APAR
Tomorrow's solutions today

APAR INDUSTRIES LIMITED
CONDUCTORS DIVISON

Marketing & Registered office : 301, Panorama Complex, RC Dutt Road, Vadodara, Gujarat,India 390 007.

CLIENT : BIHAR STATE POWER TRANSMISSION COMPANY LTD.

CONTRACTOR : APAR INDUSTRIES LIMITED

PROJECT : Supply contract for design, manufacture, testing at manufacture's works and delivery of equipment's required for Re-conductroring work of 06 Nos. 132kV Transmission Line with HTLS equivalent to ACSR Panther Conductor : (i) 132 KV Motihari (DMTCL)- Bettiah DCDS T/L (ii) 132 KV Musahari-Sitamarhi DCDS T/L (iii) 132 KV Motipur-Motihari DCSS T/L (iv) 132 KV Supaul -Nirmali DCSS T/L (v) 132 KV Supaul -Phulparas DCSS T/L (vi) 132 KV Phulparas - Nirmali DCSS T/L on turnkey basis under special assistance to states for capital investment for 2023-24 against NIT No. 18/PR/BSPTCL/2023.

NOA No. : 14-Trans/Misc/P-I/33/2023 Dated: 22.09.2023 & 15-Trans/Misc/P-I/33/2023 Dated: 22.09.2023

GUARANTEED TECHNICAL PARTICULARS OF "ACCC HTLS" (EQUIVALENT TO PANTHER) " CONDUCTOR

For Span 233 meters

Sl	Description	Unit	Value guaranteed by the Bidder
1	Name of Manufacturer		**APAR INDUSTRIES LTD**
2	Address of Manufacturer		INDIA
3	Name of the conductor		**ACCC CASABLANCA**
4	Construction of conductor/ Designation of conductor as per IEC:61089		An.Al.12/4.25mm (TW) + An.Al. 8/4.06mm (TW) + composite core 1/7.11 mm (R)
5	Particulars of Raw Material		
5.1	Outer Layers		
	a) Type of conductor strand.		1350 O-tempered aluminum as per ASTM B233, ASTM B 609
	b) Chemical composition of Conductor strand:		
	i) Al.	%	99.50 (min)
	ii) Si	%	0.10 (max)
	iii) Fe	%	0.40 (max)
	iv) Cu	%	0.04 (max)
	v) Ti + Va	%	0.02 (max)
	vi) Mn	%	0.01 (max)
	vii) Zr	%	0.01 (max)
	viii) Cr	%	0.01 (max)
5.2	Inner Core		
	a) Material of core		Hybrid carbon and glass fiber composite core as per ASTM B987
	b) Chemical composition of core		
	i) ——	%	-
	ii) ——	%	-
	iii) ——	%	-
	iv) ——	%	-
	v) ——	%	-
	vi) ——	%	-
6	Outer Aluminium / Aluminium Alloy Strand after Stranding		
6.1	Number of outer layers	Nos.	2
6.2	Diameter		**Layer 1 / Layer 2**
	a) Nominal	mm	4.06mm (TW) / 4.25mm (TW)
	b) Maximum	mm	4.10mm (TW) / 4.29mm (TW)
	c) Minimum	mm	4.02mm (TW) / 4.21mm (TW)
6.3	Minimum Breaking load of strand		
	a) Before stranding	KN	0.777 / 0.851
	b) After stranding	KN	0.738 / 0.809
6.4	Resistance of 1m length of strand at 20 deg. C	Ohm	0.002156 / 0.001965
7	Inner core strands/inner core after stranding		
7.1	Number of layers in inner core	No	1
7.2	Diameter		
	a) Nominal	mm	7.11
	b) Maximum	mm	7.16
	c) Minimum	mm	7.06
7.3	Minimum Breaking load of strand/Core		
	a) Before stranding	KN	85.0
	b) After stranding	KN	85.0

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Electrical Superintending Engineer
(Planning and Engineering)
Bihar State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021
11 OCT 2023

