TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR HARDWARE FITTINGS FOR MOOSE, ZEBRA, PANTHER ACSR CONDUCTORS

Sl.	Description			Technical Parameters/Values			
1.	Quality of material & standard to which conform			BIS			
	The Manufacturer shall produce the valid BIS certification at the time of acceptance tests.						
2	Size & designation of Ball and Socket with standard			Suspension – 16 mm		Tension – 20 mm	
3	Suitable for (Conductor size)			MOOSE, ZEBRA & PANTHER ACSR			
4	**HARDWARE :**						
	i)	Components Description	Material with Chemical Composition	Minimum Breaking Strength			
				Suspension		Tension	
				Single	Double	Single	Double
	a)	Socket Clevis	Forged Class IV Steel as per IS – 2004	70 KN	70 KN	120 KN	120KN
	b)	Ball Clevis	- do -	70 KN	70 KN	120 KN	120 KN
	c)	Anchor Shackle	- do -	70 KN	140 KN	120 KN	240 KN
	d)	Clevis Eye	- do -	70 KN	70 KN	120 KN	120 KN
	e)	Chain Link	- do -			-	240 KN
	f)	Yoke Plate	Mild Steel Plate	-	140 KN	-	240 KN
	g)	Arcing Horn	Mild Steel Tube	-	-	-	-
	h)	Security Clip	Phosphur Bronze / Stainless Steel	-	-	-	-
	i)	Horn Holder Ball Eye	Forged Steel Class IV as per IS – 2004	-	-	120 KN	-
	j)	Split Pin	Brass / Stainless steel	-	-	-	-
	k)	Clevis Clevis	Forged Class IV Steel as per IS – 2004	-	-	-	120 KN
	l)	Ball Hook	- do -	70 KN	-	-	-
	ii)	Whether parts are designed for interchangeability for different types of String		Parts are inter-changeable			
	iii)	Standard specifications to which the materials conform		IS 2486 Part - I			
	iv)	Whether reference detailed drawings with each component showing tolerances, weight, strength etc enclosed.		YES			
	v)	Standard Specification to which galvanising conforms		IS 2633 & IS - 6745			

STD/GTP-DWG/Approval No. 11 - 1 / Revision No. 0

APPROVED FOR TURNKEY PROJECTS

9/11/2011

CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR HARDWARE FITTINGS FOR MOOSE, ZEBRA, PANTHER ACSR CONDUCTORS

Sl.	Description		Technical Parameters/Values			
5	**SUSPENSION CLAMPS**		Wt. in kg			Required
	i) Components	Material with Chemical Composition	MOOSE	ZEBRA	PANTHER	1 Set
	a) Clamp Body (Cushion)	Neoprene	1.2	0.9	0.4	1 Set
	b) Housing	Al. alloy	0.6	0.6	0.4	1 Set
	c) Side Strap or Link	Al. alloy	0.25	0.25	0.25	1 Set
	d) Insert of cushion	Al. alloy	0.3	0.2	0.1	1 Set
	e) Armour Rod	Al. alloy	5.0	3.6	1.6	1 Set
	f) Bolt, Nuts & washers	Forged Steel / Mild Steel	All bolts & nuts are 5.6 grade. Fully threaded bolts shall not be used.			
	ii) Slip Strength		9% to 15% of UTS of Conductor			
	iii) Breaking Strength		7000 Kg			
	iv) Electrical Resistance		Not applicable			
6	**PREFORMED ARMOUR RODS:**		MOOSE	ZEBRA	PANTHER	
	i) Material		Heat treated Al. alloy HE-30 as per IS -733			
	ii) Breaking Strength (Min.)		35 kg / mm^2	35 kg / mm^2	35 kg / mm^2	
	iii) Weight (kg)		5.4	3.6	1.6	
	iv) Conductivity		Min 40% of IACS	Min 40% of IACS	Min 40% of IACS	
	v) No of Rods per Set		12	12	11	
	vi) Diameter of Rod with tolerances (mm)		9.27 +0.0 or – 0.1	7.87 +0.0 or – 0.1	6.35 +0.0 or – 0.1	
	vii) Length of Rod with tolerances (mm)					
	viii) Actual length of each Rod along with its helix (mm)		2235 +0.0 or -51	2080 +0.0 or – 51	1520 +0.0 or -38	
	ix) Difference of length between the longest and shortest rod in a set		As per IS – 2121 Part - I			
7.	Elastomer for AGS clamps:					
	a) Type		Neoprene			
	b) Moulded on insert		YES			
	c) Shore hardness		65 to 80			
	d) Temperature range for which designed (deg. C)		Up to 75 ^{0}C			

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CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR HARDWARE FITTINGS FOR MOOSE, ZEBRA, PANTHER ACSR CONDUCTORS

