SIMANDOU IRON ORE PROJECT · REPUBLIC OF GUINEA

N2XSY Single Core Medium Voltage Power Cables

Technical Specification and Data Schedule

6/10 (12) kV and 26/35 (40.5) kV · 70 to 500 mm² · Copper / XLPE / Copper Wire Screen / PVC · Non-armoured · Designed to European Standards

A	B	C	D	E
1 × 70 mm²	1 × 240 mm²	1 × 240 mm²	1 × 400 mm²	1 × 500 mm²
26/35 (40.5) kV Ø 39.0 mm	6/10 (12) kV Ø 32.5 mm	26/35 (40.5) kV Ø 48.2 mm	6/10 (12) kV Ø 38.0 mm	26/35 (40.5) kV Ø 56.5 mm

European design basis: **HD 620 S2 · DIN VDE 0276-620 · EN 60228 · EN 60332-1-2 · EN 50575 (CPR) · RoHS · REACH** — electrical test levels cross-referenced to **IEC 60502-2**

Project	**Simandou Iron Ore Project — Republic of Guinea**		
Purchaser / EPCM	**HOLD-01**	Vendor	**Anhui FeiChun Special Cable Co., Ltd.**
Enquiry / PO no.	**HOLD-02**	Vendor document no.	**FC-TDS-N2XSY-2026-MV5**
Package	**MV power cables — single core**	Client document no.	**HOLD-01**
Document type	**Technical specification / data sheet**	Revision · status	**A · Issued for Review (IFR)**
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Rev	Date	Description	Prepared	Checked	Approved
A	25.11.2026	Issued for Review (IFR) — Simandou Project submission	Design Eng.	Eng. / QA	Tech. Director

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Document control

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Revision history

Rev	Date	Status	Description of change
A	25.11.2026	IFR	First issue for Purchaser review and comment
B	—	IFA	Reserved — incorporation of Purchaser comments, closure of HOLDs
0	—	IFU	Reserved — Approved for manufacture / Issued for use

Holds register

Hold	Description	Section	Action by
HOLD-01	Purchaser / EPCM name and Client document number	Cover	Purchaser
HOLD-02	Enquiry / purchase order reference and line-item numbers	Cover, 2.2	Purchaser
HOLD-03	Certificate, DoP and type test report numbers	9.2	FeiChun
HOLD-04	Network earth-fault current and clearance time (copper screen sizing)	5, 7.4	Purchaser
HOLD-05	Confirmation of site service conditions against the project Basis of Design	3.1, 7.3	Purchaser
HOLD-06	Selection of sheath options per circuit / installation area	3.2, 5	Purchaser
HOLD-07	Quantities, drum lengths and delivery schedule per item	2.2, 10	Purchaser

Approval

Role	Name	Signature	Date
Prepared	Design Engineer, MV Cables		25.11.2026
Checked	Engineering Manager / QA Manager		
Approved	Technical Director		

1 Executive summary

1.1 Purpose

This document sets out the technical specification, standards compliance position and quality assurance arrangements for the supply of **N2XSY single core medium voltage power cables** by Anhui FeiChun Special Cable Co., Ltd. (FeiChun) to the **Simandou Iron Ore Project, Republic of Guinea**. It is issued for technical evaluation, vendor document approval and release for manufacture.

LINE ITEMS	VOLTAGE CLASSES	CONDUCTOR RANGE	ROUTINE PD LIMIT
5 · A – E	**6/10 · 26/35 kV**	**70 – 500 mm²**	**≤ 5 pC · 100 %**

1.2 Key messages

European standards basis

Designed to CENELEC **HD 620 S2 / DIN VDE 0276-620**, with **EN 60228** conductors, **EN 60332-1-2** flame retardance, **CPR (EN 50575)** classification and **RoHS / REACH** compliant materials. Electrical test levels are cross-referenced to IEC 60502-2.

Proven, low-risk construction

Compacted Class 2 copper conductor, super-clean XLPE insulation triple-extruded with both semi-conducting screens on a CCV dry-cure line, copper wire screen sized for earth-fault duty, flame-retardant PVC sheath.

Assured quality

Every drum is routine tested: partial discharge **≤ 5 pC** at 1.73 U_0 (half the standard limit) and AC withstand at 3.5 U_0 for 5 min. Inspection and Test Plan with Purchaser **Hold and Witness** points; third-party inspection welcomed.

Fit for Simandou conditions

Options for UV-stabilised black sheath, longitudinal water-blocking, anti-termite jacket and LSZH sheath to suit the tropical, high-rainfall mine, rail and coastal port environments. Site-adjusted current ratings are provided.

1.3 Supply summary

Item	Type designation	U_0/U (Um)	Cu screen	Overall Ø	Mass	Rating in ground Simandou site-adjusted
A	N2XSY 1×70 RM/16	26/35 (40.5) kV	16 mm²	39.0 mm	2 000 kg/km	201 A
B	N2XSY 1×240 RM/25	6/10 (12) kV	25 mm²	32.5 mm	3 050 kg/km	395 A
C	N2XSY 1×240 RM/25	26/35 (40.5) kV	25 mm²	48.2 mm	4 050 kg/km	391 A
D	N2XSY 1×400 RM/35	6/10 (12) kV	35 mm²	38.0 mm	4 700 kg/km	506 A
E	N2XSY 1×500 RM/35	26/35 (40.5) kV	35 mm²	56.5 mm	6 850 kg/km	561 A

Site-adjusted rating: direct buried, trefoil, ground 30 °C, soil 1.5 K·m/W (Section 7.3).