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7.4	Min. no. of twists which a single strand shall withstand during torsion test for a length equal to 100times dia of wire after stranding.	Nos.	Not Applicable
8	**Complete conductor**		
8.1	UTS of Conductor	KN	100.4
8.2	Lay ratio of conductor (As per ASTM B857)		Maximum / Minimum
	a) 1st layer (outer most layer)		13 / 10
	b) 2nd Layer		16 / 10
	c) 3rd Layer		-
	d) 4th Layer		-
8.3	Maximum permissible conductor temperature for continuous operation	Deg C	180
8.4	Maximum permissible conductor temperature for short term operation	Deg C	200
8.5	Permissible duration of above short term operation	Minutes	30
8.6	Maximum length of conductor that can be offered as single length	KM	2.5
8.7	DC resistance of conductor at 20°C	Ohm/km	0.1024
8.8	AC resistance at maximum continuous operating temperature corresponding to specified maximum operating current (minimum 1050 A under maximum ambient conditions and zero wind as per Technical Specification)at180°C(as per TS)	Ohm/km	0.16863
8.9	Details of Creep characteristic for conductor enclosed (as per Technical Specification)	Yes/No	Yes
8.1	Sag Tension Calculation **(233m Span)**		
8.10.1	Sag Tension Calculation enclosed	Yes/No	Yes
8.10.2	Sag & tension at 32 deg. C & no wind	Meters & KN	2.90 / 19.212
8.10.3	Sag & tension at 32 deg. C & full wind	Meters & KN	3.69 / 24.403
8.10.4	Sag & tension at 05 deg. C & 2/3rd wind	Meters & KN	2.65 / 27.570
8.10.5	Sag & tension at 65 deg. C & no wind	Meters & KN	3.25 / 17.145
8.10.6	Sag & tension at 150 deg. C & no wind Meters & KN	Meters & KN	3.34 / 16.668
8.10.7	Sag & tension at maximum operating temperature 180 deg. C & no wind	Meters & KN	**3.37 / 16.506**
8.10.8	Sag & tension at emergency temperature & no wind	Meters & KN	3.40 / 16.394
8.11	Tolerance on standard length of conductor	%	± 5%
8.12	Direction of lay for outside layer		Right Hand
8.13	Linear mass of the Conductor		
	a) Standard	Kg/Km	834.4
	b) Minimum	Kg/Km	822
	c) Maximum	Kg/Km	847
8.14	Standard length of conductor	KM	2.4
9.00	Drum is as per specification	Yes/No	Yes
10.0	Accessories as per specification/standards	Yes/No	Yes

Date: 03.10.2023
(Signature).....
Place: (Printed Name) - S.K. AGARWAL
(Designation) - Sr. Vice President (Marketing)
(Common Seal).....

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Electrical Superintending Engineer
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Vidyut Bhawan, Patna-800021

APAR INDUSTRIES LIMITED VADODARA SKS

18 OCT 2023

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CLIENT : BIHAR STATE POWER TRANSMISSION COMPANY LTD.

CONTRACTOR : APAR INDUSTRIES LIMITED

PROJECT : Supply contract for design, manufacture, testing at manufacture's works and delivery of equipment's required for Re-conductroring work of 06 Nos. 132kV Transmission Line with HTLS equivalent to ACSR Panther Conductor : (i) 132 KV Motihari (DMTCL)- Bettiah DCDS T/L (ii) 132 KV Musahari-Sitamarhi DCDS T/L (iii) 132 KV Motipur-Motihari DCSS T/L (iv) 132 KV Supaul -Nirmali DCSS T/L (v) 132 KV Supaul -Phulparas DCSS T/L (vi) 132 KV Phulparas - Nirmali DCSS T/L on turnkey basis under special assistance to states for capital investment for 2023-24 against NIT No. 18/PR/BSPTCL/2023.

NOA No. : 14-Trans/Misc/P-I/33/2023 Dated: 22.09.2023 & 15-Trans/Misc/P-I/33/2023 Dated: 22.09.2023

GUARANTEED TECHNICAL PARTICULARS OF "ACCC HTLS" (EQUIVALENT TO PANTHER) " CONDUCTOR

For Span 305 meters

Sl	Description	Unit	Value guaranteed by the Bidder
1	Name of Manufacturer		**APAR INDUSTRIES LTD**
2	Address of Manufacturer		INDIA
3	Name of the conductor		**ACCC CASABLANCA**
4	Construction of conductor/ Designation of conductor as per IEC:61089		An.Al.12/4.25mm (TW) + An.Al. 8/4.06mm (TW) + composite core 1/7.11 mm (R)
5	Particulars of Raw Material		
5.1	Outer Layers		
	a) Type of conductor strand.		1350 O-tempered aluminum as per ASTM B233, ASTM B 609
	b) Chemical composition of Conductor strand .		
	i) Al.	%	99.50 (min)
	ii) Si	%	0.10 (max)
	iii) Fe	%	0.40 (max)
	iv) Cu	%	0.04 (max)
	v) Ti + Va	%	0.02 (max)
	vi) Mn	%	0.01 (max)
	vii) Zr	%	0.01 (max)
	viii) Cr	%	0.01 (max)
5.2	Inner Core		
	a) Material of core		Hybrid carbon and glass fiber composite core as per ASTM B987
	b) Chemical composition of core		
	i) ——	%	-
	ii) ——	%	-
	iii) ——	%	-
	iv) ——	%	-
	v) ——	%	-
	vi) ——	%	-
6	Outer Aluminium / Aluminium Alloy Strand after Stranding		
6.1	Number of outer layers	Nos.	2
6.2	Diameter		**Layer 1 / Layer 2**
	a) Nominal	mm	4.06mm (TW) / 4.25mm (TW)
	b) Maximum	mm	4.10mm (TW) / 4.29mm (TW)
	c) Minimum	mm	4.02mm (TW) / 4.21mm (TW)
6.3	Minimum Breaking load of strand		
	a) Before stranding	KN	0.777 / 0.851
	b) After stranding	KN	0.738 / 0.809
6.4	Resistance of 1m length of strand at 20 deg. C	Ohm	0.002156 / 0.001965
7	Inner core strands/inner core after stranding		
7.1	Number of layers in inner core	No	1
7.2	Diameter		
	a) Nominal	mm	7.11
	b) Maximum	mm	7.16
	c) Minimum	mm	7.06
7.3	Minimum Breaking load of strand/Core		
	a) Before stranding	KN	85.0
	b) After stranding	KN	85.0