8 TENSION CLAMPS:

i)	Components	Material with chemical composition	Weight in kg			Required No.
			MOOSE	ZEBRA	PANTHER	
a)	Outer sleeve	Extruded Aluminium	2.4	2.0	1.2	1 No.
b)	Inner Sleeve	Forged Steel	2.4	1.2	1.0	1 No.
c)	Jumper	Forged Alumimium	1.2	0.8	0.6	1 No.
d)	Filler plug	Aluminium				1 No.
e)	Bolt, Nuts & washers	Forged Steel / Mild Steel				

		DIMENSIONS		LENGTH	
ii)	Dead End	Before Compression	After compression	Before Compression	After (Approx)
a)	For MOOSE ACSR				
	Aluminium	54.0	53.0 / 46.0	635	670
	Steel	21.0	20.2/17.5	335	355
b)	For ZEBRA ACSR				
	Aluminium	48.00 mm	46.0 / 40.0 mm	600 mm	630 mm
	Steel	21.00 mm	20.2 / 17.5	300 mm	340 mm
c)	For Panther ACSR				
	Aluminium	38.0 mm	37.0 / 32.0 mm	500mm	515 mm
	Steel	18.0 mm	17.4 / 15.1 mm	260 mm	305 mm

iii)	Whether Compression and non compression zones marked on the sleeves	YES		
iv)	Electrical resistance of tension clamp as a % of equivalent length of conductor	Max. 75 % of the measured resistance of equivalent length of conductor.		
v)	Details of dies and hydraulic compressor required for compressing sleeves of tension clamp.	MOOSE ACSR	ZEBRA ACSR	PANTHER ACSR
		DA-12 & DS-12	DA – 11 & DS-11	DA – 9 & DS-9

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CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR HARDWARE FITTINGS FOR MOOSE, ZEBRA AND PANTHER ACSR CONDUCTORS

9		COMPLETE STRING	220 kV				132 kV			
			Suspension		Tension		Suspension		Tension	
			Single	Double	Single	Double	Single	Double	Single	Double
	i)	Mechanical failing load (kgf)	7000	14000	11500	23000	7000	14000	11500	23000
	ii)	No deformation load (kgf)	4690	9380	7705	15410	4690	9380	7705	15410
10		Total weight of hardware tested :-	Single Suspension		Double Suspension		Single Tension		Double Tension	
	a)	MOOSE ACSR	13 Kg		23 Kg		11 Kg		22 Kg	
	b)	ZEBRA ACSR	11 Kg		23 Kg		9 Kg		20 Kg	
	c)	PANTHER ACSR	8 Kg		18 Kg		8 Kg		19 Kg	
11		Whether hardware fittings are suitable for hot line maintenance.	YES							
12		Whether ball and socket meets the 'GO' and 'NO GO' gauge test as per IS-2486 (Part-II)	YES							
13		Whether the materials covered by this bid have been fully type tested and if so whether the copies of the type test certificates enclosed to the offer.	YES							
14		Packing details of each fitting per package and gross weight.	Shall be suitably packed tin order to avoid damage in transit. Approx. Gross Wt. of each package – 50 Kg Approx.							
15		Certification mark (BIS/BS/ Any national institution)	BIS							
		The Manufacturer shall produce the valid BIS certification at the time of acceptance tests.								
16		Type Tests	The type tests should have been conducted not earlier than 5 years in the Standard third party laboratory. The Manufacturer shall produce the type test reports at the time of acceptance tests.							
17		Bolt & Nuts	All bolts & nuts are 5.6 grade. Fully threaded bolts shall not be used.							
18		Washers	Spring washers are to be made of spring steel.							
19		Galvanisation	All ferrous parts except spring washers are to be hot dip galvanised. Spring washers are to be electro galvanised.							
20		Forged components.	All forged componenets shall be made out of class IV steel as per IS-2004.							

APTRANSCO

Standardised Guaranteed Technical Particulars for Suspension and tension Hardware for Moose, Zebra and Panther ACSR Conductors