1.4 Compliance at a glance

Requirement	Items B, D (6/10 kV)	Items A, C, E (26/35 kV)
Cable design & tests — HD 620 S2 / VDE 0276-620	COMPLIANT	DESIGNED TO SAME BASIS — see D-01
Conductors — EN 60228 Class 2 · Flame — EN 60332-1-2	COMPLIANT	COMPLIANT
CPR — EN 50575 / EN 13501-6, class E_{ca} · RoHS · REACH	COMPLIANT	COMPLIANT

1.5 Decisions requested from the Purchaser

1. **Accept the 26/35 (40.5) kV voltage class** as specified, or nominate the harmonised 20.8/36 (42) kV class — D-01
2. **Confirm earth-fault level and duration** to finalise copper screen cross-section — HOLD-04
3. **Select sheath options** per installation area (UV, termite, water-blocking, LSZH) — HOLD-06
4. **Confirm ITP intervention points** and the third-party inspection agency — Section 8

2 Scope of supply

2.1 Inclusions and exclusions

Included

- Design, manufacture and factory testing of the cables in Table 2.2
- Routine and sample tests; type test evidence
- Export packing on ISPM 15 drums, marking and preservation
- Vendor documentation per the VDRL (Section 9)

Excluded (available as options)

- Joints, terminations and earthing / bonding accessories
- Installation, supervision and after-installation testing
- Project-specific EN 60287 rating and bonding studies
- Freight beyond the agreed Incoterm

2.2 Supply schedule

Item	Description	Type designation	U_0/U (Um)	Overall Ø	FeiChun article	PO line / qty
A	1C × 70 mm², non-armoured	**N2XSY 1×70 RM/16**	26/35 (40.5) kV	39.0 mm	FC-N2XSY-070-35	HOLD-07
B	1C × 240 mm², non-armoured	**N2XSY 1×240 RM/25**	6/10 (12) kV	32.5 mm	FC-N2XSY-240-10	HOLD-07
C	1C × 240 mm², non-armoured	**N2XSY 1×240 RM/25**	26/35 (40.5) kV	48.2 mm	FC-N2XSY-240-35	HOLD-07
D	1C × 400 mm², non-armoured	**N2XSY 1×400 RM/35**	6/10 (12) kV	38.0 mm	FC-N2XSY-400-10	HOLD-07
E	1C × 500 mm², non-armoured	**N2XSY 1×500 RM/35**	26/35 (40.5) kV	56.5 mm	FC-N2XSY-500-35	HOLD-07

Intended for fixed installation in MV distribution networks of the mine, process plant, rail and port infrastructure: indoors, in ducts, on cable ladders and trays, in concrete troughs and direct buried, where no special mechanical protection is required.

3 Project service conditions and design response

3.1 Service conditions — vendor design assumptions

Parameter	Design assumption	Remark
Locations	Mine & process plant, rail corridor, coastal port	Simandou range to Atlantic coast, Republic of Guinea
Climate	Tropical; distinct wet and dry seasons	High seasonal rainfall; Harmattan dust in dry season
Ambient air temperature	**max. 40 °C** / min. 10 °C	Basis for in-air ratings (7.3)
Relative humidity	Up to 100 %, condensing	Cable ends sealed at all times before termination
Altitude	≤ 1 800 m above sea level	No derating of cable; check accessory ratings
Ground temperature at laying depth	**30 °C**	Basis for buried ratings (7.3)
Soil thermal resistivity	**1.5 K·m/W**	Lateritic soils, dry-season condition; thermal backfill recommended
Solar / UV exposure	High, on exposed ladder and riser sections	Black UV-stabilised sheath recommended (Option BK)
Atmosphere	Ore dust inland; salt-laden at port	PVC sheath resistant; no metallic parts exposed
Biological	Termites and rodents present	Anti-termite jacket for buried runs (Option T)

> **HOLD-05.** The values above are vendor assumptions for material selection and current rating. They shall be confirmed against the Purchaser's Site Conditions Specification / Basis of Design; ratings in Section 7.3 will be re-issued at Rev B if they differ.

3.2 Design response — sheath and construction options

Code	Site condition	Design response	Resulting designation
STD	General duty, ducts, trays	Red flame-retardant PVC sheath DMV 5 (HD 620 S2)	**N2XSY**
BK	Direct sunlight / UV	Black UV-stabilised PVC sheath, carbon-black loaded	**N2XSY (black)**
W	Wet season, buried, flood-prone	Semi-conducting water-swellable tapes over and under the screen	**N2XS(F)Y**
T	Termites, rodents (buried)	Additional polyamide (PA 12) anti-termite jacket over the PVC sheath	**N2XSY + PA**
H	Enclosed / occupied areas, substations	Halogen-free, low-smoke sheath (EN 60332-3, EN 61034, EN 60754)	**N2XSH**

4 Standards and compliance — European design basis

The design basis is CENELEC **HD 620 S2** (implemented as **DIN VDE 0276-620**), with electrical test levels cross-referenced to **IEC 60502-2**. Material tests, fire performance, ratings and environmental compliance follow the corresponding EN standards and EU regulations.