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(Planning and Engineering)
Bihar State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021
18 OCT 2023

APAR INDUSTRIES LIMITED VADODARA

7.4	Min. no. of twists which a single strand shall withstand during torsion test for a length equal to 100times dia of wire after stranding.	Nos.	Not Applicable
8	**Complete conductor**		
8.1	UTS of Conductor	KN	100.4
8.2	Lay ratio of conductor (As per ASTM B857)		Maximum / Minimum
	a) 1st layer (outer most layer)		13 / 10
	b) 2nd Layer		16 / 10
	c) 3rd Layer		-
	d) 4th Layer		-
8.3	Maximum permissible conductor temperature for continuous operation	Deg C	180
8.4	Maximum permissible conductor temperature for short term operation	Deg C	200
8.5	Permissible duration of above short term operation	Minutes	30
8.6	Maximum length of conductor that can be offered as single length	KM	2.5
8.7	DC resistance of conductor at 20°C	Ohm/km	0.1024
8.8	AC resistance at maximum continuous operating temperature corresponding to specified maximum operating current (minimum 1050 A under maximum ambient conditions and zero wind as per Technical Specification)at180°C(as per TS)	Ohm/km	0.16863
8.9	Details of Creep characteristic for conductor enclosed (as per Technical Specification)	Yes/No	Yes
8.1	Sag Tension Calculation **(305m Span)**		
8.10.1	Sag Tension Calculation enclosed	Yes/No	Yes
8.10.2	Sag & tension at 32 deg. C & no wind	Meters & KN	4.33 / 22.030
8.10.3	Sag & tension at 32 deg. C & full wind	Meters & KN	5.45 / 28.407
8.10.4	Sag & tension at 05 deg. C & 2/3rd wind	Meters & KN	4.47 / 28.017
8.10.5	Sag & tension at 65 deg. C & no wind	Meters & KN	5.36 / 17.811
8.10.6	Sag & tension at 150 deg. C & no wind Meters & KN	Meters & KN	5.49 / 17.383
8.10.7	Sag & tension at maximum operating temperature 180 deg. C & no wind	Meters & KN	**5.54 / 17.238**
8.10.8	Sag & tension at emergency temperature & no wind	Meters & KN	5.57 / 17.137
8.11	Tolerance on standard length of conductor	%	± 5%
8.12	Direction of lay for outside layer		Right Hand
8.13	Linear mass of the Conductor		
	a) Standard	Kg/Km	834.4
	b) Minimum	Kg/Km	822
	c) Maximum	Kg/Km	847
8.14	Standard length of conductor	KM	2.4
9.00	Drum is as per specification	Yes/No	Yes
10.0	Accessories as per specification/standards	Yes/No	Yes

Date: 03.10.2023
(Signature).....
Place: (Printed Name) - S.K. AGARWAL
(Designation) - Sr. Vice President (Marketing)
(Common Seal).....