STD/GTP-DWG/Approval No. **11 - 1** / Revision No. **0**

Prepared & Approved during November - 2011

APPROVED FOR TURNKEY PROJECTS

9/11/2011

CHIEF ENGINEER / CONSTRUCTION -1
APTRANSCO/VIDYUTH SOUDHA/HYD

TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

GUARANTEED TECHNICAL PARTICULARS FOR SUSPENSION AND TENSION CLAMPS FOR GALVANISED STEEL EARTH WIRE

Sl. No	Description	Suspension Clamp	Tension Clamp
(1)	(2)	(3)	(4)
1	Materials	SUSPENSION AND TENSION CLAMPS FOR GALVANISED STEEL EARTH WIRE	
2	Type	Envelope Type	Compression Type
3	Manufactured as per ISS	IS – 2486 Part - I	IS – 2486 Part - I
4	Material used	Forged Steel & MCI	Forged Steel
5	Quality of material used	As per Requirement of relevant ISS for each type of materials	
6	Make of bolt, nut & washers used	BI/ASP or equivalent	
7	Ultimate strength of material used	Min.35 Kg/mm^2	
8	Method of manufacture adopted e.g. forging or casting	Susp. Clamp – Casting Eye Hook - Forging	Forging
9	Standard specification to which galvanising conforms	IS – 2633	
10	Minimum slip strength (kg)	15 kN to 17 kN	95% of Earthwire UTS
11	Minimum ultimate strength (kg)	70 kN	- do -
12	Tested to standard specification	IS – 2486 Part - I	
13	Total weight of each clamp	Approx. 2.5 Kg	Approx 2.2 Kg
14	Packing details	Shall be suitably packed tin order to avoid damage in transit. Gross Wt. of each package 50 Kg Approx.	
15	Certification mark (BIS/BS/ Any national institute)	BIS. The Manufacturer shall produce the valid BIS certification at the time of acceptance tests.	
16	Whether the materials covered by this bid have been fully type tested.	The type tests should have been conducted not earlier than 5 years in the Standard third party laboratory. The Manufacturer shall produce the type test reports at the time of acceptance tests.	
17	Bolt & Nuts	All bolts & nuts are 5.6 grade. Fully threaded bolts shall not be used.	
18	Washers	Spring washers are to be made of spring steel.	
19	Galvanisation	All ferrous parts except spring washers are to be hot dip galvanised. Spring washers are to be electro galvanised.	
20	Forged components.	All forged componenets shall be made out of class IV steel as per IS-2004.	

APTRANSCO

Standardised Guaranteed Technical Particulars for Suspension and tension Hardware for HTGS wire

STD/GTP-DWG/Approval No. **11 - 2** / Revision No. **0**

Prepared & Approved during November - 2011

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CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD.

TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR MIDSPAN COMPRESSION JOINTS AND REPAIR SLEEVES FOR CONDUCTOR & HTGS WIRE

Sl. No.	Description	Midspan compress-ion joints	Repair Sleeves	Midspan compress-ion joints	Repair Sleeves	Midspan compressi on joints	Repair Sleeves	Midspan compression joints
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	Quality of material & standard to which conform	BIS						
	The Manufacturer shall produce the valid BIS certification at the time of acceptance tests.							
2.	Type	Compression Type						
3.	Suitable for	MOOSE ACSR Conductor		ZEBRA ACSR Conductor		PANTHER ACSR Conductor		HTGS WIRE
4.	**Outer diameter of sleeves (mm)**							
a)	**Before compression**							
i)	Aluminium	54.0	54.0	48.0	48.0	38.0	38.0	-
ii)	Steel	24		21.0	-	18.0	-	18.0
b)	**After compression**	*(Corner to Corner)*						
i)	Aluminium	53.0± 0.5	53± 0.5	46 ± 0.5	46 ± 0.5	37 ± 0.5	37 ± 0.5	-
ii)	Steel	20.2± 0.5	-	20.2 ± 0.5	-	17.5 ± 0.5	-	17.4 ± 0.5
c)	**After compression**	*(Face to Face)*						
i)	Aluminium	46 ± 0.5	46 ± 0.5	40 ± 0.5	40 ± 0.5	32± 0.5	32± 0.5	
ii)	Steel	17.5 ± 0.5		17.5 ± 0.5	-	15.1± 0.5		15.1± 0.5
5.	**Inner diameter of sleeve before compression (mm)**							
i)	Aluminium	34.0	34.0	31.0	31.0	23.0	23.0	-
ii)	Steel	11.1		10.0	-	9.5	-	10.0
6.	**Length of sleeve**							
a)	**Before compression**							
i)	Aluminium	735	300	711	279	610	241	-
ii)	Steel	305	-	241	-	203		203
b)	**After compression**							
i)	Aluminium (Approx)	785	330	761	309 ± 5	650	265	225
ii)	Steel (Approx)	285		276		225		
7.	**Wt. of sleeve per joint (kg / Approx)**							
i)	Aluminium	2.60	0.95	2.0	0.68	1.2	0.4	0.3
ii)	Steel	0.40	-	0.4	-	0.3	-	-
iii)	Total	3.00	0.95	2.4	0.68	1.5	0.4	0.3
8.	Guaranteed breaking strength of the mid span joint	Min. 95% of ultimate tensile of Conductor / groundwire as per their relavant IS.						
9.	Conductivity of the compression joint	More than the Conductivity of Conductor / Earthwire						

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CHIEF ENGINEER / CONSTRUCTION
APTRANSCO/VIDYUTH SOUDH

STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR MIDSPAN COMPRESSION JOINTS AND REPAIR SLEEVES FOR CONDUCTOR & HTGS WIRE

