

دوڪاب - HV
Ducab - HV

Introduction

Ducab HV (DHV) is the first dedicated high voltage (60kV – 150kV) and extra high voltage (220kV – 500kV) power cable manufacturing facility in the Middle East. The company is a joint venture between Ducab Group (50%); Abu Dhabi Water and Electricity Authority (ADWEA – 25%) and Dubai Electricity and Water Authority (DEWA – 25%).

This unique partnership draws on the collective strengths of its shareholders:

Ducab Group - proven local power cable manufacturing quality up to and including 132kV. The first of Ducab's factories was erected in Jebel Ali, Dubai in 1979, under the auspices of BICC, with its first HV cable supplied in 2004. Now generating turnover in excess of US\$1 billion, the Group manufactures cables in four UAE based factories, including a copper rod manufacturing facility and the DHV plant, and one UK based factory. Ducab Group still bears the BICC brand.

ADWEA and DEWA - represent the two largest water and electricity authorities in the region and are experienced leaders in the electricity supply industry. Due to the rapid growth associated with both emirates, each owns, operates and installs extensive underground (LV, MV, HV and EHV) cable networks with Abu Dhabi controlling one of the world's largest 400kV XLPE underground cable networks.

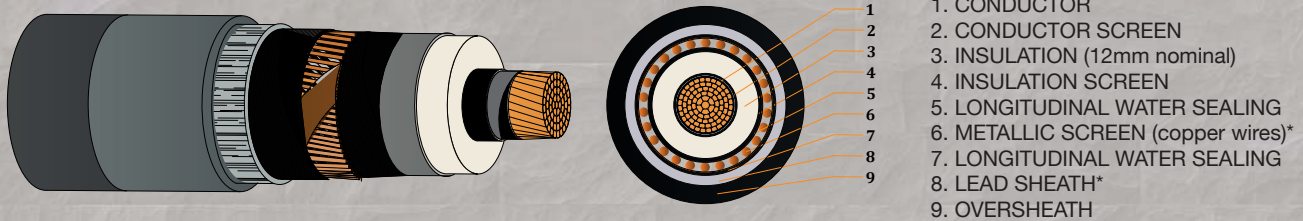
The DHV facility is a state of the art plant employing the latest machinery and technology available to produce HV and EHV cable. In order for the factory to maximise its resources and produce world's best practice within a reliable and repeatable process it was decided at the outset to also align with an experienced cable technology partner.

HV and EHV manufacturing technology has been in existence since the 1960's when Japanese cable makers were the first to produce XLPE insulated cables in these voltage ranges. A natural fit with a technology leader has therefore now also been cemented with the signing of a technology transfer agreement between DHV and J-Power Systems (a fully owned subsidiary company of Sumitomo Electric Industries Ltd - Japan).

The combined experience, technology and know how brought together by DHV's facilities, its shareholders and its engagement with its technology partner culminate in making it a formidable player in the power cable market. The company draws on the best available resources world wide and looks forward to bringing its customer base **Energy at a Higher Level.**

The DHV plant was formally inaugurated by His Highness Sheikh Mohammed Bin Rashid Al Maktoum, UAE Vice-President, Prime Minister and Ruler of Dubai on 29 November 2011 and in the presence of His Highness Sheikh Hamed Bin Zayed Al Nahyan, Chairman of the Abu Dhabi Crown Prince's Court.

VOLTAGE 60 kV ($U_m = 72.5$ kV)



* Earth fault current for screen is 40 kA for 1s

Cross section of copper conductor	Diameter of conductor	Diameter over insulation	Cross section area of copper wires screen	Thickness of oversheath	Overall diameter	Mass of cable Approx.	Charging current per phase	Induced voltage (trefoil formation direct buried)
mm ²	mm	mm	mm ²	mm	mm	kg/m	A/km	V/km
240	18.3	46.4	235	4.0	70	13.1	2.1	28
300	20.4	48.5	235	4.0	72	14.0	2.2	32
400	23.0	51.1	233	4.0	75	15.1	2.4	34
500	26.2	54.2	230	4.0	78	16.6	2.6	39
630	30.4	58.4	230	4.0	82	18.5	2.9	44
800	34.5	62.5	225	4.0	86	20.8	3.1	48
1000	39.2	67.2	220	4.0	91	23.6	3.4	53
1200	45.0	73.7	216	4.5	99	26.9	3.8	60
1600	51.0	79.7	213	4.5	105	31.2	4.2	68
2000	56.0	84.7	207	4.5	110	35.4	4.6	75
2500	62.0	90.7	202	4.5	116	41.2	4.9	80