APAR INDUSTRIES LIMITED VADODARA SKS

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Electrical Superintending Engineer
(Planning and Engineering)
Bihar State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021

18 OCT 2023

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CONTRACTOR : APAR INDUSTRIES LIMITED

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GUARANTEED TECHNICAL PARTICULARS OF "ACCC HTLS" (EQUIVALENT TO PANTHER) " CONDUCTOR

For Span 365 meters

Sl	Description	Unit	Value guaranteed by the Bidder
1	Name of Manufacturer		**APAR INDUSTRIES LTD**
2	Address of Manufacturer		INDIA
3	Name of the conductor		**ACCC CASABLANCA**
4	Construction of conductor/ Designation of conductor as per IEC:61089		An.Al.12/4.25mm (TW) + An.Al. 8/4.06mm (TW) + composite core 1/7.11 mm (R)
5	Particulars of Raw Material		
5.1	Outer Layers		
	a) Type of conductor strand.		1350 O-tempered aluminum as per ASTM B233, ASTM B 609
	b) Chemical composition of Conductor strand .		
	i) Al.	%	99.50 (min)
	ii) Si	%	0.10 (max)
	iii) Fe	%	0.40 (max)
	iv) Cu	%	0.04 (max)
	v) Ti + Va	%	0.02 (max)
	vi) Mn	%	0.01 (max)
	vii) Zr	%	0.01 (max)
	viii) Cr	%	0.01 (max)
5.2	Inner Core		
	a) Material of core		Hybrid carbon and glass fiber composite core as per ASTM B987
	b) Chemical composition of core		
	i) ——	%	-
	ii) ——	%	-
	iii) ——	%	-
	iv) ——	%	-
	v) ——	%	-
	vi) ——	%	-
6	Outer Aluminium / Aluminium Alloy Strand after Stranding		
6.1	Number of outer layers	Nos.	2
6.2	Diameter		**Layer 1 / Layer 2**
	a) Nominal	mm	4.06mm (TW) / 4.25mm (TW)
	b) Maximum	mm	4.10mm (TW) / 4.29mm (TW)
	c) Minimum	mm	4.02mm (TW) / 4.21mm (TW)
6.3	Minimum Breaking load of strand		
	a) Before stranding	KN	0.777 / 0.851
	b) After stranding	KN	0.738 / 0.809
6.4	Resistance of 1m length of strand at 20 deg. C	Ohm	0.002156 / 0.001965
7	Inner core strands/inner core after stranding		
7.1	Number of layers in inner core	No	1
7.2	Diameter		
	a) Nominal	mm	7.11
	b) Maximum	mm	7.16
	c) Minimum	mm	7.06
7.3	Minimum Breaking load of strand/Core		
	a) Before stranding	KN	85.0
	b) After stranding	KN	85.0

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(Planning and Engineering)
Bihar State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021

18 OCT 2023

APAR INDUSTRIES LIMITED VADODARA SKS

7.4	Min. no. of twists which a single strand shall withstand during torsion test for a length equal to 100times dia of wire after stranding.	Nos.	Not Applicable	
8	**Complete conductor**			
8.1	UTS of Conductor	KN	100.4	
8.2	Lay ratio of conductor (As per ASTM B857)		Maximum	Minimum
	a) 1st layer (outer most layer)		13	10
	b) 2nd Layer		16	10
	c) 3rd Layer		-	
	d) 4th Layer		-	
8.3	Maximum permissible conductor temperature for continuous operation	Deg C	180	
8.4	Maximum permissible conductor temperature for short term operation	Deg C	200	
8.5	Permissible duration of above short term operation	Minutes	30	
8.6	Maximum length of conductor that can be offered as single length	KM	2.5	
8.7	DC resistance of conductor at 20°C	Ohm/km	0.1024	
8.8	AC resistance at maximum continuous operating temperature corresponding to specified maximum operating current (minimum 1050 A under maximum ambient conditions and zero wind as per Technical Specification)at180°C(as per TS)	Ohm/km	0.16863	
8.9	Details of Creep characteristic for conductor enclosed (as per Technical Specification)	Yes/No	Yes	
8.1	Sag Tension Calculation **(365m Span)**			
8.10.1	Sag Tension Calculation enclosed	Yes/No	Yes	
8.10.2	Sag & tension at 32 deg. C & no wind	Meters & KN	6.26 / 21.850	
8.10.3	Sag & tension at 32 deg. C & full wind	Meters & KN	7.58 / 29.286	
8.10.4	Sag & tension at 05 deg. C & 2/3rd wind	Meters & KN	6.32 / 28.400	
8.10.5	Sag & tension at 65 deg. C & no wind	Meters & KN	7.45 / 18.365	
8.10.6	Sag & tension at 150 deg. C & no wind Meters & KN	Meters & KN	7.61 / 17.976	
8.10.7	Sag & tension at maximum operating temperature 180 deg. C & no wind	Meters & KN	**7.67 / 17.841**	
8.10.8	Sag & tension at emergency temperature & no wind	Meters & KN	7.71 / 17.750	
8.11	Tolerance on standard length of conductor	%	± 5%	
8.12	Direction of lay for outside layer		Right Hand	
8.13	Linear mass of the Conductor			
	a) Standard	Kg/Km	834.4	
	b) Minimum	Kg/Km	822	
	c) Maximum	Kg/Km	847	
8.14	Standard length of conductor	KM	2.4	
9.00	Drum is as per specification	Yes/No	Yes	
10.0	Accessories as per specification/standards	Yes/No	Yes	

Date: 03.10.2023
(Signature).....
Place: (Printed Name) - S.K. AGARWAL
(Designation) - Sr. Vice President (Marketing)
(Common Seal).....

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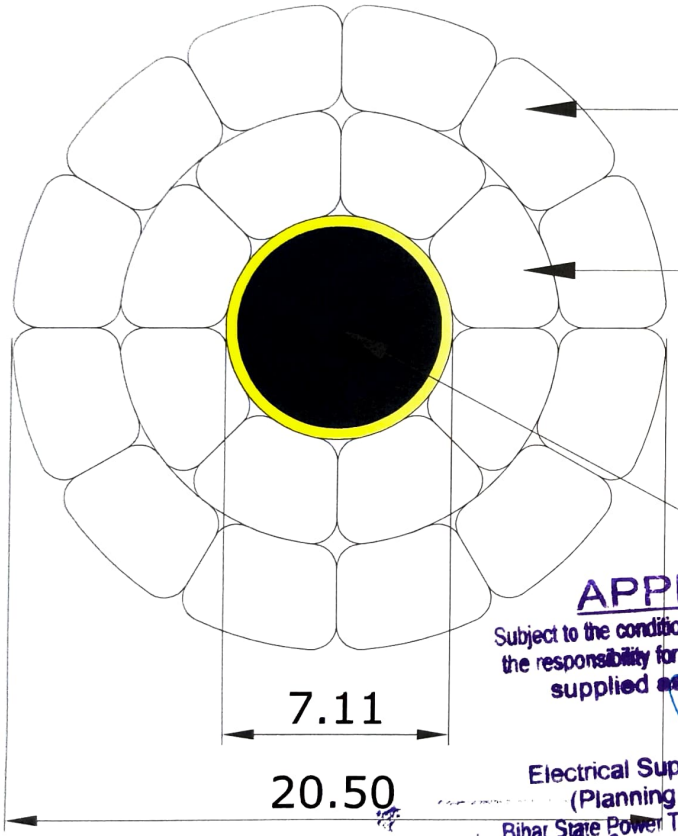
supplied as per specification

Electrical Superintending Engineer
(Planning and Engineering)
State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021

16 OCT 2023

CROSS SECTIONAL DRAWING : CONCENTRIC LAY STRANDED CONDUCTOR



Trapezoidal Shaped Annealed Al.Wire
Nos. =12
Diameter Equi. Round wire = 4.25mm

Trapezoidal Shaped Annealed Al.Wire
Nos. =08
Diameter Equi. Round wire = 4.06mm

Hybrid Carbon and glass fiber Composite core
Nos 1
Diameter = 7.11 mm

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(Planning and Engineering)
Bihar State Power Transmission Company Limited
Vidyut Bhawan, Patna-800021

18 OCT 2023

APAR INDUSTRIES LIMITED VADODARA SKS

ALL DIAMESIONS ARE IN MM

CLIENT : BIHAR STATE POWER TRANSMISSION COMPANY LIMITED
CONTRACTOR : APAR INDUSTRIES LIMITED
PROJECT: Supply contract for design, manufacture, testing at manufacture's works and delivery of equipment's required for Reconductoring of 06 Nos. 132kV Transmission lines with HTLS equivalent to ACSR Panther
NIT No. 18/PR/BSPTCL/2023
NOA NO. 14-Trans/Misc/P-I/33/2023 Dated: 22.09.2023 &
15-Trans/Misc/P-I/33/2023 Dated: 22.09.2023

TITLE	**CODE NAME: ACCC CASABLANCA**

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DRN	DDS-05.10.2020
CHK'D	PA - 05.10.2020
APR'D	SKJ - 05.10.2020
SCALE	N.T.S

DRG. NO. . AIL:CSD:ACCC . TW

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Bihar State Power Transmission Company Limited
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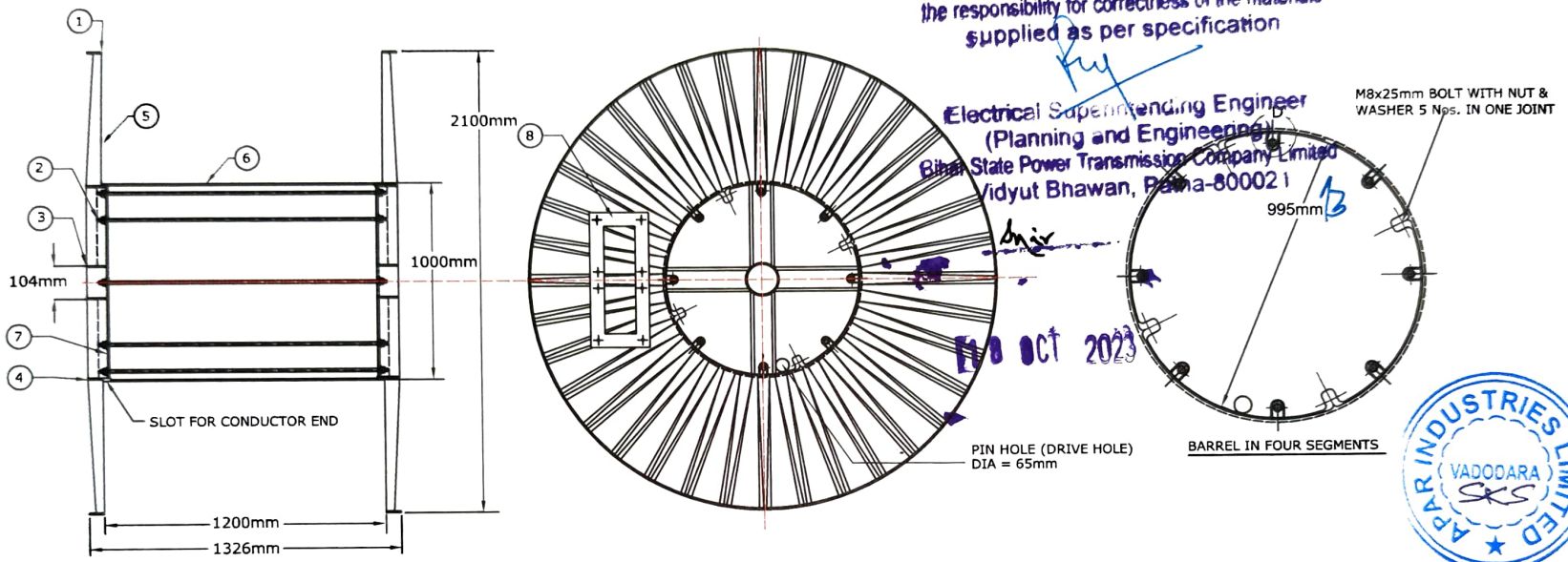
10 OCT 2023



APAR INDUSTRIES LIMITED VADODARA

RETURNABLE STEEL DRUM DRAWING WITH PP SHEET

NOTE :

1. **OUTER RING : 63 X 8mm**
2. **TIE ROD : 16 mm & 8 Nos.**
3. **CENTRE HOLE : 104 mm ID x 116 mm OD.**
4. **INNER RING : 100 X 6 mm**
5. **CORRUGATION SHEET : 1.6 mm THICK**
6. **BARREL SHEET : 2.5 mm THICK**
7. **CROSS ARM : 100mm x 50mm, 6mm THICK**
8. **FRAME SIZE (FOR MARKING) : 200mm x 300mm (APPROX)**
9. **TYING HOLES : 14mm**
10. **COLOUR : DEEP ORANGE**
11. **TOLERANCE ON DIMENSIONS = +/- 3%**
12. **After reeling the conductor in drum, the exposed outermost layer of conductor in drum shall be wrapped with waterproof plastic sheet to prevent ingress of dirt and grit into the conductor and then a protective covering of polypropylene sheet of 4.00mm thickness shall be provided secured with 2 numbers of steel / polyester strap to protect the conductor from external damages during storage, handling and transit.**

CONTRACTOR : APAR INDUSTRIES LIMITED
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& 15-Trans/Misc/P-I/33/2023 Dated: 22.09.2023
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NIT No. 18/PR/BSPTCL/2023

NOTE :
Standard length and drum size are subject to change and shall be supplied as per tower schedule.

	Steel drums		
REV	DESCRIPTION	SIGN	DATE

CUSTOMER	BIHAR STATE POWER TRANSMISSION COMPANY LTD.	
CODE NAME	ACCC CASABLANCA	
SIZE	An.Al.12/4.25mm(TW)+An.Al.8/4.06mm(TW)+ Composite Core1/7.11mm(R)	
CONDUCTOR DETAILS	SPECIFICATION	ASTM B 857, ASTM B 609
	STANDARD LENGTH	2400m ± 5%
	Approx. NET Wt.	2003 Kgs (Approx)
	Approx. Gross Wt.	2353 Kgs (approx)

APAR CONDUCTORS

DRN	S K Tiwari
CHK'D	P Agnihotri
APR'D	S K Jana

SCALE : N.T.S

DRG. NO.:- AIL : SS : 13DD

NOTE : Standard length and drum size are subject to change and shall be supplied as per tower schedule.