Sl. No.	Description	Midspan compress-ion joints	Repair Sleeves	Midspan compress-ion joints	Repair Sleeves	Midspan compressi on joints	Repair Sleeves	Midspan compression joints
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10	Full details of the hydraulic compressor and dies required	100 Tonne Hydraulic Compressor required with Die Nos:-						
		DAH-12	DAH -12	DA-11	DA-11	DA-9	DA-9	
		DSH-11		DS-11		DS-9		DS-9
11	Guaranteed slip strength of the mid span joint	Min. failing load / slip strength 95 % of UTS of Conductor / Earth wire						
12	Resistance	Max.75 % of the resistance of equivalent length of Conductor / Earth wire						
13	Standard specification to which the materials will be manufactured and tested	IS – 2121 Part -II						
14	Type tests.	The type tests should have been conducted not earlier than 5 years in the Standard third party laboratory. The Manufacturer shall produce the type test reports at the time of acceptance tests.						
15	Galvanisation	All ferrous parts except spring washers are to be hot dip galvanised.						
16	Forged components.	All forged componenets shall be made out of class IV steel as per IS-2004.						

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Standardised Guaranteed Technical Particulars for MSC Joints and Repair Sleeves for Moose, Zebra and Panther ACSR Conductors and HTGS wire

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A. PROVED FOR TURNKEY PROJECTS

9/11/2011

CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD.

TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED
STANDARDISED GUARANTEED TECHNICAL PARTICULARS FOR
4R TYPE VIBRATION DAMPERS CONDUCTOR

Sl. No.	Description	For Moose ACSR Conductor	For Zebra ACSR Conductor	For Panther ACSR Conductor	For Panther AAAC Conductor
1	2	3	4	5	6
1	Quality of material & standard to which conform	BIS			
	The Manufacturer shall produce the valid BIS certification at the time of acceptance tests.				
2	Type	4R type	4R type	4R type	4R type
3	Suitable for (Conductor size)	31.77mm	28.66 mm	21 mm	20.16mm
4	Total weight of each damper	6.5 KGS	6.5 KGS	4.5 KGS	4.5 KGS
5	Diameter of balancing weights (mm) RH & LH	64 & 60	64 & 60	58 & 55	58 & 55
6	Length of balancing weights (mm) RH & LH	220 & 190	220 & 190	185 & 165	185 & 165
7	Weight of each balancing weights (kg) RH & LH	3.00 & 2.20 KGS	3.00 & 2.20 KGS	2.20 & 1.15 KGS	2.20 & 1.15 KGS
8	Tolerance of balancing weights (%)	5.00%	5.00%	5.00%	5.00%
9	Slip strength of steel messenger cable (kg)	35 KG / mm2	35 KG / mm2	35 KG / mm2	35 KG / mm2
10	Diagram showing power dissipated by the damper in watts for various frequencies and amplitudes.	As per Type Test reports			
11	Natural frequency of the damper				
a)	Upper (Cycles per sec)	$F1=16^{+}$-1 $F2=20^{+}$-2		$F1=12^{+}$-1 $F2=16^{+}$-2	
b)	Lower (Cycles per sec)	$F3=41^{+}$-2 $F4=46^{+}$-2		F3=38+-2 $F4=44^{+}$-2	
12	The numbers of dampers required per span for various span lengths and their spacings	SPAN LENGTHS			
		Up to 350 m	Up to 350 m	Up to 350 m	Up to 350 m
13	Test reports of the damping characteristics and energy dissipation	As per Type Test reports			
14	Whether a write-up explaining the suppression of Aeolian vibration dampers is given in the bid.	As per Type Test reports			
15	Damping efficiency of the damper	As per Type Test reports			
16	Wind velocity range for which damper will be effective	As per Type Test reports			
17	Packing details	Packed in Gunny Bags	Packed in Gunny Bags	Packed in Gunny Bags	Packed in Gunny Bags

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APTRANSCO/VIDYUTH SOUDHA

18	Standard according to which the conductor will be manufactured and tested	IS: 9708
	The type tests should have been conducted not earlier than 5 years in the Standard third party laboratory. The Manufacturer shall produce the type test reports at the time of acceptance tests.	
19	Bolt & Nuts	All bolts & nuts are 5.6 grade. Fully threaded bolts shall not be used.
20	Washers	Spring washers are to be made of spring steel.
21	Galvanisation	All ferrous parts except spring washers are to be hot dip galvanised. Spring washers are to be electro galvanised.
22	Forged components.	All forged componenets shall be made out of class IV steel as per IS-2004.

APTRANSCO

Standardised Guaranteed Technical Particulars for Vibration Dampers for Moose, Zebra, Panther ACSR and Panther AAA Conductors.

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APTRANSCO/VIDYUTH SOUDHA/HYD