Cross section of copper conductor	Capacitance	Inductance		Conductor short circuit current for 1s	Current Carrying Capacity for single point and cross bonded			
		Flat (200 mm spacing)	Trefoil (touching)		Flat (200 mm spacing)		Trefoil (touching)	
					Direct buried	In Air	Direct buried	In Air
mm ²	μF/km	mH/km	mH/km	kA	A	A	A	A
240	0.172	0.667	0.457	34.3	530	620	490	550
300	0.185	0.645	0.441	42.9	600	710	555	625
400	0.200	0.621	0.424	57.2	690	825	630	720
500	0.216	0.595	0.407	71.5	780	950	720	830
630	0.239	0.565	0.387	90.1	885	1120	810	960
800	0.260	0.540	0.371	114	985	1265	905	1090
1000	0.286	0.515	0.357	143	1090	1430	990	1210
1200	0.319	0.487	0.345	172	1245	1685	1150	1440
1600	0.354	0.462	0.333	229	1415	1975	1300	1670
2000	0.380	0.443	0.323	286	1550	2215	1410	1840
2500	0.412	0.432	0.313	358	1670	2460	1520	2025

RATING FACTORS

Standard laying conditions:

Ground temperature: 35 °C

Air temperature: 50 °C

Ground thermal resistivity : 1 K·m/W

Number of circuits: 1 circuit

Laying depth: 1 m

Distance between conductors (flat): 200 mm

Laying depth

Laying depth [m]	Factor
0.7	1.05
0.9	1.01
1.0	1.00
1.2	0.98
1.4	0.96
1.6	0.94
1.8	0.93
2.0	0.92
2.2	0.91
2.4	0.90
2.6	0.89

Ground temperature

Ground Temperature [°C]	Factor
5	1.25
10	1.21
15	1.17
20	1.13
25	1.09
30	1.05
35	1.00
40	0.95
45	0.90
50	0.85
55	0.79

Air temperature

Air Temperature [°C]	Factor
5	1.54
10	1.48
15	1.43
20	1.38
25	1.32
30	1.26
35	1.20
40	1.14
45	1.07
50	1.00
55	0.93

Soil thermal resistivity

Soil thermal resistivity [K·m/W]	1.0	1.1	1.2	1.3	1.4	1.5	2	2.5
		1.00	0.96	0.93	0.89	0.87	0.84	0.74

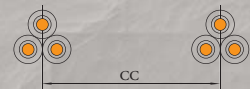
Phase spacing (Single phase) Single circuit in flat formation in ground

Phase spacing PS [mm]	200	250	300	400	500	600
Factor	1.00	1.05	1.09	1.14	1.17	1.20



Group of circuits in ground in trefoil formation

Distance cc between groups [mm]	Number of groups				
	2	3	4	5	6
400	0.82	0.73	0.68	0.65	0.62
500	0.84	0.76	0.71	0.68	0.66
600	0.86	0.78	0.74	0.70	0.69
800	0.88	0.81	0.78	0.75	0.74
1000	0.90	0.84	0.81	0.79	0.77
1200	0.92	0.86	0.84	0.82	0.81
1500	0.94	0.89	0.87	0.86	0.85
2000	0.96	0.92	0.91	0.90	0.89

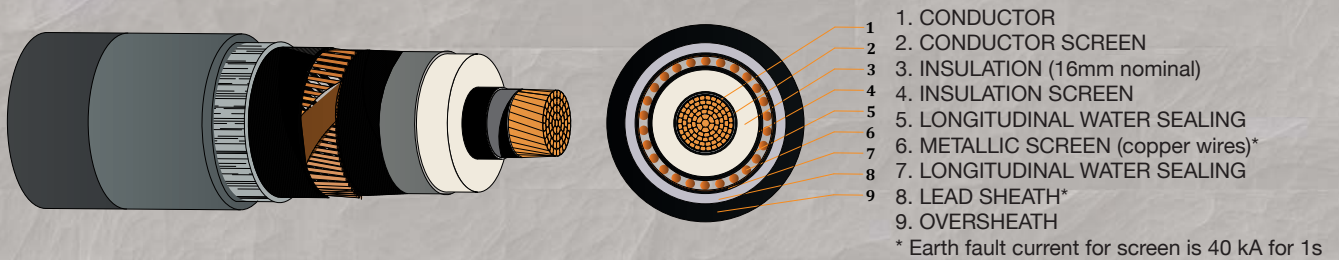


Group of circuits in ground in flat formation

Distance cc between groups [mm]	Number of groups		
	2	3	4
1000	0.90	0.85	0.79
1200	0.92	0.85	0.83
1400	0.93	0.87	0.85
1800	0.94	0.90	0.88
2000	0.95	0.91	0.90



VOLTAGE 132 kV ($U_m = 145$ kV)



Cross section of copper conductor	Diameter of conductor	Diameter over insulation	Cross section area of copper wires screen	Thickness of oversheath	Overall diameter	Mass of cable Approx.	Charging current per phase	Induced voltage (trefoil formation direct buried)
mm ²	mm	mm	mm ²	mm	mm	kg/m	A/km	V/km
240	18.3	54.6	229	4.0	78	14.8	3.4	27
300	20.4	55.6	229	4.0	80	15.5	3.6	30
400	23.0	59.3	226	4.0	83	16.8	3.8	34
500	26.2	62.5	223	4.0	86	17.6	4.2	39
630	30.4	66.6	222	4.0	91	20.3	4.6	44
800	34.5	70.7	218	4.0	94	22.6	5.0	48
1000	39.2	75.6	212	4.0	99	25.3	5.4	53
1200	45.0	81.9	212	4.5	107	28.4	6.0	60
1600	51.0	87.9	204	4.5	113	33.0	6.6	68
2000	56.0	92.9	200	4.5	118	37.3	7.1	67
2500	62.0	99.9	195	4.5	124	43.3	7.7	71

Cross section of copper conductor	Capacitance	Inductance		Conductor short circuit current for 1s	Current Carrying Capacity for single point and cross bonded			
		Flat (200 mm spacing)	Trefoil (touching)		Flat (200 mm spacing)		Trefoil (touching)	
					Direct buried	In Air	Direct buried	In Air
mm ²	μF/km	mH/km	mH/km	kA	A	A	A	A
240	0.141	0.666	0.478	34.3	525	610	490	545
300	0.151	0.645	0.461	42.9	590	700	555	620
400	0.160	0.621	0.445	57.2	675	810	630	715
500	0.176	0.595	0.428	71.5	770	940	715	825
630	0.193	0.565	0.407	90.1	870	1090	810	950
800	0.208	0.540	0.389	114	980	1250	905	1080
1000	0.226	0.514	0.373	143	1050	1420	1000	1210
1200	0.252	0.486	0.361	172	1235	1660	1155	1435
1600	0.277	0.462	0.347	229	1400	1940	1305	1645
2000	0.297	0.443	0.337	286	1535	2165	1425	1835
2500	0.321	0.422	0.327	358	1655	2405	1535	2020

RATING FACTORS

Standard laying conditions:

Ground temperature: 35 °C

Air temperature: 50 °C

Ground thermal resistivity : 1 K·m/W

Number of circuits: 1 circuit

Laying depth: 1 m

Distance between conductors (flat): 200 mm

Laying depth

Laying depth [m]	Factor
0.7	1.05
0.9	1.01
1.0	1.00
1.2	0.98
1.4	0.96
1.6	0.94
1.8	0.93
2.0	0.92
2.2	0.91
2.4	0.90
2.6	0.89

Ground temperature

Ground Temperature [°C]	Factor
5	1.25
10	1.21
15	1.17
20	1.13
25	1.09
30	1.05
35	1.00
40	0.95
45	0.90
50	0.85
55	0.79

Air temperature

Air Temperature [°C]	Factor
5	1.54
10	1.48
15	1.43
20	1.38
25	1.32
30	1.26
35	1.20
40	1.14
45	1.07
50	1.00
55	0.93

Soil thermal resistivity

Soil thermal resistivity [K·m/W]	1.0	1.1	1.2	1.3	1.4	1.5	2	2.5
		1.00	0.96	0.93	0.89	0.87	0.84	0.74

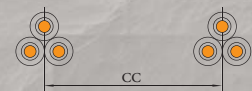
Phase spacing (Single phase) Single circuit in flat formation in ground

Phase spacing PS [mm]	200	250	300	400	500	600
Factor	1.00	1.05	1.09	1.14	1.17	1.20



Group of circuits in ground in trefoil formation

Distance cc between groups [mm]	Number of groups				
	2	3	4	5	6
400	0.82	0.73	0.68	0.65	0.62
500	0.84	0.76	0.71	0.68	0.66
600	0.86	0.78	0.74	0.70	0.69
800	0.88	0.81	0.78	0.75	0.74
1000	0.90	0.84	0.81	0.79	0.77
1200	0.92	0.86	0.84	0.82	0.81
1500	0.94	0.89	0.87	0.86	0.85
2000	0.96	0.92	0.91	0.90	0.89

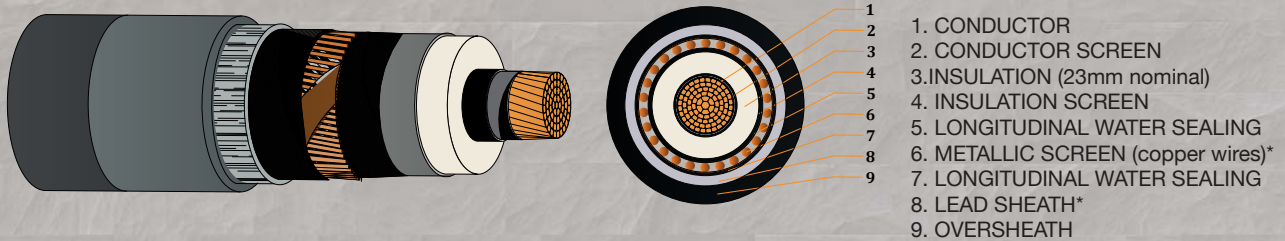


Group of circuits in ground in flat formation

Distance cc between groups [mm]	Number of groups		
	2	3	4
1000	0.90	0.85	0.79
1200	0.92	0.85	0.83
1400	0.93	0.87	0.85
1800	0.94	0.90	0.88
2000	0.95	0.91	0.90



VOLTAGE 220 kV ($U_m = 245$ kV)



* Earth fault current for screen is 40 kA for 1s

Cross section of copper conductor	Diameter of conductor	Diameter over insulation	Cross section area of copper wires screen	Thickness of oversheath	Overall diameter	Mass of cable Approx.	Charging current per phase	Induced voltage (trefoil formation direct buried)
mm ²	mm	mm	mm ²	mm	mm	kg/m	A/km	V/km
500**	26.2	78.6	213	4.5	103	22.6	5.4	37
630	30.4	80.8	207	4.5	106	24.3	6.0	42
800	34.5	84.9	202	4.5	110	26.7	6.5	47
1000	39.2	89.6	202	4.5	114	29.6	7.0	52
1200	45.0	95.4	196	5.0	122	33.0	7.7	59
1600	51.0	101.4	190	5.0	128	37.6	8.4	67
2000	56.0	106.9	185	5.0	133	42.2	9.0	72
2500	62.0	112.9	178	5.0	139	48.2	9.8	78

** 24mm insulation thickness

Cross section of copper conductor	Capacitance	Inductance		Conductor short circuit current for 1s	Current Carrying Capacity for single point and cross bonded			
		Flat (200 mm spacing)	Trefoil (touching)		Flat (200 mm spacing)		Trefoil (touching)	
					Direct buried	In Air	Direct buried	In Air
mm ²	μF/km	mH/km	mH/km	kA	A	A	A	A
500	0.135	0.595	0.462	71.5	750	900	710	810
630	0.151	0.565	0.438	90.1	855	1050	810	935
800	0.163	0.540	0.420	114	955	1200	905	1065
1000	0.176	0.514	0.403	143	1060	1360	1000	1200
1200	0.193	0.487	0.388	172	1205	1590	1150	1405
1600	0.210	0.462	0.373	229	1370	1860	1300	1625
2000	0.225	0.443	0.362	286	1490	2075	1420	1805
2500	0.245	0.423	0.350	358	1595	2290	1530	1981

RATING FACTORS

Standard laying conditions:

Ground temperature: 35 °C

Air temperature: 50 °C

Ground thermal resistivity : 1 K·m/W

Number of circuits: 1 circuit

Laying depth: 1 m

Distance between conductors (flat): 200 mm

Laying depth

Laying depth [m]	Factor
0.7	1.05
0.9	1.01
1.0	1.00
1.2	0.98
1.4	0.96
1.6	0.94
1.8	0.93
2.0	0.92
2.2	0.91
2.4	0.90
2.6	0.89

Ground temperature

Ground Temperature [°C]	Factor
5	1.25
10	1.21
15	1.17
20	1.13
25	1.09
30	1.05
35	1.00
40	0.95
45	0.90
50	0.85
55	0.79

Air temperature

Air Temperature [°C]	Factor
5	1.54
10	1.48
15	1.43
20	1.38
25	1.32
30	1.26
35	1.20
40	1.14
45	1.07
50	1.00
55	0.93

Soil thermal resistivity

Soil thermal resistivity [K·m/W]	1.0	1.1	1.2	1.3	1.4	1.5	2	2.5
		1.00	0.96	0.93	0.89	0.87	0.84	0.74

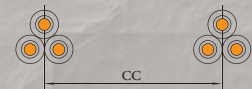
Phase spacing (Single phase) Single circuit in flat formation in ground

Phase spacing PS [mm]	200	250	300	400	500	600
Factor	1.00	1.05	1.09	1.14	1.17	1.20



Group of circuits in ground in trefoil formation

Distance cc between groups [mm]	Number of groups				
	2	3	4	5	6
400	0.82	0.73	0.68	0.65	0.62
500	0.84	0.76	0.71	0.68	0.66
600	0.86	0.78	0.74	0.70	0.69
800	0.88	0.81	0.78	0.75	0.74
1000	0.90	0.84	0.81	0.79	0.77
1200	0.92	0.86	0.84	0.82	0.81
1500	0.94	0.89	0.87	0.86	0.85
2000	0.96	0.92	0.91	0.90	0.89

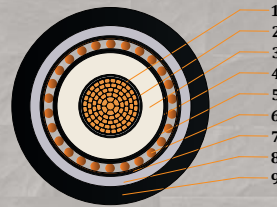
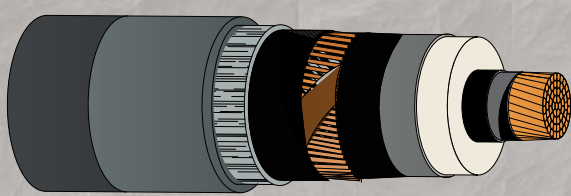


Group of circuits in ground in flat formation

Distance cc between groups [mm]	Number of groups		
	2	3	4
1000	0.90	0.85	0.79
1200	0.92	0.85	0.83
1400	0.93	0.87	0.85
1800	0.94	0.90	0.88
2000	0.95	0.91	0.90



VOLTAGE 400 kV ($U_m = 420$ kV)



1. CONDUCTOR
2. CONDUCTOR SCREEN
3. INSULATION (27mm nominal)
4. INSULATION SCREEN
5. LONGITUDINAL WATER SEALING
6. METALLIC SCREEN (copper wires)*
7. LONGITUDINAL WATER SEALING
8. LEAD SHEATH*
9. OVERSHEATH

* Earth fault current for screen is 63 kA for 1s

Cross section of copper conductor	Diameter of conductor	Diameter over insulation	Cross section area of copper wires screen	Thickness of oversheath	Overall diameter	Mass of cable Approx.	Charging current per phase	Induced voltage (trefoil formation direct buried)
mm ²	mm	mm	mm ²	mm	mm	kg/m	A/km	V/km
630**	30.4	99.8	352	6.0	129	30.9	9.2	43
800**	34.5	100.1	352	6.0	130	32.5	10.3	48
1000**	39.2	102.8	345	6.0	132	34.9	11.4	52
1200	45.0	105.9	345	6.0	136	37.7	13.9	60
1600	51.0	111.9	336	6.0	142	42.4	14.4	68
2000	56.0	116.9	336	6.0	147	46.9	15.3	74
2500	62.0	123.9	328	6.0	154	53.3	16.6	80