APAR CONDUCTORS

DOC NO	:AIL/MQP/NP-751/01
ISSUE NO	:1
ISSUE DATE	:03.10.2023
REV NO	:00
REV DATE	:00

STANDARD MANUFACTURING QUALITY PLAN

CLIENT	**Bihar State Power Transmission Corporation Ltd.**
CONTRACTOR	**APAR INDUSTRIES LIMITED**
NOA No.	**14-Trans/Misc/P-I/33/2023 Dated: 22.09.2023 & 15-Trans/Misc/P-I/33/2023 Dated: 22.09.2023**
Project Name	**Supply contract for design, manufacture, testing at manufacture's works and delivery of equipment's required for Reconductoring of 06 Nos. 132kV Transmission lines with HTLS equivalent to ACSR Panther, NIT No. 18/PR/BSPTCL/2023**
Code Name	**ACCC CASABLANCA**
Size / Construction	**An.Al.12/4.25mm (TW) + An. Al. 8/4.06mm (TW) + Composite core 1/7.11 mm (R)**

SECTION: (A) PROCUREMENT OF RAW MATERIALS & INSPECTION:

1.0 ALUMINIUM WIRE ROD (Continuously Casted and Rolled)

SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
1.1	Chemical Analysis	1 sample per heat	**ASTM B 233** Silicon = 0.10 max Iron = 0.40 max Copper = 0.04 max Manganese = 0.01 max Chromium = 0.01 max Zinc = 0.05 max Boron = 0.05 max Gallium = 0.03 max Vanadium + titanium, total = 0.02 max Other elements, each = 0.03 max Other elements, total = 0.10 max Aluminum = 99.50min	Supplier of wire rod	Review of records of the contractor at the time of final inspection.
1.2	Diameter	1 Sample from each coil.	-	Supplier of wire rod	Review of records of the contractor at the time of final inspection.
			Nom: 9.50 mm		
			Min.: 9.00 mm		
			Max.: 10.00 mm		
1.3	Tensile Strength	1 Sample from each coil.	TS 85 to 125 N/mm² (Min)	Supplier of wire rod	Review of records of the contractor at the time of final inspection.
1.4	Elongation	1 Sample from each coil.	8% on 250 mm gauge length.	Supplier of wire rod	Review of records of the contractor at the time of final inspection.
1.5	Resistivity & Conductivity	1 Sample from each coil.	28.264 Ωmm²/km at 20°C.	Supplier of wire rod	Review of records of the contractor at the time of final inspection.
1.6	Cleanliness and surface smoothness (visual Check)	100% on each coil.	The wire rod shall be smooth and free from pipes laps, cracks, kinks, twists, scams & other injurious defects within the limits of good commercial practice.	Supplier of wire rod	Review of records of the contractor at the time of final inspection.

APPROVED
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Electrical Superintending Engineer
(Planning and Engineering)
Bihar State Power Transmission Company
Vidyut Bhawan, Patna-800021
18 OCT 2023

APAR INDUSTRIES LIMITED VADODARA SKS

Prepared by:
Aritra Mukherjee

Reviewed by & Issued by:
Pradeep Agnihotri

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STANDARD MANUFACTURING QUALITY PLAN

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2. COMPOSITE CORE:

SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
2.1	Diameter of composite core	5% of the batch	Min : 7.06mm Max : 7.16mm Nom : 7.11mm	Supplier of core	Review of records of the contractor at the time of final inspection.
2.2	Breaking load / Tensile Test	5% of the batch	Min. 85.0KN	Supplier of core	Review of records of the contractor at the time of final inspection.
2.3	Surface Smoothness	100% of the entire batch	Surface shall be free from all imperfections such as nicks, indentations etc.. Not consistent with good commercial practice.	Supplier of core	Review of records of the contractor at the time of final inspection.

SECTION (B): INPROCESS INSPECTION

3. Annealed Aluminium Trapezoidal drawn wire.

SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
3.1	Surface Finish (Visual Check)	100% on each spool	ASTM 609 The wire shall be smooth, uniform & free from all imperfections such as spills, splits, scale, inclusion, die marks, scratches, abrasions, [illegible] etc.	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.

