABLE