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015
SPECIFICATION P-140:82

SUSPENSION STRINGS



PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY
(DESIGN DEPARTMENT POWER)

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text suggests that organizations should implement robust systems to track every aspect of their operations, from procurement to sales.

2. The second section focuses on the role of technology in modern business management. It highlights how digital tools can streamline processes, reduce errors, and improve overall efficiency. The author argues that embracing technology is not just a competitive advantage but a necessity for long-term success in today's fast-paced market.

3. The third part of the document addresses the challenges of human resource management. It discusses the importance of recruiting and retaining top talent, as well as the need for continuous training and development. The text provides insights into how organizations can create a positive work environment that fosters innovation and productivity.

4. The fourth section explores the impact of market trends and external factors on business performance. It encourages organizations to stay informed about industry developments and to adapt their strategies accordingly. The author stresses that flexibility and a proactive approach are key to navigating uncertainty and seizing opportunities.

5. The final part of the document concludes with a call to action, urging leaders to take responsibility for their decisions and to strive for excellence in all aspects of their work. It reiterates the importance of integrity, honesty, and a commitment to the well-being of all stakeholders.

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PRINTING HISTORY

First approved on. 21.7.80

First revision on December, 1982.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text suggests that organizations should implement robust systems to track every detail, from small expenses to major investments.

2. The second section addresses the challenges of data management in a rapidly changing environment. It notes that as the volume of data increases, the complexity of managing it also grows. The author argues that organizations must invest in advanced technologies and skilled personnel to effectively handle this information. This includes not only storage but also the ability to analyze and interpret the data for strategic decision-making.

3. The third part of the document focuses on the role of leadership in fostering a culture of innovation and risk-taking. It states that leaders must encourage their teams to think creatively and explore new possibilities, even if it means taking calculated risks. The text provides examples of successful companies that have thrived by embracing change and innovation, highlighting the importance of a supportive and flexible organizational structure.

4. The fourth section discusses the importance of continuous learning and development for all employees. It argues that in a competitive market, organizations must ensure that their workforce is constantly updating its skills and knowledge. This can be achieved through various means, including formal training programs, workshops, and on-the-job learning opportunities. The author stresses that a commitment to learning is a key factor in long-term success.

5. The final part of the document concludes by summarizing the key points discussed and offering final thoughts on the future of business. It reiterates the importance of adaptability, innovation, and a strong focus on the customer. The author expresses optimism about the future, provided that organizations continue to evolve and embrace the challenges ahead.

SPECIFICATION P-140: 82

SUSPENSION STRINGS

0 FOREWORD

- 0.1 This standard has been introduced by WAPDA and has been prepared by the Transmission Line Section of the office of the Chief Engineer (Design).
- 0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.
- 0.3 This specification is subject to periodic revision as and when required.

1 SCOPE

- 1.1 This specification covers the hardware of suspension strings for transmission lines.

2 TYPES OF SUSPENSION STRINGS

- 2.1 Suspension string described in this specification are of the following types:

Description	String Designation	Cond:O.D. (mm)
a) Single Suspension string for "DOG"	SS-D	14.2
b) Single Suspension string for "LYNX"	SS-L	19.5
c) Single Suspension string for "CUCKOO"	SS-C	27.7
d) Single Suspension string for "RAIL"	SS-R	29.6
e) Single Suspension string for "CARDINAL"	SS-CA	30.4
f) Double Suspension string for "DOG"	DS-D	14.2
g) Double Suspension string for "LYNX"	DS-L	19.5
h) Double Suspension string for "CUCKOO"	DS-C	27.7
i) Double Suspension string for "RAIL"	DS-R	29.6
j) Double Suspension string for "CARDINAL"	DS-CA	30.4

The hardware used in the suspension string described above in this specification has been designated by the code numbers. These codes have been assigned in the following manner:

- i) The first letter 'S' stands for single and 'D' for Double.
- ii) The next letter 'S' stands for Suspension.
- iii) The succeeding letters stand for the name of conductor for which the hardware is meant for i.e. 'D' for Dog 'L' for Lynx, 'C' for Cuckoo, 'R' for Rail and 'CA' for Cardinal.

3 RATINGS OF HARDWARE

3.1 The hardware shall be of the ratings as specified in Table-I and Table-II below:

TABLE - I

RATINGS OF HARDWARE FOR SINGLE SUSPENSION STRING

Sr. No.	Description	Failing Load Kg.				
		SS-D	SS-L	SS-C	SS-R	SS-CA
1.	Ball hook	8000	8000	12000	12000	16000
2.	Socket eye	8000	8000	12000	12000	16000
3.	Arcing Horn	150	150	150	150	150
4.	Suspension Clamp:					
	i) Resistance to Conductor slippage	600	1500	2500	2500	3350
	ii) Vertically applied load	8000	8000	12000	12000	16000

TABLE - II

RATINGS OF HARDWARE FOR DOUBLE SUSPENSION STRING

Sr. No.	Description	Failing Load Kg.				
		DS-D	DS-L	DS-C	DS-R	DS-CA
1.	Ball Hook	12000	12000	20,000	20,000	25,000
2.	Socket Clevis Type A	12000	12000	20,000	20,000	25,000
3.	Yoke Plates	12000	12000	20,000	20,000	25,000
4.	Ball Clevis	8000	8000	12,000	12,000	16,000
5.	Socket Clevis Type B	8000	8000	12,000	12,000	16,000

Sr. No.	Description	Failing Load Kg.				
		DS-D	DS-L	DS-C	DS-R	DS-CA
6.	Arcing Horn Bottom	150	150	150	150	150
7.	Eye Clevis	12000	12000	20,000	20,000	25,000
8.	Suspension Clamp:					
	i) Resistance to Conductor slippage	600	1500	2,500	2,500	3,350
	ii) Vertically applied load	8000	8000	12,000	12,000	16,000

4 GENERAL REQUIREMENTS

4.1 Each single suspension string hardware shall consist of:

- 1 Self locking ball hook
- 1 Socket eye
- 1 Arcing horn bottom
- 1 Non magnetic suspension clamp

4.2 Each double suspension string hardware shall consist of:

- 1 Self locking ball hook
- 1 Socket clevis type 'A'
- 2 Yoke plates
- 2 Ball clevis
- 2 Socket clevis type 'B'
- 1 Arcing horn
- 1 Eye clevis
- 1 Suspension clamp

4.3 The ball and socket shall be of size IEC, 16mmA, and shall conform to WAPDA Specification P-8:82 (latest revision).

4.4 All ferrous parts shall be hot dip galvanized in accordance with WAPDA Specification P-82:81 (latest revision).

4.5 The parts of hardware that mate with each other shall not have a play clearance of more than 2mm.

5 DIMENSIONS AND TOLERANCES

All hardware shall generally be in accordance with drawings forming a part of this Specification.

The dimensions of these parts of hardware that mate with other hardware or that determine the length of insulator string are binding and are shown enclosed on the drawing.

For dimensions that are fixed and binding the tolerance

will be plus or minus 2 percent with a maximum of 0.8mm. For dimensions that are shown as Max. or Min. there shall be no plus and minus tolerance respectively. The tolerance in the opposite sense may however be 4%.

6 DESIGN AND MATERIAL

6.1 Self Locking Ball Hook

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. The detail dimensions shall be according to Drawing No. PDW/DF-315.

6.2 Socket Eye

It shall be made from drop forged steel or malleable iron of suitable grade. It shall be hot dip galvanized. The detail dimension shall be according to Dwg. No. PDW/DF-316. It shall be supplied with a split pin made from half round brass wire protected against corrosion by appropriate coating and shall be able to work under hot line conditions.

6.3 Socket Clevis

These shall be made from drop forged steel or malleable iron of suitable grade. These shall be hot dip galvanized and shall be made according to Dwg. No. PDW/DF-376 and PDW/DF-378. The socket shall be supplied with a split pin made from half round brass wire protected against corrosion by an appropriate coating and shall be able to work under hot line conditions. The clevis shall be supplied with rivet round headed with aluminium alloy round washer and straight split pin. The split pin shall be made from cadmium plated brass or copper.

6.4 Yoke Plates

Yoke plates shall be of mono block or flat type and shall be made from high grade steel, hot dip galvanized and subject to normalizing process and shall be made according to Drawing No. PDW/DF-377.

6.5 Ball Clevis

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. It shall be made according to Dwg. No. PDW/DF-382.

6.6 Arcing Horn

It shall be made from drop forged mild steel and shall be hot dip galvanized. The dimensions shall be according to

Drawing No. PDW.DF-317. The tolerance on the length shall be 5% with a maximum of 15mm.

6.7 Eye Clevis

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. The detail dimensions shall be according to Dwg. No. PDW/DF-379. The clevis shall be supplied with rivet round headed with aluminium alloy round washer and straight split pin. The split pin shall be made from cadmium plated brass or copper.

The eye shall be supplied with a split pin made from half round brass wire protected against corrosion by an appropriate coating and shall be able to work under hot line conditions.

6.8 Conductor Suspension Clamps

Suspensions clamps shall be so designed that the effect of vibration, both on the conductor and on the fitting itself, are minimised. They shall be designed, manufactured and finished so as to avoid sharp radius of curvature, ridges and out growths which might lead to localized pressure or damage to the conductor in service. The clamp shall permit the conductor to slip before failure of the conductor occurs. The clamps shall have sufficient contact surface to minimize damage due to fault current.

The wire groove diameter shall be within the limits of 1.0 and 1.15 times the diameter of the conductor. Suspension clamp shall be made according to Dwg. No. PDW/DF-318. The bodies and keepers shall be of cast or forged high strength corrosion resistant aluminium alloy. Connecting pieces, bolts, nuts and locks washers shall be made of hot dip galvanized steel. Cotter pins shall be made of stainless steel. Edges and corners shall be rounded to minimise field contractions and radio interference.

7 TESTS

7.1 Type Tests

Type tests are intended to verify and established design characteristics. They shall be made once only on hardware identical in all essential details with those to be supplied.

The following type tests shall be carried out in according with clause 8.9 and 10.

- | | | | |
|-----|---------------------------------------|---|--------------------------|
| i) | Mechanical Test |) | On each individual item |
| | |) | or hardware |
| ii) | Resistance to conductor slippage test |) | On suspension clamp only |

- iii) Corona Test) For complete insulator String.

7.2 Sample Tests

Sample tests shall be made to verify the quality and workmanship. The following sample test shall be performed in accordance with clause 8, 9, 11, 12, & 13.

- | | | | |
|------|---------------------------------------|---|--------------------------|
| i) | Visual examination |) | |
| ii) | Verification of dimensions |) | On each item of hardware |
| iii) | Mechanical test |) | |
| iv) | Resistance to conductor slippage test |) | On suspension clamp only |
| v) | Galvanising test |) | On all ferrous parts |

8 MECHANICAL TEST

8.1 For Hardware Except Arcing Horn

The fitting shall be held in tensile testing machine in a manner approximating as nearly as possible to the arrangement to be used in service. A tensile load equal to one-half of the specified minimum failing load shall be applied and increased at a steady rate. Failure of the fitting shall not occur at a load less than the specified minimum failing load as per Table-I & Table-II.

8.2 For Arcing Horn

Arcing horn shall be rigidly supported in a manner approximating as nearly as possible to the arrangement in service and a load of 150 Kg shall be applied parallel to the insulator string axis at each outer extremity of the fitting. The fitting shall not fail or show any signs of distortion or over-stressing of the material.

9 RESISTANCE TO CONDUCTOR SLIPPAGE TEST

Test piece shall be assembled in accordance with manufacturer's recommendations on conductors of the size and type with which it is to be used. The assembly shall be mounted in a tensile testing machine and anchored in a manner approximating as nearly as possible to the arrangement to be used in service, precautions being taken to avoid birdcaging of the conductor. The length of conductor joint in the test assembly should preferably be not less than 100 times the overall diameter of the conductor.

A tensile load of about 50% of the minimum failing load as specified in table-I and table-II shall be applied and

the conductor shall be marked in such a way that movement relative to the fitting can easily be detected, without any subsequent adjustment of the fitting, the load shall be steadily increased to 95% of the minimum failing load and then reduced to 90% of the minimum failing load and maintained for 1 minute. There shall be no movement of the conductor relative to the fitting due to slip during this 1 minute period and no failure of the fitting.

10 CORONA TEST

Typical insulator sets completely assembled with all fittings shall be set up in a manner as nearly as possible to the arrangement to be used. A test voltage of 160kV, 100kV and 50kV shall be applied for the nominal voltage of 220kV, 132kV and 66kV respectively between the conductor and earth for five minutes during which time no corona formation shall be visible or audible with the room in complete darkness.

11 VISUAL EXAMINATION

The test samples shall be examined visually for the following defects:

Visual Examination

Examination	Defects
Material	Not as specified in relevant clauses.
Construction	Not of the shape given in relevant Dwg. Any part missing.
Finish	Galvanising not proper. Presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles.

12 VERIFICATION OF DIMENSIONS

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawings subject to the tolerance given in clause 5.

13 GALVANISING TEST

This test shall be carried out on all ferrous parts complying with the following requirements:

- i. Weight of zinc coating
- ii. Uniformity of zinc coating
- iii. Adherence of zinc coating

This test shall be performed in accordance with WAPDA Specification P-82:81 (latest revision)

14 SAMPLING PLAN ---ACCEPTANCE AND REJECTION

- I. Sampling sizes are designated by code letters.. Table-III shall be used to find the applicable code letter for the particular lot or batch size for various tests specified in this specification. While the number of units of product from each lot or batch which are to be inspected (sample size) & the criteria for determining the acceptability of the lot or batch (acceptance & rejection numbers) for different code letters can be obtained from the table-IV given below.
- II. The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units found in the first sample is equal to or less than the first acceptance number, the lot shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection number, a second sample of the size given by the plan shall be inspected. The number of defectives found in the first & the second samples shall be accumulated. If the cumulative number of defectives is equal to or less than the second acceptance number, the lot shall be acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

Table-III Sample Size

Lot or Batch Size	Sample size for Test Specified in Clause 8,9, & 13.	Sample size for dimensional and finish defects
2 to 8	A	A
9 to 15	A	B
16 to 25	A	C
26 to 50	A	D
51 to 90	B	E
91 to 150	B	F
151 to 280	B	G
281 to 500	B	H
501 to 1200	C	J

Table-IV Sample Acceptance Criteria

Sample size code letters	Sample size	Sample size	Cumulative sample size	Acceptance Number	Rejection Number
1	2	3	4	5	6
A	First Second	1 -	1 -	0 -	1 -
B	First Second	2 2	2 4	0 1	2 2
C	First Second	3 3	3 6	0 1	2 2
D	First Second	5 5	5 10	0 1	2 2
E	First Second	8 8	8 16	0 1	2 2
F	First Second	13 13	13 26	0 3	3 4
G	First Second	20 20	20 40	1 4	4 5
H	First Second	32 32	32 64	2 6	5 7
J	First Second	50 50	50 100	3 8	7 9

15

MARKING AND PACKING

The material shall be packed in wooden crates for export shipment to permit convenient handling and to protect against loss or damage to final destination. Containers (wooden crates) shall be designed for handling by forklifts, trucks and by slings around the containers. The weight of each package should be between 100 and 150 Kg.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate.

1. Quantity
2. Name of hardware item
3. Manufacturer's name

All packages shall be numbered consecutively so that total shipment can be readily determined.

16

INFORMATION TO BE SUPPLIED

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualifications:

1. Detailed fully dimensioned drawings of hardware for suspension strings.

- ii) Specification giving material grade & composition of all items of hardware.
- iii) Catalogues/literature of standardised items.
- iv) Test certificates.
- v) One complete sample of hardware for all types of suspension strings.
- vi) Detail of manufacturing & testing facilities available with manufacturers.

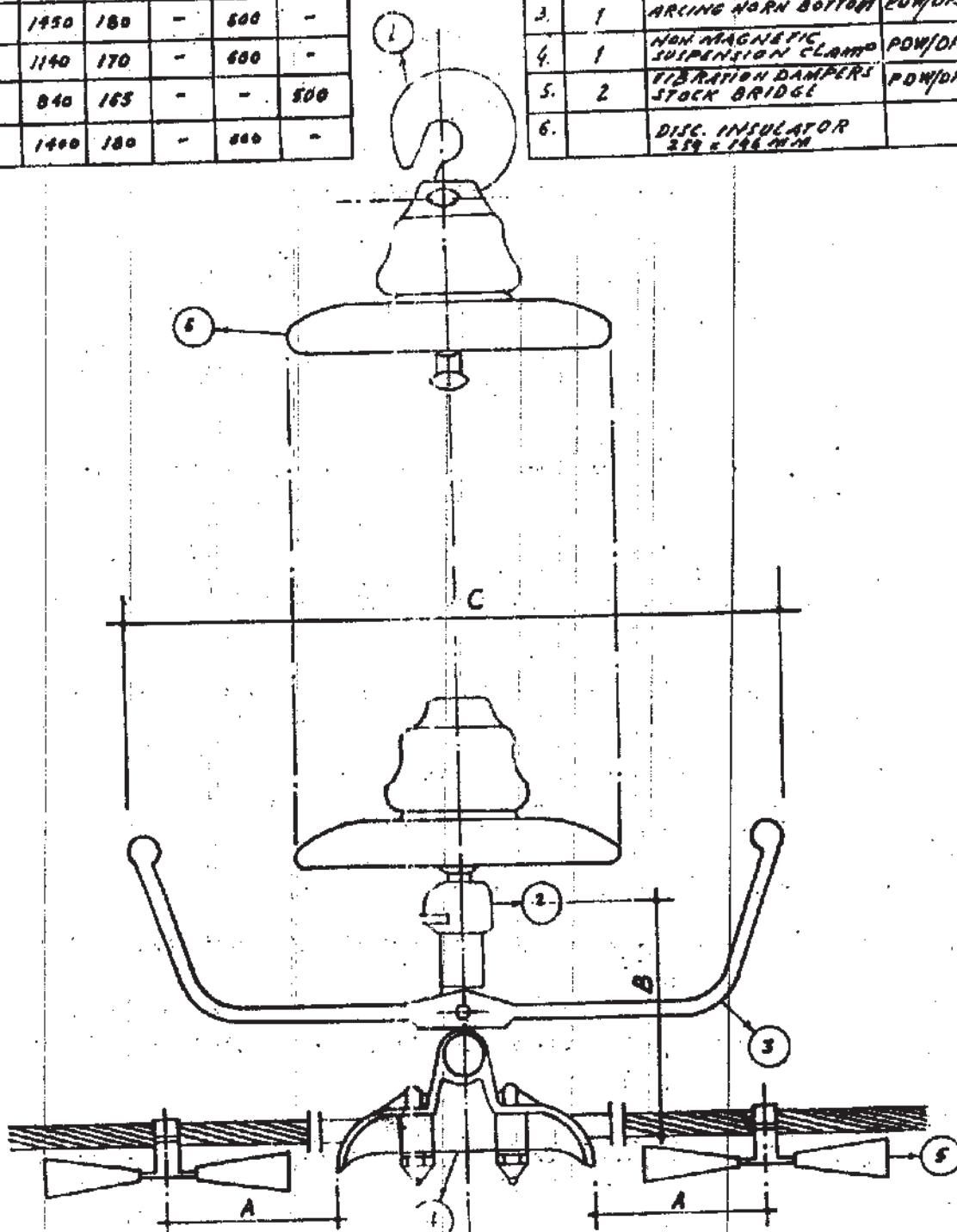
17 DRAWINGS

The following drawings form the part of this specification:

a)	Single Suspension String	PDW/DF-314
b)	Self Locking Ball Hook	PDW/DF-315
c)	Socket Eye	PDW/DF-316
d)	Arching Horns	PDW/DF-317
e)	Suspension Clamp for ACSR Conductors	PDW/DF-318
f)	Socket Clevis Type A	PDW/DF-376
g)	Yoke Plate	PDW/DF-377
h)	Ball Clevis	PDW/DF-382
i)	Socket Clevis Type B	PDW/DF-378
j)	Eye Clevis	PDW/DF-379
k)	Double Suspension String	PDW/DF-381

CONDUCTOR DESIGNATION	DIMENSIONS				
	A	B	C		
			220 KV	132 KV	66 KV
RAIL	1525	180	750	600	-
CUCKOO	1450	180	-	600	-
LYNX	1140	170	-	600	-
DOG	840	165	-	-	500
CARDINAL	1400	180	-	600	-

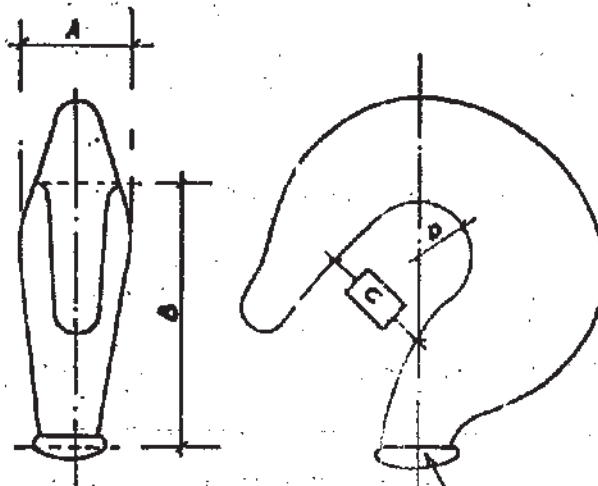
ITEM	QTY.	DESCRIPTION	REF.
1.	1	SELF LOCKING BALL HOOK	PDW/DF-315
2.	1	SOCKET EYE	PDW/DF-316
3.	1	ARCING HORN BOTTOM	PDW/DF-317
4.	1	NON MAGNETIC SUSPENSION CLAMP	PDW/DF-318
5.	2	VIBRATION DAMPERS STOCK BRIDGE	PDW/DF-322
6.		DISC INSULATOR 259 x 146 MM	



DIMENSION SHOWN IN MILLIMETRES

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR SHAH	<i>[Signature]</i>	SINGLE SUSPENSION STRING
CHECKED	GHULAM RASUL	<i>[Signature]</i>	
JUNIOR ENGINEER	HAZAR ABBAS	<i>[Signature]</i>	
SENIOR ENGINEER	A'UNAWAR-A- MALIK	<i>[Signature]</i>	
DIRECTOR	S. ISHTIAQ HUSAIN	<i>[Signature]</i>	SCALE ✓
CHIEF	SAID AKHTER	<i>[Signature]</i>	DATE 27.9.80
			DWG. NO. PDW/DF-314

1 20.7.82 DIMENSION FOR ACSS
CARDINAL CONDUCTOR ASSEMBLY



BALL SIZE IEC **16** W/A FOR DOG, LYNX
CUGRA, RAIL
BALL SIZE IEC **30** W/A FOR CARDINAL

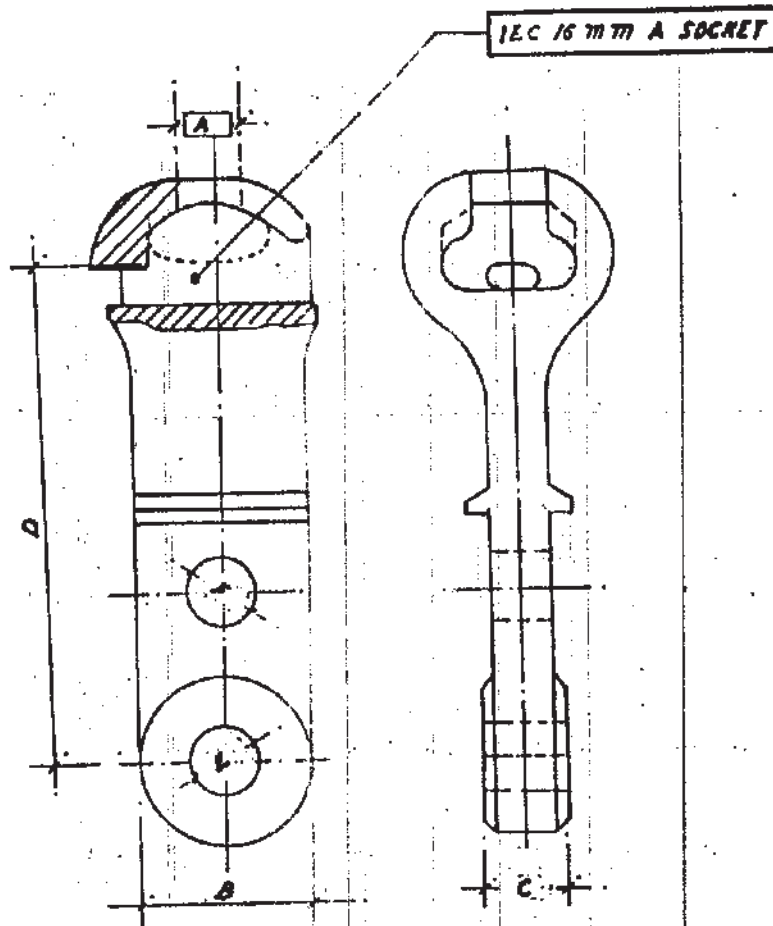
DESCRIPTION	A	B	C	D
SELFLOCKING BALL HOOK	30	60	22	14

☐ INDICATES BINDING DIMENSION

DIMENSION SHOWN IN MILLIMETRES

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT	
DRAWN	ILHAR SHAH	Checked	SELF LOCKING BALL HOOK	
CHECKED	SHAHAN RASUL	Approved		
JUNIOR ENGINEER	ILHAR ABBAS	Approved		
SENIOR ENGINEER	MUHAMMAD A. MALIK	Approved		
DIRECTOR	S. ISHTIAD HUSSAIN	Approved	SCALE	DATE 17.9.80
CHIEF	DAVID AKHTER	2	DWG. NO. PDW/DF35	

1	2-2-80	BALL SIZE FOR ACSA CARDINAL CONDUCTOR AND
2	2-2-80	REVISIONS



SOCKET EYE

DESCRIPTION	A	B	C	D	E	F
DOG LYNX	16	44.5	22	110	17.5	14
CUCKOO RAIL	16	44.5	35	110	17.5	14
CARDINAL	20	44.5	35	110	17.5	14

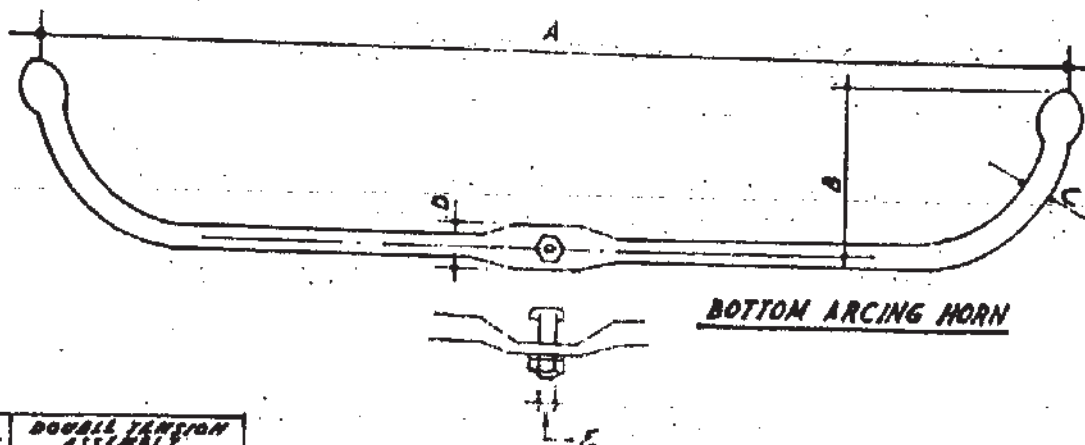
□ INDICATES BINDING DIMENSION

DIMENSION SHOWN IN MILLIMETRES

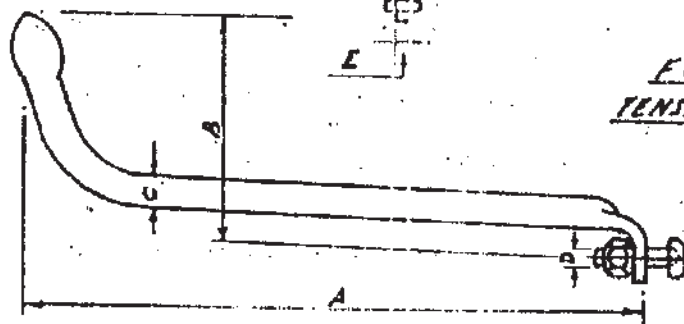
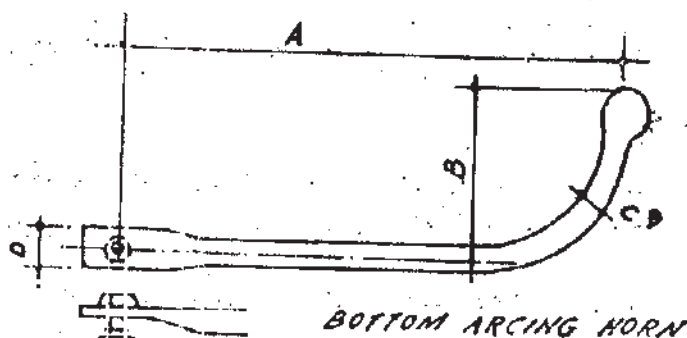
PAKISTAN				DESIGN		
WATER AND POWER DEVELOPMENT AUTHORITY				DEPARTMENT		
DRAWN	AZHAR SHAH	SOCKET EYE (FOR SUSPENSION STRING)				
CHECKED	GHULIAM RASUL					
JUNIOR ENGINEER	NATIA ABBAS					
SENIOR ENGINEER	MUHAMMAD A. MULLA					
DIRECTOR	S. ISHTIAQ HUSSAIN					
2.9.82 DIMENSIONS FOR ACSC CARDINAL ADDED.		SCALE ✓	DATE 27.9.80			
REVISIONS	27	CHIEF	JAYD AYHTER	DWG. NO PDW/DE.316		

FOR SINGLE
SUSPENSION ASSEMBLY

VOLTAGE KV	SINGLE SUSPENSION ASSEMBLY					SINGLE TENSION/DOUBLE SUSPENSION ASSEMBLY				
	A	B	C	D	E	A	B	C	D	E
66	500	110	14	30	12	250	110	14	30	12
132	600	120	14	30	12	300	120	14	30	12
220	750	125	18	30	12	375	125	18	30	12



VOLTAGE	DOUBLE TENSION ASSEMBLY			
	A	B	C	D
66 KV	245	115	14	12
132 KV	295	125	16	12
220 KV	370	140	18	12

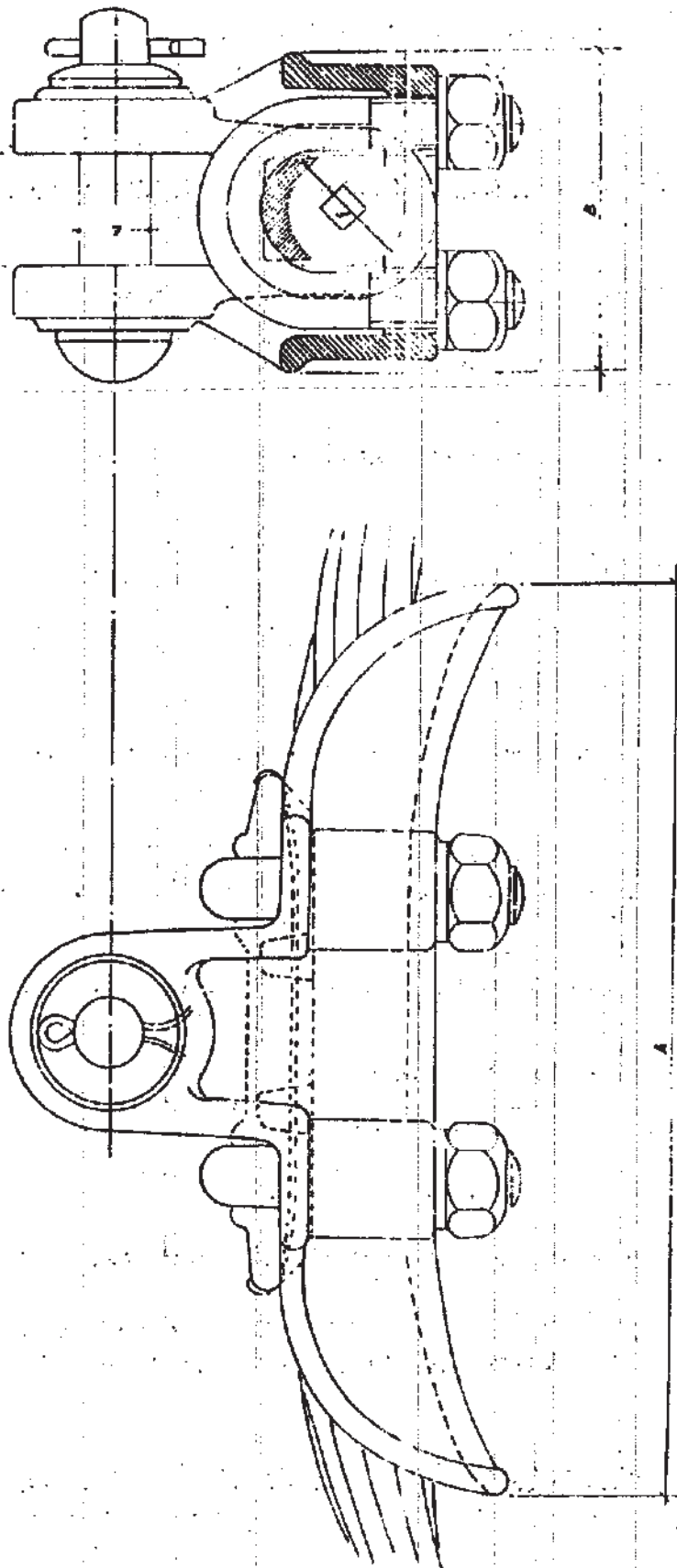


FOR DOUBLE TENSION ASSEMBLY
BOTTOM ARCING HORN

ALL DIMENSION IN MILLIMETRES

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR SHAH	<i>[Signature]</i>	ARCING HORNS
CHECKED	GULIAM RASUL	<i>[Signature]</i>	
JUNIOR ENGINEER	HAZAR ABBAS	<i>[Signature]</i>	
SENIOR ENGINEER	SYNAHAR-A- MALIK	<i>[Signature]</i>	
DIRECTOR	S. ISHTIAQ HUSAIN	<i>[Signature]</i>	
SCALE			DATE 27.9.80

1 9-9-80 BOTTOM ARCING HORN
DOUBLE TENSION ASSEMBLY
ADDED



INDICATES BINDING DIMENSION

INDICATES BINDING DIMENSION

PAKISTAN		DESIGN	
WATER AND POWER DEVELOPMENT AUTHORITY		DEPARTMENT	
ORDER	ATMOR SHAR	SUSPENSION CLAMP	
CHECKED	FORN HAZEL	FOR ACSR CONDUCTORS	
JUNIOR	DATE 1983	SCALE	
ENGINEER	1-1-82	DATE 27.9.82	
ENGINEER	1-1-82	DWG: NO. PDW/01-318	
DIRECTOR	1-1-82		
CHIEF	1-1-82		
ENGINEER	1-1-82		

DESCRIPTION	A	B	C	D	E	F
DBG	180	62	55	24	16	14.2
LYHX	190	65	60	24	16	15.5
CNCX00	220	87	70	57	16	27.7
RAIL	226	87	70	37	16	29.6
CARDINAL	219	87	70	57	16	30.4

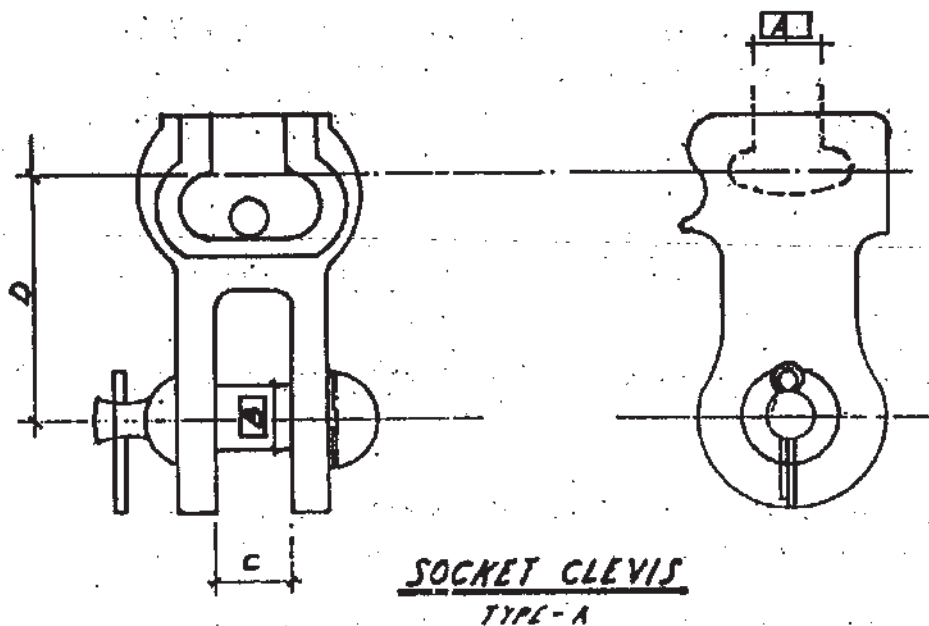
1-1-82 DIMENSIONS FOR ACSR CARDINAL ADDED

BY

REVISED

DATE

NO

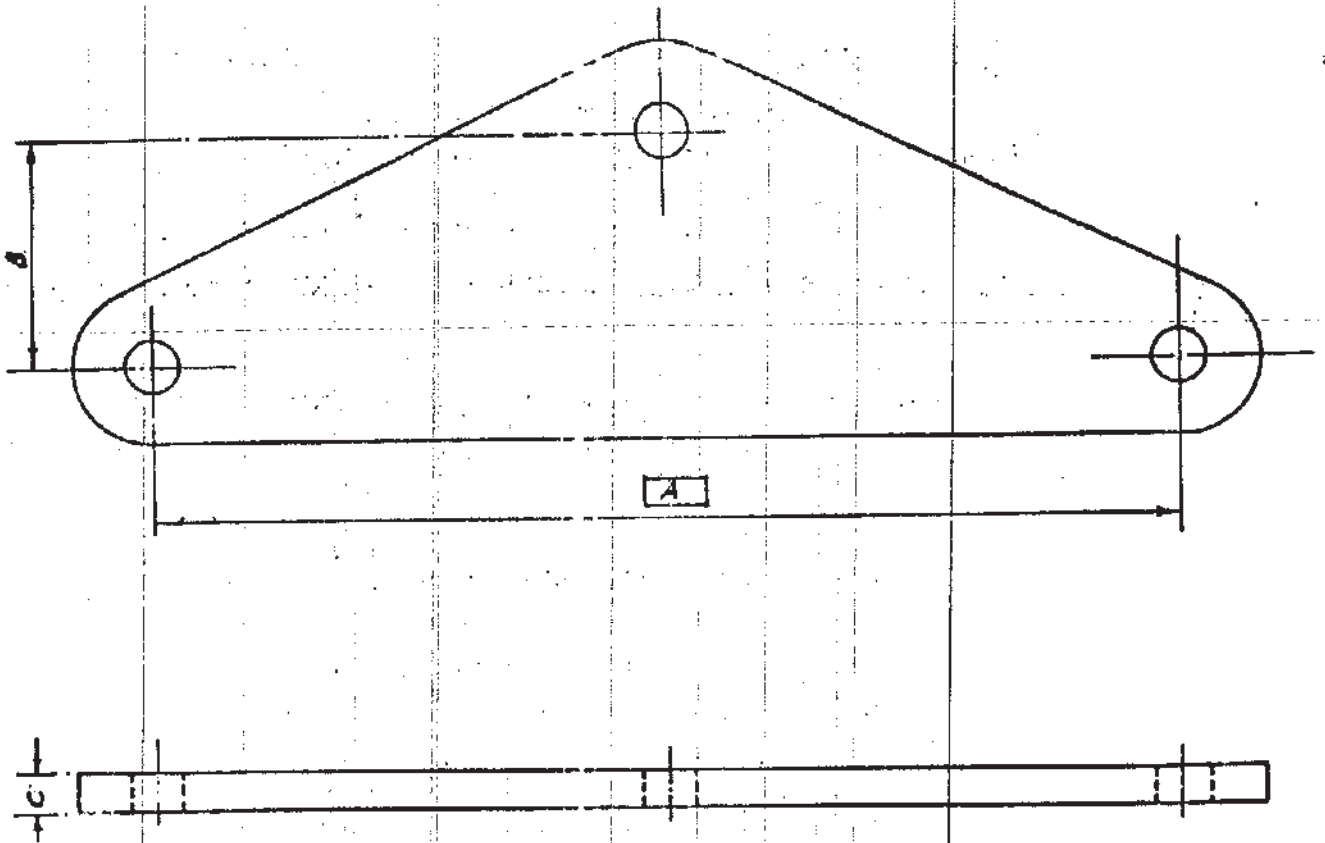


DESCRIPTION	DIMENSIONS			
	A	B	C	D
DOG, LYNN	16	16	18	70
CUCADO, RNL	16	16	20	70
CARDINAL	20	16	20	70

DIMENSIONS SHOWN IN MILLIMETRES

INDICATES BINDING DIMENSIONS

PAKISTAN		DESIGN	
WATER AND POWER DEVELOPMENT AUTHORITY		DEPARTMENT	
DRAWN	AZHAR SHAH	SOCKET CLEVIS TYPE - A	
CHECKED	GHULAM RASUL		
ASST. DIRECTOR	HAZAR ABBAS		
DEPUTY DIRECTOR	MUHAMMAD-A-MALIK		
DIRECTOR	S. ISHTIAR HUSSAIN		
CHIEF ENGINEER		SCALE ✓	DATE 13-9-82
		DWG. NO. PDW/DF-376	