HD 620 S2
CENELEC MV cable harmonisation document

VDE 0276-620
German national implementation

EN 60228
Class 2 copper conductors

EN 60332-1-2
Flame propagation, single cable

CPR · EN 50575
Regulation (EU) No 305/2011

RoHS · REACH
2011/65/EU · 2015/863 (EC) 1907/2006

4.1 Standards compliance matrix

Standard	Title / subject	Application in this document	Position
HD 620 S2	Distribution cables with extruded insulation, 3.6/6 (7.2) kV to 20.8/36 (42) kV	Design, materials, routine / sample / type tests	COMPLIANT [1]
DIN VDE 0276-620	German implementation of HD 620 — type N2XSY	Designation, construction, sheath colour	COMPLIANT [1]
IEC 60502-2	Extruded-insulation power cables, Um 7.2 kV to 36 kV	Insulation thickness, test voltages, PD	COMPLIANT [1]
EN / IEC 60228	Conductors of insulated cables	Class 2 compacted Cu, max. DC resistance	COMPLIANT
HD 605 S3	Electric cables — additional test methods	Supplementary sample and type tests	COMPLIANT
EN 60811 series	Test methods for non-metallic materials	Hot set, ageing, shrinkage, hot pressure	COMPLIANT
EN 60885-3	Partial discharge measurement on extruded cable lengths	Routine PD test, every drum	COMPLIANT
EN 60230	Impulse tests on cables and accessories	Lightning impulse type test (BIL)	COMPLIANT
EN 62230	Spark-test method	In-line spark test of outer sheath	COMPLIANT
EN 60332-1-2	Vertical flame propagation, single cable	Outer sheath fire performance	COMPLIANT
EN 50575 / EN 13501-6	Reaction to fire, CPR — Regulation (EU) 305/2011	Class E_{ca}; DoP and CE marking	COMPLIANT
EN 60287 / IEC 60949	Current rating; permissible short-circuit currents	Sections 7.3 and 7.4	CALC. BASIS
HD 629.1 S3	Test requirements on accessories for MV cables	Compatibility with European accessories	COMPATIBLE
RoHS · REACH	2011/65/EU + (EU) 2015/863 · (EC) 1907/2006	All cable materials	COMPLIANT
IEC 60183 · GB/T 12706.3	Selection of cables by Um · 26/35 kV insulation levels	Insulation and tests for 26/35 (40.5) kV	DESIGN BASIS [1]
ISO 9001	Quality management system	Manufacture and quality control	CERTIFIED

[1] Items B, D fully within scope. Items A, C, E (26/35 kV) exceed the voltage scope and are built to the same principles, materials and test methods — see D-01.

4.2 Cross-reference to IEC and AS/NZS practice

For Purchaser engineering teams working to IEC or Australian / New Zealand practice, the European standards applied in this document map as follows.

Subject	European basis	IEC equivalent	AS/NZS reference	Position
Cable design & tests	HD 620 S2	IEC 60502-2	AS/NZS 1429.1	Equivalent design and test philosophy
Conductors	EN 60228	IEC 60228	AS/NZS 1125	Equivalent — Class 2 copper
Material test methods	EN 60811 series	IEC 60811 series	AS/NZS 1660 series	Equivalent test methods
Partial discharge	EN 60885-3	IEC 60885-3	—	IEC method applied
Flame propagation	EN 60332-1-2	IEC 60332-1-2	—	IEC method applied
Current rating	EN 60287	IEC 60287	—	IEC 60287 is customary for MV

> AS/NZS certification is not claimed. Where the Purchaser's specification invokes AS/NZS 1429.1, FeiChun will provide a clause-by-clause statement of equivalence (dimensions, test voltages and acceptance criteria) for review.

5 Deviations, exceptions and clarifications register

This register lists every point where this offer departs from, or requires clarification of, a typical project MV cable specification. No other deviations are taken.

Ref	Subject	Description	FeiChun proposal	Type
D-01	Voltage class 26/35 (40.5) kV	HD 620 S2 covers up to 20.8/36 (42) kV; IEC 60502-2 up to 18/30 (36) kV. Items A, C, E are outside their formal voltage scope.	Same construction, materials and test methods; insulation 10.5 mm, AC 91 kV, BIL 200 kV for Um 40.5 kV per IEC 60183 / GB/T 12706.3. 20.8/36 kV available as alternative.	CLARIFICATION
D-02	Copper screen size	Standard screens 16 / 25 / 35 mm² are offered; adequacy depends on network earth-fault duty.	Screen re-sized (e.g. 50 mm²) on receipt of fault level and duration — HOLD-04.	CLARIFICATION
D-03	Sheath material	Standard PVC sheath is not halogen-free.	Option H (N2XSH, LSZH) for enclosed and occupied areas.	OPTION
D-04	Sheath colour	VDE 0276-620 standard colour is red.	Black UV-stabilised sheath (Option BK) for exposed outdoor runs.	OPTION
D-05	Termite protection	Not included in the base construction.	Option T — PA 12 anti-termite jacket for direct-buried circuits.	OPTION
D-06	Current ratings	Ratings in 7.3 are indicative EN 60287 values for assumed conditions.	Project-specific calculation on receipt of route, bonding and grouping data.	CLARIFICATION
D-07	Dimensions & masses	Values other than overall diameter are typical design values.	Final values confirmed in the approved production drawing (Rev 0).	CLARIFICATION

6 Cable construction

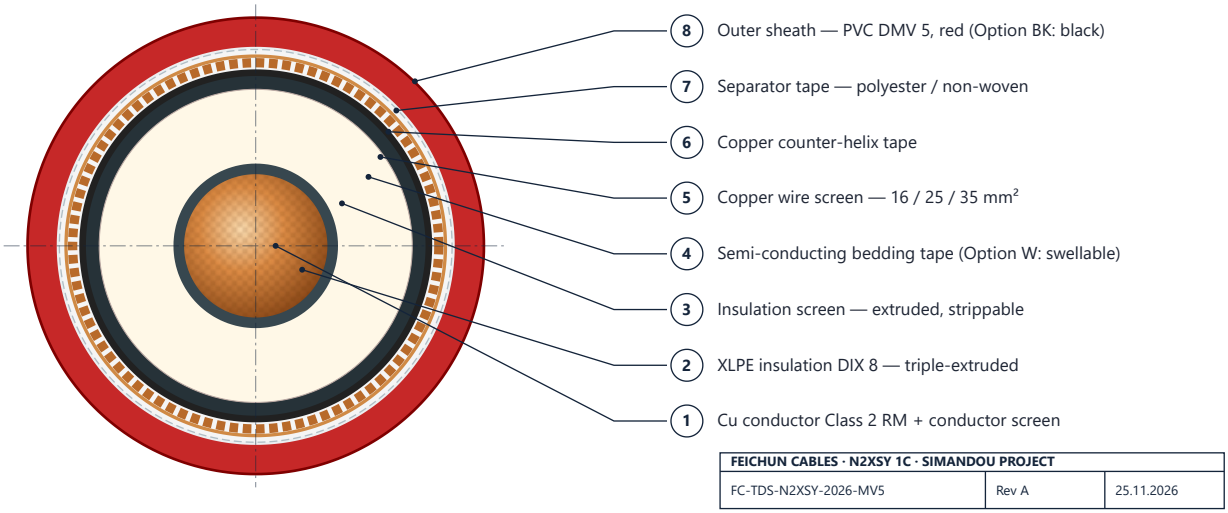

Figure 6.1 — Cross-section, N2XSY 1C Cu/XLPE/CWS/PVC, typical for items A – E (schematic, not to scale)

Pos.	Component	Material and requirement
1	**Conductor**	Plain annealed copper, stranded and compacted circular (RM), **EN 60228 Class 2**. Extruded semi-conducting conductor screen, firmly bonded, ≥ 0.5 mm.
2	**Insulation**	Super-clean XLPE, compound **DIX 8 per HD 620 S2**, dry-cured in nitrogen on a CCV line. Nominal 3.4 mm (6/10 kV) and 10.5 mm (26/35 kV).
3	**Insulation screen**	Extruded semi-conducting compound, cold-strippable; applied with pos. 1 and 2 in a single **triple-extrusion** pass.
4	**Bedding**	Semi-conducting tape, overlapped. Option W: semi-conducting water-swellable tape.
5	**Metallic screen**	Plain annealed copper wires, helically applied; 16 / 25 / 35 mm² (Section 7.1). Larger screens on request (D-02).
6	**Counter-helix**	Copper tape applied in the opposite lay direction to bind the wires and equalise current distribution.
7	**Separator**	Polyester or non-woven tape (Option W: swellable tape).
8	**Outer sheath**	PVC **DMV 5 per HD 620 S2**, flame retardant, red. Options: black UV-stabilised (BK), PA 12 jacket (T), LSZH (H), graphite layer for sheath testing.

6.1 Type designation key — DIN VDE 0276-620

N	2X	S	Y	1×240	RM	/25	6/10 kV
VDE standard type	XLPE insulation	Copper wire screen	PVC outer sheath	Cores × size mm²	Round, multi-wire	Screen mm²	U_0/U rated voltage

7 Technical data schedules

7.1 Constructional data, dimensions and weights

Parameter	Unit	A 1×70 · 26/35 kV	B 1×240 · 6/10 kV	C 1×240 · 26/35 kV	D 1×400 · 6/10 kV	E 1×500 · 26/35 kV
CONDUCTOR						
Nominal cross-section	mm²	**70**	**240**	**240**	**400**	**500**
Class / shape / material	—	Class 2 · compacted circular (RM) · plain annealed Cu				
Min. number of wires (EN 60228)	—	12	34	34	53	53
Conductor diameter (approx.)	mm	9.8	18.2	18.2	23.2	26.0
INSULATION SYSTEM — TRIPLE-EXTRUDED						
Conductor screen thickness (approx.)	mm	0.7	0.5	0.8	0.6	0.8
Insulation thickness, nominal	mm	**10.5**	**3.4**	**10.5**	**3.4**	**10.5**
Insulation thickness, min. at any point	mm	9.35	2.96	9.35	2.96	9.35
Diameter over insulation (approx.)	mm	32.2	26.0	40.8	31.2	48.6
Insulation screen thickness (approx.)	mm	0.7	0.5	0.7	0.6	0.8
Diameter over insulation screen (approx.)	mm	33.6	27.0	42.2	32.4	50.2
METALLIC SCREEN						
Copper screen cross-section, nominal	mm²	**16**	**25**	**25**	**35**	**35**
Screen wires, number × diameter (approx.)	n × mm	32 × 0.80	50 × 0.80	50 × 0.80	70 × 0.80	70 × 0.80
Counter-helix copper tape (approx.)	mm			0.1 × 10		
Diameter over screen (approx.)	mm	34.6	28.6	43.4	33.6	51.5
OUTER SHEATH AND COMPLETE CABLE						
Outer sheath thickness, nominal	mm	2.2	2.0	2.4	2.2	2.5
Sheath colour	—	Red (standard) · black UV-stabilised (Option BK)				
Overall diameter (approx.)	**mm**	**39.0**	**32.5**	**48.2**	**38.0**	**56.5**
Overall diameter tolerance	mm			± 2.0		
Cable mass (approx.)	**kg/km**	**2 000**	**3 050**	**4 050**	**4 700**	**6 850**
Copper content, conductor + screen (approx.)	kg/km	800	2 440	2 440	3 970	4 870

Overall diameters as specified by the Purchaser. All other dimensions and masses are typical design values, confirmed in the approved production drawing (D-07).

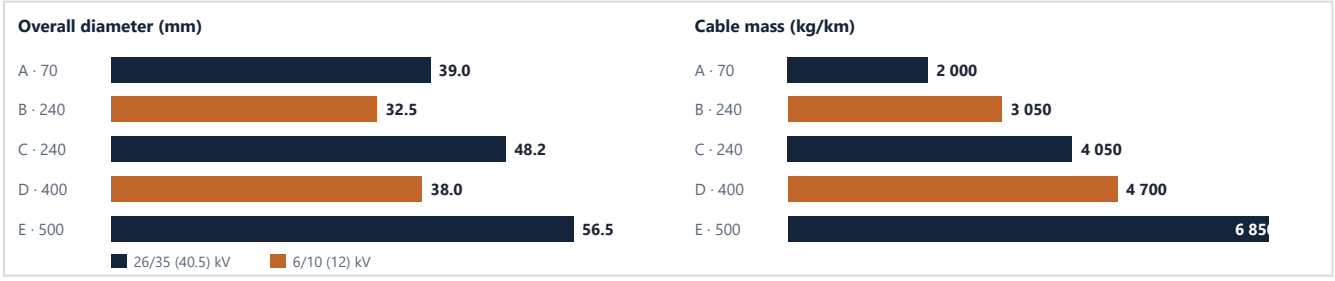

Figure 7.1 — Overall diameter and mass by item (for cable ladder, duct and drum planning)

7.2 Electrical characteristics and insulation levels

Parameter	Unit	A 1×70 · 26/35 kV	B 1×240 · 6/10 kV	C 1×240 · 26/35 kV	D 1×400 · 6/10 kV	E 1×500 · 26/35 kV
RATED VALUES						
Rated voltage U_0/U (Um)	**kV**	**26/35 (40.5)**	**6/10 (12)**	**26/35 (40.5)**	**6/10 (12)**	**26/35 (40.5)**
System frequency	Hz			50 / 60		
Max. DC resistance of conductor at 20 °C (EN 60228)	Ω/km	**0.268**	**0.0754**	**0.0754**	**0.0470**	**0.0366**
AC resistance at 90 °C, 50 Hz (approx.)	Ω/km	0.342	0.098	0.098	0.063	0.050
DC resistance of Cu screen at 20 °C (approx.)	Ω/km	1.15	0.727	0.727	0.524	0.524
Inductance, trefoil touching (approx.)	mH/km	0.47	0.31	0.38	0.29	0.34
Reactance, trefoil touching, 50 Hz (approx.)	Ω/km	0.146	0.096	0.120	0.090	0.108
Operating capacitance (approx.)	µF/km	0.13	0.46	0.19	0.57	0.25
Charging current at U_0, 50 Hz (approx.)	A/km	1.08	0.87	1.57	1.07	2.01
Max. electric stress at conductor screen (approx.)	kV/mm	4.4	2.1	3.6	2.0	3.3
Insulation resistance constant K_i at 90 °C	MΩ·km			≥ 3.67 (IEC 60502-2)		
Relative permittivity ε_r of XLPE	—			2.3 – 2.5		
TEST VOLTAGES AND INSULATION LEVELS						
Routine AC voltage test, 3.5 U_0, 5 min	**kV**	**91**	**21**	**91**	**21**	**91**
Partial discharge test voltage, 1.73 U_0	kV	45	10.4	45	10.4	45
Partial discharge at 1.73 U_0 (routine)	**pC**	**≤ 5 — FeiChun internal limit (HD 620 / IEC 60502-2 limit ≤ 10)**				
Lightning impulse withstand (BIL), ± 10 impulses	**kV pk**	**200**	**75**	**200**	**75**	**200**
AC voltage type test, 4 U_0, 4 h	kV	104	24	104	24	104
tan δ at 95 – 100 °C, at U_0 (type test)	—			≤ 40 × 10^{-4}		
Outer sheath DC test (if graphite layer applied)	kV			4 kV/mm of sheath thickness, max. 10 kV, 1 min		

Inductance and reactance calculated for three single core cables in trefoil, touching, screens bonded at both ends. Capacitance and electric stress calculated from nominal dimensions with ε_r = 2.5. Max. DC resistance, insulation thickness, test voltages and BIL are normative values; other values are calculated / typical.

7.2.1 Insulation coordination summary

6/10 (12) kV — items B, D	
Highest system voltage Um	**12 kV**
Insulation thickness / min.	**3.4 / 2.96 mm**
Routine AC / BIL	**21 kV · 75 kV pk**
Standard basis	**HD 620 S2 · IEC 60502-2**

26/35 (40.5) kV — items A, C, E	
Highest system voltage Um	**40.5 kV**
Insulation thickness / min.	**10.5 / 9.35 mm**
Routine AC / BIL	**91 kV · 200 kV pk**
Standard basis	**IEC 60183 · GB/T 12706.3 (D-01)**

7.3 Continuous current ratings — EN 60287, 100 % load factor

Installation condition	Unit	A 1×70 · 26/35 kV	B 1×240 · 6/10 kV	C 1×240 · 26/35 kV	D 1×400 · 6/10 kV	E 1×500 · 26/35 kV
REFERENCE CONDITIONS (EUROPEAN)						
Direct in ground, trefoil touching [2]	A	255	500	495	640	710
In free air, trefoil touching [3]	A	290	620	630	820	930
In free air, flat formation, spaced 1 × D [3]	A	340	720	730	960	1 080
SIMANDOU SITE-ADJUSTED (SECTION 3.1 ASSUMPTIONS)						
Direct in ground, trefoil — 30 °C, 1.5 K·m/W [4]	**A**	**201**	**395**	**391**	**506**	**561**
In free air, trefoil — 40 °C, shaded [5]	**A**	**264**	**564**	**573**	**746**	**846**
In free air, flat spaced — 40 °C, shaded [5]	**A**	**309**	**655**	**664**	**874**	**983**

[2] Ground 20 °C, soil 1.0 K·m/W, depth 0.8 m, screens bonded both ends. [3] Air 30 °C, shaded, on brackets / ladder. [4] Factor 0.93 × 0.85 = 0.79. [5] Factor 0.91. Single circuit, no grouping. For cables exposed to direct sun apply a further solar correction or provide shading. Values are indicative — project-specific calculation per D-06.

7.3.1 Correction — ground temperature

°C	15	20	25	30	35	40
Factor	1.04	1.00	0.96	**0.93**	0.89	0.85

7.3.2 Correction — soil thermal resistivity

K·m/W	0.7	1.0	1.5	2.0	2.5
Factor	1.10	1.00	**0.85**	0.75	0.68

7.3.3 Correction — air temperature

°C	25	30	35	40	45	50
Factor	1.04	1.00	0.96	**0.91**	0.87	0.82

Screen bonding. For sizes ≥ 240 mm², single-point bonding or cross-bonding reduces circulating-current losses and can raise ratings by approx. 10 – 25 %. FeiChun can provide the bonding study on request.

7.4 Short-circuit capacity — adiabatic, IEC 60949

Parameter	Unit	A 1×70 · 26/35 kV	B 1×240 · 6/10 kV	C 1×240 · 26/35 kV	D 1×400 · 6/10 kV	E 1×500 · 26/35 kV
Conductor, 1 s (90 → 250 °C, k = 143)	**kA**	**10.0**	**34.3**	**34.3**	**57.2**	**71.5**
Conductor, 0.5 s	kA	14.2	48.5	48.5	80.9	101.1
Copper screen, 1 s (80 → 200 °C, k ≈ 128)	**kA**	**2.1**	**3.2**	**3.2**	**4.5**	**4.5**

For other durations t (0.1 – 5 s): $I_t = I_{1s} / \sqrt{t}$. A non-adiabatic calculation per IEC 60949 gives higher screen values. Screen adequacy to be confirmed against the network earth-fault current and clearance time — HOLD-04.

7.5 Mechanical, thermal and installation data

Parameter	Unit	A 1×70 · 26/35 kV	B 1×240 · 6/10 kV	C 1×240 · 26/35 kV	D 1×400 · 6/10 kV	E 1×500 · 26/35 kV
Min. bending radius during laying (15 × D)	**mm**	**585**	**490**	**725**	**570**	**850**
Min. bending radius, single set bend with former (10 × D)	mm	390	325	485	380	565
Max. pulling force on conductor (50 N/mm²)	**kN**	**3.5**	**12.0**	**12.0**	**20.0**	**25.0**
Max. sidewall pressure on bends (recommended)	kN/m			3.0		
Recommended drum length	m	1 000	1 000	500 / 1 000	500 / 1 000	500

Thermal property	Value
Max. conductor temperature, continuous	**90 °C**
Max. conductor temperature, emergency overload	**105 °C** [6]
Max. conductor temperature, short circuit (≤ 5 s)	**250 °C**
Min. ambient, fixed installation	**– 20 °C**
Min. temperature during laying	**– 5 °C**
Storage temperature	**– 20 °C to + 60 °C**

Environmental property	Value
Flame propagation	**EN 60332-1-2 — pass**
CPR reaction-to-fire class	**E_{ca} (EN 50575)**
Water / damp locations	**Suitable; Option W watertight**
UV / weathering	**Option BK for permanent sun**
Termites / rodents	**Option T (PA 12 jacket)**
Halogen-free version	**Option H — N2XSH**

[6] Emergency overload operation limited in cumulative duration per IEC 60502-2 practice; to be agreed for the project.

7.6 Installation guidance for the Simandou site

- **Pulling:** by pulling eye on the conductor or cable stocking; use a dynamometer and record pulling tension. Rollers at 2 – 3 m spacing; corner rollers at bends.
- **Single-core layout:** lay in trefoil or flat; no closed ferromagnetic loops around individual cores; non-ferrous glands and gland plates.
- **Cleating:** short-circuit-rated cleats to IEC 61914, sized for the project peak fault current.
- **Buried runs:** bedding and cover of sieved sand or thermally stable backfill; warning tape and cover slabs; Option T in termite zones.
- **Screen bonding:** both-ends, single-point or cross-bonding per the Purchaser's design; SVLs where single-point bonded.
- **Wet season:** seal cut ends with heat-shrink caps immediately; do not leave ends in water-filled trenches or pits.
- **Accessories:** HD 629.1 tested joints and terminations, rated for Um and altitude of the installation.
- **After-installation test:** per IEC 60502-2 cl. 20 — AC test at U_0 for 24 h, or as agreed (e.g. VLF), plus sheath test where a graphite layer is applied.

