

Appendix –A

9.0 Calculation of Load on the Feeder Suspension Insulators:

The calculation of total load on the feeder suspension insulators has been worked out as under:

9.1 Parameters Considered -

- 9.1.1 Initial tension in feeder wire (T) =500kgf (as per RDSO drg no. ETI/OHE/G/05600)
- 9.1.2 Wt of feeder wire=0.652kg/m, Span length=72m
- 9.1.3 String insulator weight (4nos) = 6*4 = 24kg
- 9.1.4 Wt of Cross arm (self + fittings) =10+10=20 kg for approximate length 1.5m
- 9.1.5 Wind Load of feeder wire= $0.75 * 0.01992 * 72 * 178 = 191.47$ kg
- 9.1.6 Vertical load component in feeder wire= $T \sin 30^\circ = 250$ kg
- 9.1.7 Horizontal load component in feeder wire= $T \cos 30^\circ = 433$ kg
- 9.1.8 Maximum Radius of curvature = 2200m
- 9.1.9 Length of 4 disc insulators = 540mm= 0.54m

- (a) **Total Vertical load:** Load of string insulators + Wt. of Feeder wire for 72m span +Vertical component + Wt. of Cross arm along with fittings/fasteners
= $24 + (0.652 * 72) + 250 + 20 = 340.944 = \mathbf{341}$ kg (say)

Total Vertical load = 341 kg

- (b) **Total Horizontal load** (at 30° angle) =Wind Load on Feeder wire + Radial Pull in Feeder wire for 72m span (LT/R) + Horizontal load component in feeder wire
Horizontal load component = $191.47 + 17 + 433 = 641.47 = \mathbf{642}$ kg (say)

- (c) **Maximum Tensile load for Feeder Anchor:** Tension in Feeder wire + Wind Load on Feeder wire + wind load on string insulators + Radial Pull in Feeder wire (LT/R) at supports + Force due to thermal contraction (20° variation) = $500 + (0.75 * 0.01992 * 1000 * 178) + (4 * 22 * 0.146 * 0.28 * 178 / 2) + 16.36 * 22 + 6625 = 500 + 2659.32 + 320.2 + 360 + 6625 = 10463.52$ kg = **102.75kN** (i.e. >70kN)

(Feeder Tension length to be 1000m)

Therefore, disc insulator for feeder anchor location should be of **120kN** or higher.

9.2 Bending moment calculation -

- 9.2.1 Due to vertical load = Vertical load * Lever arm = $341 * 1 = 341$ Kg-m
- 9.2.2 Due to horizontal load = Horizontal load * lever arm + wind load on disc insulators
= $642 * 0.54 = 346.68 + 20$ (approx. bending moment on string insulators) = 366.68 Kg-m
Total bending moment = $341 + 366.68 = 707.68$ Kg-m

9.3 Safety check of cross arm fitted on feeder mast:

- 9.3.1 Stress due to axial/vertical load (σ_{ac}) = Vertical load (V) / Area of cross section (A)
= $341 / 12.2 = 27.95$ kg/cm² < 1500 kg/cm² (Permissible axial stress = 0.6fy as per IS: 800-1984, where fy=250 MPa).

Hence, cross arm is safe in axial stress.

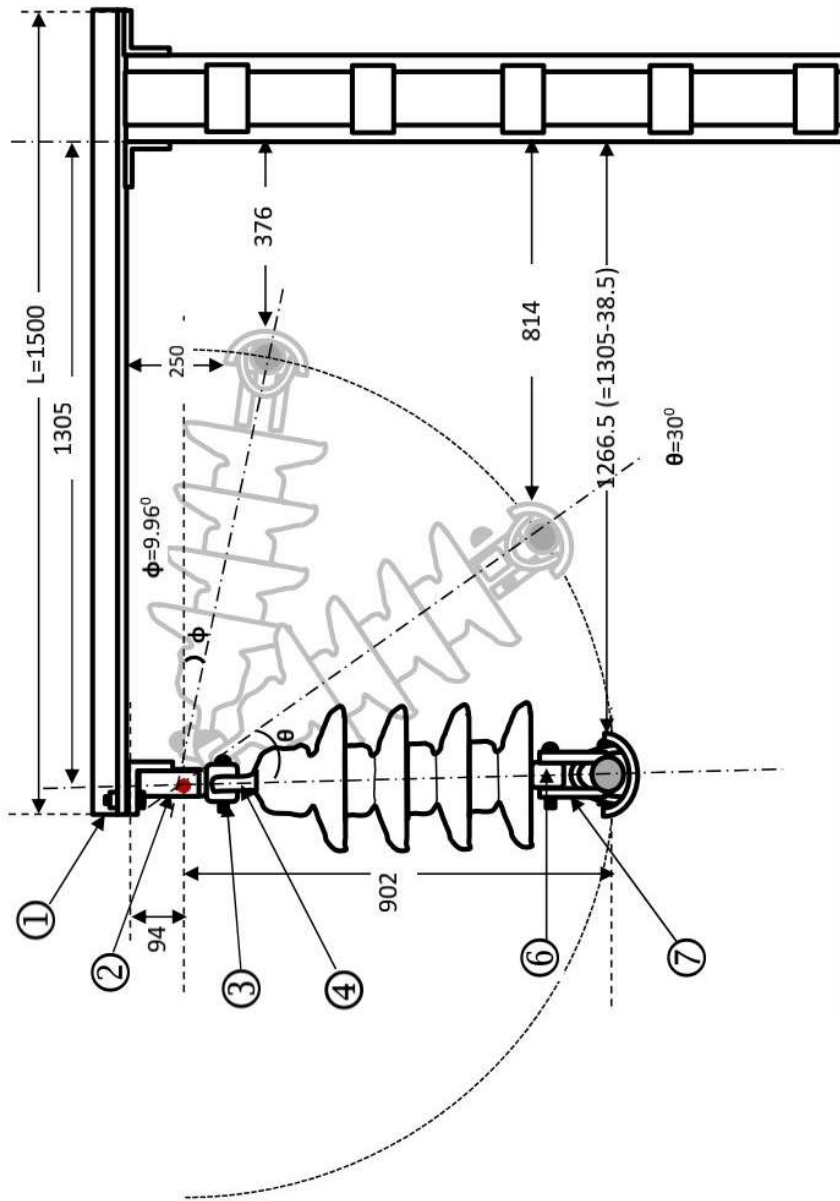
- 9.3.2 Stress due to bending stress (σ_{bc}) = Total bending moment (M) / Sectional modulus of cross arm (Z)
= $707.68 * 100 / 33.5 = 2112.5$ kg/cm² < 2200 kg/cm² (Permissible axial stress = 0.66fy * 1.33 due to wind as per IS: 800-1984, where fy=250 MPa).