**32mm insulation thickness for 630mm², 30mm insulation thickness for 800mm², 29mm insulation thickness for 1000mm²

Cross section of copper conductor	Capacitance	Inductance		Conductor short circuit current for 1s	Current Carrying Capacity for single point and cross bonded			
		Flat (200 mm spacing)	Trefoil (touching)		Flat (200 mm spacing)		Trefoil (touching)	
					Direct buried	In Air	Direct buried	In Air
mm ²	μF/km	mH/km	mH/km	kA	A	A	A	A
630	0.135	0.565	0.477	90.1	830	1005	805	920
800	0.150	0.540	0.453	114	935	1160	900	1050
1000	0.166	0.514	0.430	143	1035	1315	990	1175
1200	0.202	0.487	0.409	172	1180	1545	1140	1385
1600	0.208	0.462	0.393	229	1330	1800	1295	1600
2000	0.221	0.443	0.380	286	1445	2005	1410	1780
2500	0.240	0.420	0.368	358	1550	2215	1520	1950

RATING FACTORS

Standard laying conditions:

Ground temperature: 35 °C

Air temperature: 50 °C

Ground thermal resistivity : 1 K·m/W

Number of circuits: 1 circuit

Laying depth: 1 m

Distance between conductors (flat): 200 mm

Laying depth

Laying depth [m]	Factor
0.7	1.05
0.9	1.01
1.0	1.00
1.2	0.98
1.4	0.96
1.6	0.94
1.8	0.93
2.0	0.92
2.2	0.91
2.4	0.90
2.6	0.89

Ground temperature

Ground Temperature [°C]	Factor
5	1.25
10	1.21
15	1.17
20	1.13
25	1.09
30	1.05
35	1.00
40	0.95
45	0.90
50	0.85
55	0.79

Air temperature

Air Temperature [°C]	Factor
5	1.54
10	1.48
15	1.43
20	1.38
25	1.32
30	1.26
35	1.20
40	1.14
45	1.07
50	1.00
55	0.93

Soil thermal resistivity

Soil thermal resistivity [K·m/W]	1.0	1.1	1.2	1.3	1.4	1.5	2	2.5
		1.00	0.96	0.93	0.89	0.87	0.84	0.74

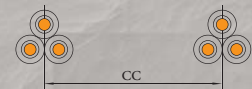
Phase spacing (Single phase) Single circuit in flat formation in ground

Phase spacing PS [mm]	200	250	300	400	500	600
Factor	1.00	1.05	1.09	1.14	1.17	1.20



Group of circuits in ground in trefoil formation

Distance cc between groups [mm]	Number of groups				
	2	3	4	5	6
400	0.82	0.73	0.68	0.65	0.62
500	0.84	0.76	0.71	0.68	0.66
600	0.86	0.78	0.74	0.70	0.69
800	0.88	0.81	0.78	0.75	0.74
1000	0.90	0.84	0.81	0.79	0.77
1200	0.92	0.86	0.84	0.82	0.81
1500	0.94	0.89	0.87	0.86	0.85
2000	0.96	0.92	0.91	0.90	0.89



Group of circuits in ground in flat formation

Distance cc between groups [mm]	Number of groups		
	2	3	4
1000	0.90	0.85	0.79
1200	0.92	0.85	0.83
1400	0.93	0.87	0.85
1800	0.94	0.90	0.88
2000	0.95	0.91	0.90



Product and Service Range

Ducab HV offers turnkey cable system solutions:

Manufacture of XLPE insulated power cables from 60kV – 500kV

- Conductors in either copper or aluminium
- Conductor sizes from 150mm² – 2500mm²
- Cables are currently finished with a combination of either a lead sheath and copper wire screen or a laminated sheath and copper wire screen
- Long length capability

Accessories

- Full range to suit cable, from pre-approved suppliers
- System type tested/pre-qualification tested
- Proven compatibility of components

Technical

- Theory and specifications
- System design and optimization
- Earthing and bonding design

Installation

- Site supervision services
- Civil work
- Cable installation
- Jointing and terminating

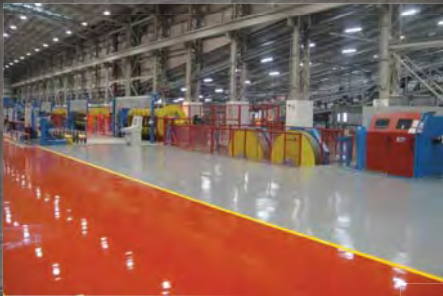
Training

- In-house and tailor made to customer's requirements

Testing

- Dedicated Type Test laboratory
- 600kV ac test capability
- 1900kVp impulse generator





دوڪاب - HV
Ducab - HV



دوڪاب Ducab