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SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
3.2	Cross sectional area of Aluminium wire	One sample per 10 spools	Customer Specification 1st layer : Nom : 12.946mm² (eq. to 4.06mm round wire) 2nd Layer : Nom : 14.186mm² (eq. to 4.25mm round wire) Tolerance on area = ±2%	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.
3.3	Breaking Load/Tensile Test	One sample per 10 spools	ASTM B 609 Min-0.777 KN for wire of 4.06mm Min-0.851 KN for wire of 4.25mm	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.
3.4	% Elongation	One sample per 10 spools	ASTM B 609 Min.20% on guage length of 250mm	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.
3.5	Wrapping test	One sample per 10 spools	8 wraps, 6 unwrap & 8 wraps on the wire itself. The wire shall not break or show any crack.	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.
3.6	Resistance @ 20°C	One sample per 10 spools	**Approved GTP** Max.2.156 Ω/km for 4.06mm wire Max.1.965 Ω/km for 4.25mm wire	QC Dept. of the contractor	Review of records of the contractor at the time of final inspection.

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SECTION (B): INPROCESS INSPECTION

(4) FINAL CONDUCTOR STRANDING:

SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
4.1	Lay ratio/ Direction & Compactness	One sample at the beginning of each setup	ASTM B 857 LAYER / MIN / MAX. / DIR. Al 8 (TW) / 10 / 16 / LH Al.12 (TW) / 10 / 13 / RH	QC Dept. of contractor.	Review of records of the contractor at the time of final inspection.

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SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
4.2	Surface Smoothness/ Scratches (Visual Check)	100%	APAR Specification : The finished conductor shall be smooth, compact, uniform and free from all imperfections.	QC Dept. of contractor.	Review of records of the contractor at the time of final inspection.
4.3	Joints (Visual Check)	100%	APAR Specification : There shall be no joints on the outer most layer. Joints are allowed in inner layers but no two such joints shall be less than 15 metres apart in completed conductor.	QC Dept. of contractor.	Review of records of the contractor at the time of final inspection.

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SECTION (C): FINAL INSPECTION AND TESTING (ROUTINE & ACCEPTANCE TEST ON FINAL CONDUCTOR)

(5) ROUTINE TESTS:

SR. NO	COMPONENTS / OPERATION & DESCRIPTION OF TEST	SAMPLING PLAN BASIS	REF. DOCUMENT AND ACCEPTANCE NORMS	TESTING AGENCY	REMARKS
5.1	All tests as per clause 6.1 to 6.6 as under	10% of the drums.	ASTM B 609, ASTM B 857 and APAR Specification	QC Dept. of Contractor.	Review of records of contractor at the time of final Inspection.
A	**Acceptance tests on Finished Conductor:**				
6.1	Lay ratio	One sample for every 10 drums or part thereof	**ASTM B 857** LAYER / MIN / MAX. Al 8 (TW) / 10 / 16 Al.12 (TW) / 10 / 13	QC Dept. of Contractor.	Inspection at works

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B	**Annealed Aluminium Trapezoidal drawn wire (After Stranding)**				
SR. NO	**COMPONENTS / OPERATION & DESCRIPTION OF TEST**	**SAMPLING PLAN BASIS**	**REF. DOCUMENT AND ACCEPTANCE NORMS**	**TESTING AGENCY**	**REMARKS**
6.2	Total Cross sectional area of Aluminium wire	10% of the drums	ASTM B 857 273.6mm² ± 2%	QC Dept. of contractor	Inspection at works
6.3	Breaking Load/Tensile Test	10% of the drums	ASTM B 609 Min-0.738 KN for wire of 4.06mm Min-0.809 KN for wire of 4.25mm	QC Dept. of contractor	Inspection at works
6.4	% Elongation	10% of the drums	ASTM B 609 Min.20% on guage length of 250mm	QC Dept. of contractor	Inspection at works
6.5	Wrapping test	10% of the drums	8 wraps, 6 unwrap & 8 wraps on the wire itself. The wire shall not break or show any crack.	QC Dept. of contractor	Inspection at works
6.6	DC Resistance @ 20°C (Conductivity Test)	10% of the drums	Max.2.156 Ω/km for 4.06mm wire / Max.1.965 Ω/km for 4.25mm wire	QC Dept. of contractor	Inspection at works

7	**LENGTH MEASUREMENT OF FINISHED CONDUCTOR**				
7.1	Check for joints, surface finish & length measurement by rewinding.	5% of the drums	Conductor length as per packing list and marking on drum	Visual check & length measurement by rewinding as per packing list.	Inspection at works

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C	**PACKING AND DISPATCH**				
8	**Check for Identification and Packing.**				
8.1	Contract/ Award Letter no.	100%	-	QC Department of Contractor	-
8.2	Manufacturer's Name & Address				
8.3	Drum No.				
8.4	Size & Code name of Conductor				
8.5	Length of Conductor				
8.6	Gross Weight of Drum after lagging.				
8.7	Tare Weight without Lagging				
8.8	Net Weight of Conductor in the drum.				
8.9	Arrow Marking for unwinding				
8.10	Position of conductor ends.				
8.11	Name & Address of consignee				

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