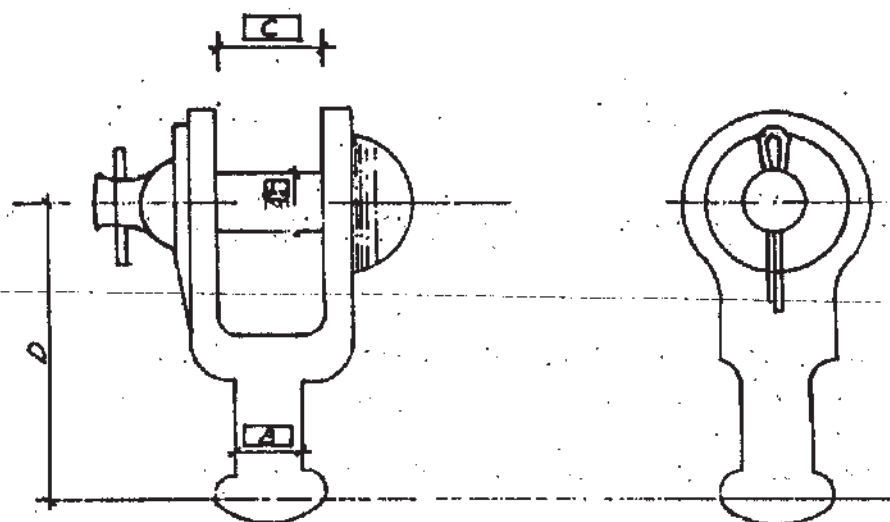


DESCRIPTION	A	B	C
DOG, LYNX	400	90	16
CUCKOO, RAIL CARDINAL	400	90	18

ALL DIMENSIONS IN MILLIMETRES

☐ INDICATES BINDING DIMENSIONS

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT POWER
DRAWN IZHAR SHAH	CHECKED SHULAN NASUL	YOKE PLATE	
ASSTY DIRECTOR NAZAR ABBAS	DEPUTY DIRECTOR MUHAMMAD - A - MALIK		
DIRECTOR S. ISHTIAP NUSSEIN	CHIEF ENGINEER	SCALE ✓	DATE. 13-9-82
DWG: NO. PDW/DF-377			



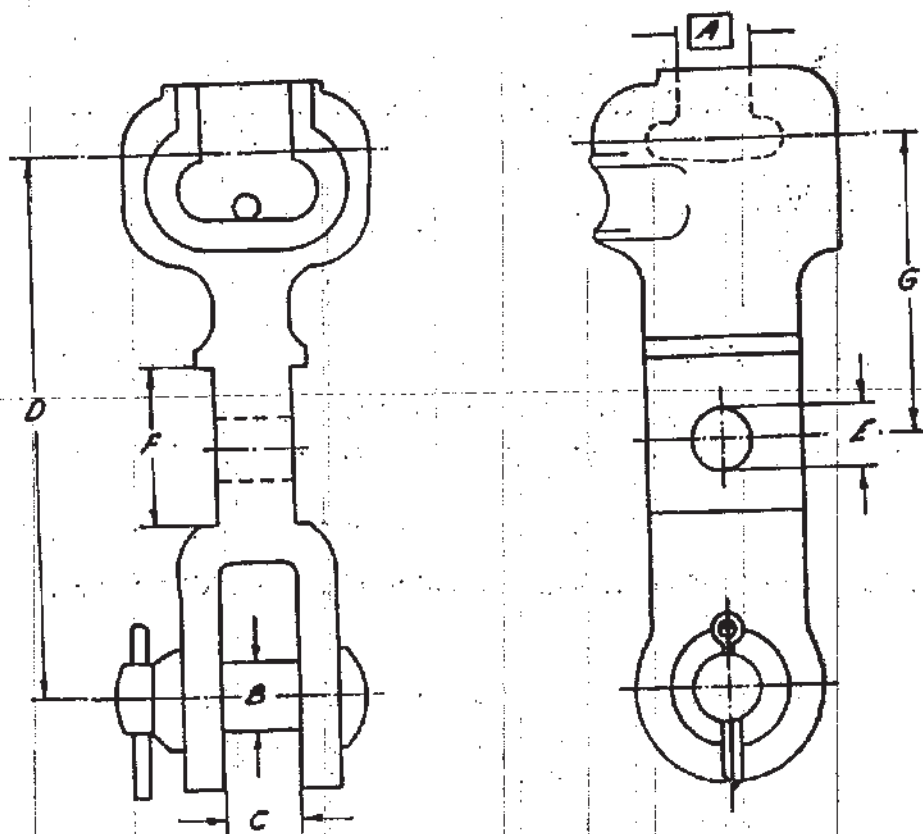
BALL CLEVIS

DESCRIPTION	DIMENSIONS			
	A	B	C	D
DOG, LYNA	16	16	18	75
CUCKOO, RAZ	16	16	20	75
CARDINAL	16	20	20	75

DIMENSION SHOWN IN MILLIMETRES

☐ INDICATES BINDING DIMENSIONS

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT	
DRAWN	AZHAR SHAH	BALL CLEVIS		
CHECKED	GHULAM RAJUL			
ASST DIRECTOR	HAZAR ABBAS			
DEPUTY DIRECTOR	MUNAWAR-A- MALIK			
DIRECTOR	S. IHTIAP NUSSAIN	SCALE ✓	DATE 13-9-82	
CHIEF ENGINEER		DWG: NO. PDW/DF-382		



SOCKET CLEVIS

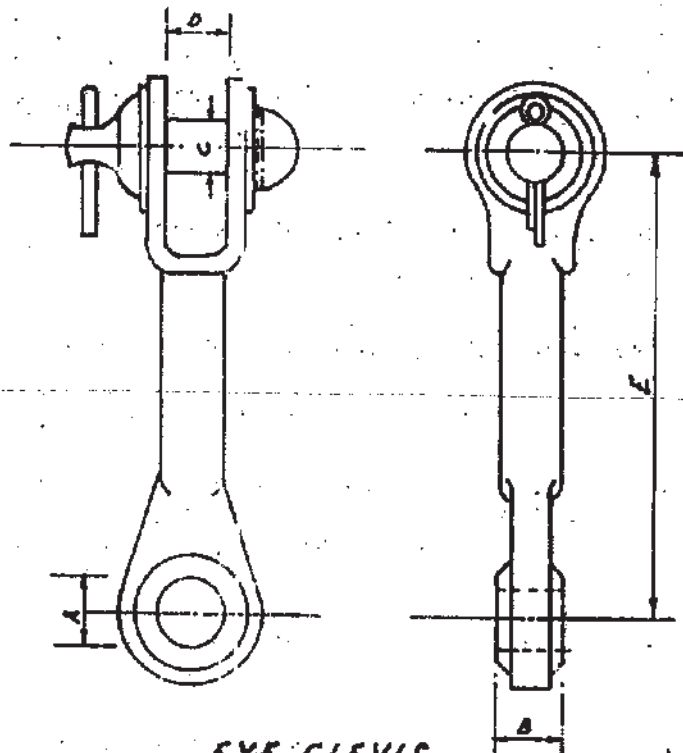
TYPE-B

DESCRIPTION	A	B	C	D	E	F	G
DOG, LYNX	16	16	18	110	14	30	60
CUCKOO, RAIL	16	16	20	110	14	30	60
CARDINAL	20	16	20	110	14	30	60

DIMENSION SHOWN IN MILLIMETERS.