8 Quality assurance, inspection and test plan

8.1 Quality management

Manufacture is controlled under FeiChun's ISO 9001 quality management system. A project Quality Plan and the Inspection and Test Plan (ITP) below are submitted for Purchaser approval before manufacture. Tests are carried out in FeiChun's high-voltage laboratory to HD 620 S2 / IEC 60502-2 and the EN methods in Section 4. Every drum length is tested before release.

8.2 Inspection and test plan (ITP) — summary

No.	Activity	Reference	Acceptance criteria	Record	FC	Purch. / TPI
1	**Pre-production meeting, PO review**	PO, this document	Requirements and HOLDs closed	Minutes	P	R
2	**Incoming materials**	Material specs	Cu rod, XLPE, semicon, PVC per CoA	CoA, inspection log	P	R
3	**Conductor stranding**	EN 60228	Wire count, Ø, DC resistance	Process record	P	M
4	**Triple extrusion & CCV curing**	HD 620 S2	On-line thickness & eccentricity (X-ray)	Line record	P	M
5	**Screening and sheathing**	HD 620 · EN 62230	Screen size; sheath thickness; spark test pass	Process record	P	M
6	**Routine tests, each drum**	HD 620 · IEC 60502-2	R_{DC} ≤ max.; PD ≤ 5 pC; AC 3.5 U_0 5 min	Routine test cert.	P	W
7	**Sample tests, per batch**	HD 620 · EN 60811	Dimensions; hot set; 4 h test (Section 8.3)	Sample test report	P	W
8	**Type test evidence**	HD 620 · IEC 60502-2	Valid reports covering each design	Type test reports	P	R
9	**Final inspection & packing**	Section 10	Marking, end caps, drum labels, lagging	Packing list	P	W
10	**Manufacturer's Data Report**	VDRL (Section 9)	Complete, signed, indexed	MDR	P	R
11	**Release for shipment**	PO	All records accepted; NCRs closed	Release note	P	H

Legend: P — perform · H — Hold point (work shall not proceed without written release) · W — Witness point (notice ≥ 10 working days) · R — Document review · M — Monitor / surveillance. Intervention points shown are proposed; final points per Purchaser's ITP mark-up.

> **Third-party inspection.** Witness inspection by the Purchaser or a nominated agency (e.g. Bureau Veritas, SGS, TÜV, Intertek) is welcomed at FeiChun's works. Non-conformances are managed through FeiChun's NCR procedure and reported to the Purchaser.

8.3 Test schedule and acceptance criteria

Class	Test	Method	Acceptance criterion
ROUTINE	Conductor DC resistance	EN 60228	≤ values in Section 7.2
	Partial discharge at 1.73 U_0	EN 60885-3	≤ 5 pC (standard ≤ 10 pC)
	AC voltage, 3.5 U_0, 5 min	HD 620 · IEC 60502-2	No breakdown — 21 kV / 91 kV
	Sheath spark test · visual & marking	EN 62230	No breakdown; marking legible and complete
SAMPLE	Insulation thickness	EN 60811-201	Min. ≥ 90 % of nominal − 0.1 mm
	Sheath thickness	EN 60811-202	Min. ≥ 85 % of nominal − 0.1 mm
	Hot set test, XLPE	EN 60811-507	200 °C, 20 N/cm², 15 min: elongation ≤ 175 %, permanent ≤ 15 %
	Conductor, diameters, 4 h voltage test	HD 620 · IEC 60502-2	Per standard; no breakdown
TYPE	Bending test + PD	IEC 60502-2	PD ≤ 10 pC at 1.73 U_0
	tan δ at 95 – 100 °C	IEC 60502-2	≤ 40 × 10^{-4}
	Heating cycles + PD; impulse + AC	EN 60230	No breakdown; BIL 75 / 200 kV pk
	Semicon screen resistivity	IEC 60502-2	Conductor ≤ 1 000 Ω·m · insulation ≤ 500 Ω·m
	Flame propagation	EN 60332-1-2	Char ≥ 50 mm below top clamp; ≤ 540 mm
	Water penetration (Option W)	HD 620 · IEC 60502-2	No water at sample ends

9 Vendor data requirements (VDRL) and certification

9.1 Vendor data requirements list

Document	With offer	For approval before manufacture	Final / MDR
Technical specification and data sheet (this document)	●	●	●
Cross-section drawing per item	●	●	●
Quality Plan and Inspection & Test Plan	○	●	●
Type test reports and certificates	●	●	●
Production and test schedule	—	●	—
Routine and sample test certificates per drum	—	—	●
Material certificates (EN 10204 3.1), DoP, RoHS / REACH declarations	○	—	●
Drum schedule, packing list, handling & storage instructions	—	●	●
Manufacturer's Data Report (MDR), indexed	—	—	●

● Required · ○ Preliminary / sample. All documents in English; drum labels bilingual English / French.

9.2 Certification

ISO 9001	CE · CPR	RoHS · REACH	Type tests
Quality management system	EN 50575 · DoP class E_{ca}	2011/65/EU · (EU) 2015/863 (EC) 1907/2006	HD 620 S2 / IEC 60502-2 independent laboratory
Cert. No. — HOLD-03	DoP No. — HOLD-03	Report No. — HOLD-03	Report No. — HOLD-03

10 Marking, packing, logistics and preservation

10.1 Marking and packing

Sheath marking	Embossed or ink-jet, intervals ≤ 1 m, e.g.: **FEICHUN CABLE · N2XSY 1×240 RM/25 6/10 kV · HD 620 S2 / IEC 60502-2 · CE E_{ca} · 2026 · [BATCH] · [METRE]**
Project marking	Project identifier and PO number added to sheath or drum label on request
Length marking	Sequential metre marking, accuracy ± 0.5 %
Delivery length	Per drum schedule; tolerance 0 / + 2 %; one continuous length per drum, no joints
Drums	Heat-treated timber drums to ISPM 15, or steel drums for large sizes; barrel Ø ≥ 25 × D; full timber lagging or plywood protection
Cable ends	Both ends sealed with heat-shrink end caps; inner end accessible for testing; pulling eye on request
Drum label	English / French: manufacturer, designation, voltage, length, gross / net mass, drum and batch no., PO and item no., rolling-direction arrow, CE / CPR label

10.2 Logistics to the Republic of Guinea

- Seaworthy export packing for ocean freight and tropical climates; drums sized for 40 ft containers, flat-racks or break-bulk as per drum schedule.
- Shipping documents: commercial invoice, packing list, certificate of origin, bill of lading, fumigation / ISPM 15 evidence and test certificates — formats per Purchaser's logistics procedure.
- Delivery terms per contract Incoterm; FeiChun coordinates with the Purchaser's freight forwarder for port of discharge and site delivery.

10.3 Site storage and preservation — tropical conditions

- Store drums upright on flanges on firm, level, well-drained hardstand; never lay drums flat.
- Chock drums on both sides; keep lagging in place until installation.
- Protect from standing water during the wet season; raise above flood level.
- Inspect end caps monthly and after storms; re-seal immediately if damaged.
- Shade or cover drums for long-term storage to limit UV and heat exposure.
- Roll drums only in the direction of the arrow; lift with spindle bar and spreader.

11 Health, safety, environment and product stewardship

FeiChun recognises that safety, environmental performance and responsible supply are core expectations of major mining projects. This section summarises how the product and its supply support those expectations.

11.1 Safety in handling and installation

Drum handling	Gross drum mass shown on every label. Lift only with spindle bar and spreader or by forklift under both flanges; never lift by the lagging or drop drums from transport.
Pulling operations	Maximum pulling forces and bending radii given in Section 7.5 to keep installation within safe limits; tension monitoring recommended.
Fire performance	Flame retardant to EN 60332-1-2; CPR class E_{ca}. Option H (LSZH) for occupied or enclosed areas where smoke and corrosive gas must be limited.
Material safety	Safety data for insulation and sheath compounds available on request; no hazardous substances released in normal use.

11.2 Environment and product stewardship

Substances

RoHS-compliant, lead-free PVC compound. REACH SVHC declaration provided with the MDR.

Recyclability

Copper makes up approx. 40 – 85 % of cable mass and is fully recyclable. XLPE and PVC are separable at end of life.

Packaging

ISPM 15 heat-treated timber; minimal plastic. Steel drums can be specified for reuse.

11.3 Responsible supply

- Copper rod and polymer compounds sourced from qualified, audited suppliers, with traceability from raw material lot to drum number.
- Supplier code of conduct, conflict-minerals and modern-slavery declarations can be provided to support the Purchaser's supplier due diligence.
- Product carbon footprint data for the supplied cables can be prepared on request.

> Copper share is calculated from the conductor and screen copper content in Section 7.1 (item A approx. 40 %, item B approx. 80 %).

12 Warranty, support and approval

Manufacturer / origin	Anhui FeiChun Special Cable Co., Ltd. · Made in China
Warranty	12 months from commissioning or 18 months from shipment, whichever comes first, subject to storage, installation and operation in accordance with this document — or as per contract
Engineering support	Project-specific EN 60287 ratings, screen bonding study, pulling-tension calculation, selection of HD 629.1 tested joints and terminations
Site support	Installation supervision and after-installation test support available on request

Prepared	Checked	Approved
Design Engineer, MV Cables	Engineering / QA Manager	Technical Director
Signature · Date	Signature · Date	Signature · Date

A Appendix A — Abbreviations

BIL	Basic insulation level (lightning impulse)
CCV	Catenary continuous vulcanisation
CoA	Certificate of analysis
CPR	Construction Products Regulation (EU) 305/2011
CWS	Copper wire screen
DoP	Declaration of performance
EPCM	Engineering, procurement, construction management
HD	CENELEC harmonisation document
IFR / IFA / IFU	Issued for review / approval / use
ITP	Inspection and test plan
LSZH	Low smoke, zero halogen
MDR	Manufacturer's data report
NCR	Non-conformance report
PD	Partial discharge
SVL	Sheath voltage limiter
TPI	Third-party inspection
U_0 / U / Um	Phase-earth / phase-phase / highest voltage
VDRL	Vendor data requirements list
VLF	Very low frequency (test)
XLPE	Cross-linked polyethylene

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