Hence, cross arm is safe in bending stress.

.....XXX.....

ANNEXURE-A

FEEDER WIRE SUSPENSION ARRANGEMENT WITH 70kN DISC INSULATORS



CALCULATION OF LENGTH OF SUSPENSION STRING

SN	ITEM DESCRIPTION	4 Disc Insulators of CD=320 (mm)	3 Disc Insulators of CD= 430 (mm)
1	CROSS ARM 1.5/2.8M LONG-RDSO DRG C/P/8022	L=1500	L=1500
2	SUSPENSION SUPPORT ANGLE – RDSO DRG C/P/8014	94	94
3	18MM CLEVIS-RDSO DRG P/5041-1	85	85
4	BALL AND EYE-RDSO DRG P/6068	65	65
5	STRING INSULATOR- (146x4/146x3)	584	438
6	SOCKET AND EYE (16mm)	53	53
7	LARGE SUSPENSION BRACKET-RDSO DRG P/1580	75+40=115	75+40=115
8	Total Suspension Length $[(3)+(4)+(5)+(6)+(7)]$	902	756
9	Distance between suspension and face of super mast(L-55-140)	1305	1305
10	Minimum Vertical clearance (250mm)	250	250
11	Min. horizontal clearance $[(9)-(8)*\sin(80.1)-40$ (bolt projection)]	376	617
12	Horizontal clearance at 30° suspension angle $[(9)-(8)*\sin 30]$	814	887

NOTE:

- (1) The feeder wire should be aligned in such a way to get the maximum angle of deviation do not exceed 30° from the vertical axis.
- (2) The minimum length of cross arm shall be 1.5m.
- (3) The super mast length shall be selected as per the clearances at the site.
- (4) The movement between clevis and eye should be free and the same shall be ensured at the time of erection
- (5) Disc insulators of CD=320mm or 430mm (4 or 3 nos respectively) may be used as per the availability.
- (6) The required components for suspension string may be purchased from RDSO or PGCIL approved suppliers.

Signature Not Verified

Digitally signed by
PRAMOD KUMAR
DUBEY
Date: 2026.06.05
15:46:00 IST
Reason: IRE PS-CRIS
Location: New Delhi

The drawing illustrates two styles of a cable-stayed bridge deck. **STYLE - 1** is shown on the left, and **STYLE - 2** is shown on the right. Both styles feature a central longitudinal beam (1) and a series of transverse beams (2) supporting the deck. The deck is composed of multiple segments (3) connected by joints (4). The top view of **STYLE - 2** shows the following dimensions:

- Overall width: 330
- Distance from centerline to the outer edge of the deck: 165
- Distance from centerline to the center of the transverse beam: 140
- Distance from centerline to the center of the cable anchor: 280

The components are numbered as follows:

- Longitudinal beam
- Transverse beam
- Deck segment
- Joint
- Anchor
- Support
- Support
- Support
- Support

SN	ITEM DESCRIPTION	Style-1	Style-2
1	18MM SINGLE CLEVIS - RDSO ETI/OHE/P/5040	01	01
2	9-T ADJUSTER (BOTH END CLEVIS) - RDSO ETI/OHE/P/5020-2	01	01
3	YOKE PLATE (330MM) FOR 120KN	-	02
4	BALL EYE (11500Kgf) - RDSO ETI/OHE/P/6068-1	01	-
5	BALL EYE (7000kgf) - RDSO ETI/OHE/P/6068	-	02
6	DISC INSULATORS - 280mm WIDTH (Max)	120kN	70kN
6(a)	STRING OF 4-DISC INSULATORS (Sets)	01	02
7	SOCKET AND EYE (11500Kgf) - Forged	01	-
8	SOCKET AND EYE (7000Kgf) - RDSO ETI/OHE/P/6069	-	02
9	STRAIN CLAMP (20mm) - RDSO ETI/OHE/P/1600	01	01

NOTE:

- (1) Feeder wire anchoring may be done as per Style -1 or Style-2 may be used as per the site conditions and availability of disc insulators.
- (2) The movement between clevis and eye should be free and the same shall be ensured at the time of erection
- (3) Disc insulators of CD=320mm or 430mm may be used as per the availability.
- (4) The required components for which there is no RDSO drawing, may be purchased from PGCIL approved suppliers.
- (5) The maximum tension length of feeder wire shall be restricted to 1000m for both the arrangements.