☐ INDICATES BINDING DIMENSIONS

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT (POWER)
DRAWN	HAZARAT MOOD	SOCKET CLEVIS TYPE-B	
CHECKED	A. LATIF		
JUNIOR ENGINEER	NAZAR ABBAS		
SENIOR ENGINEER	MUNAWWAR A. MALIK		
DIRECTOR	A. IFTIKHAR HUSSAIN		
CHIEF		SCALE:-	DATE:-13-9-82
			CHIEF AND POWINE-37B

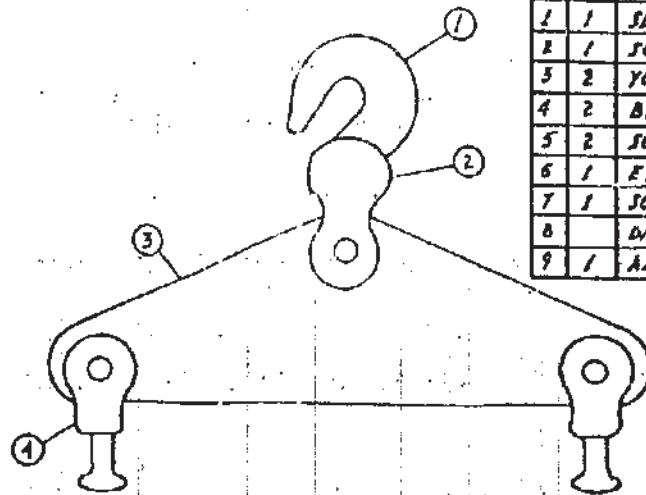


EYE CLEVIS

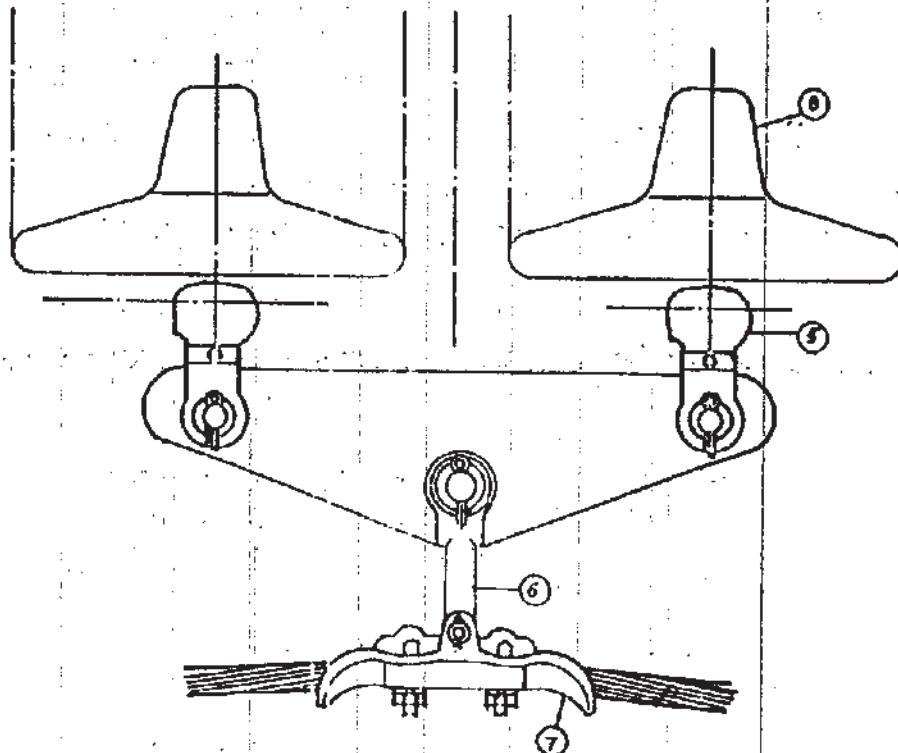
DESCRIPTION	A	B	C	D	E
DOG, LYNX	10	22	16	18	80
CUCRGO, RAIL CARDINAL	10	35	15	20	80

ALL DIMENSION IN MILLIMETRES

PAKISTAN		DESIGN	
WATER AND POWER DEVELOPMENT AUTHORITY		DEPARTMENT	
POWER			
DRAWN	ASHRAF ALI SHAN	EYE CLEVIS WITH 90° EYE	
CHECKED	GHULAM RAJUL		
JUNIOR DIRECTOR	HAZAR ABBAS		
DEPUTY DIRECTOR	MUNAWAR-A-MALIK		
DIRECTOR	S. ISHTIAD HUSSAIN		
CHIEF ENGINEER		SCALE	DATE 13-9-02
		DWG: NO. PDN/DF-379	



ITEM	QTY	DESCRIPTION	DWG. NO.
1	1	SELF LOCKING BALL HOOK	PDM/DF-315
2	1	SOCKET CLEVIS TYPE-A	PDM/DF-376
3	2	YOKER PLATE	PDM/DF-377
4	2	BALL CLEVIS	PDM/DF-382
5	2	SOCKET CLEVIS TYPE-B	PDM/DF-378
6	1	EYE CLEVIS	PDM/DF-379
7	1	SUSPENSION CLAMP	PDM/DF-318
8		DISC. INSULATORS 854-116	—
9	1	ARCING HORN	PDM/DF-317



PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT	
DRAWN	AZHAR SHAH	12-5	DOUBLE SUSPENSION STRING	
CHECKED	GHUFRAN RASUL	12-5		
ASST. DIRECTOR	HAZAR ABBAS	12-5		
DEPUTY DIRECTOR	MUNAWAR-A-MALIK	12-5		
DIRECTOR	S. ISHTIAR MUSSAIN	12-5	SCALE	DATE 13-9-82
CHIEF ENGINEER		12-5	DWG: NO. PDM/DF-384	

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

2. The second part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

3. The third part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

4. The fourth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

5. The fifth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

6. The sixth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

7. The seventh part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

8. The eighth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

9. The ninth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

10. The tenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

11. The eleventh part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

12. The twelfth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

13. The thirteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

14. The fourteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

15. The fifteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

16. The sixteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

17. The seventeenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

18. The eighteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

19. The nineteenth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.

20. The twentieth part of the document is a list of the names of the persons who have been appointed to the various offices of the city.