

HVDC Light[®] Cables

Submarine and land power cables



ABB



The HVDC Light cables to offshore platform



The light and robust HVDC Light cables can be laid with very cost efficient laying methods

HVDC Light System

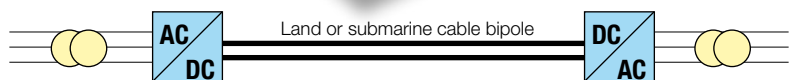
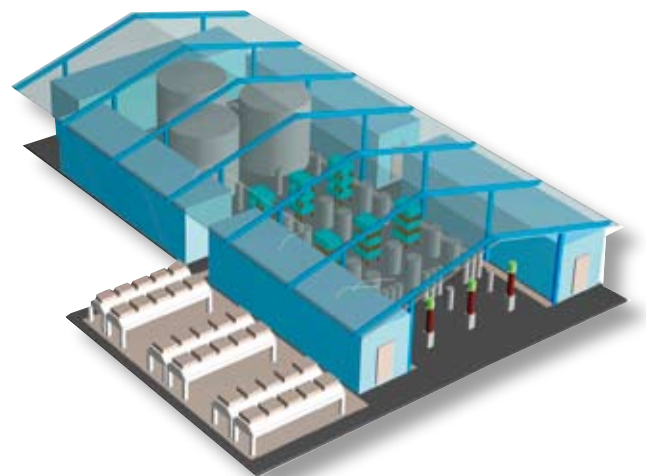
HVDC Light is a transmission system in one ABB turn-key delivery including cables, converters, transformers etcetera. ABB has the capability to provide the complete chain of services from design to commissioning.

Applications:

- Power transmission
- Reactive power control in both connected AC networks
- Connecting not synchronized networks, offshore platforms, wind farms etc.

Main technical features are:

- Advantageous for long distance cable transmission
- Power reversal without interruption
- Can start up dead AC network
- No increase of short circuit currents
- Equal or longer service life than XLPE AC cables.





We produced and installed MurrayLink, the world's longest land cable

Cable ship for the Cross Sound Cable 330 MW feeder to Long Island - floating the cable end ashore

HVDC Light Cables

The cable system is complete with cables, accessories and installation services.

The cables are operated in bipolar mode, one cable with positive polarity and one cable with negative polarity.

The cables have polymeric insulating material, which is very strong and robust. This strength and flexibility make the HVDC Light cables perfect for severe installation conditions:

- The submarine cables can be laid in deeper waters and on rough bottoms
- The land cables can be installed less costly with ploughing technique
- HVDC cables can now also go overhead with Aerial Cables.

Environmentally friendly

- Magnetic fields are eliminated since HVDC Light cables are laid in pairs with antiparallel DC currents
- Risk of oil spill, as in paper-oil-insulated cables, is eliminated.

More than 1,600 km HVDC Light cables installed:

Submarine cable reference projects

Estlink, Estonia - Finland
Interconnecting the Baltic countries with the Nordic countries
350 MW at 150 kV, 2 x 75 km submarine cable, 2 x 29 km land cable, year 2006

Troll A offshore gas platform, Norway
Unique and efficient combination of power transmission and frequency regulated electric drives
2 x 40 MW at 80 kV, 4 x 68 km, year 2004

Cross Sound Cable, USA
Fully controllable power to Long Island
330 MW at 150 kV, 2 x 42 km, year 2002

Land cable reference projects

MurrayLink, Victoria – South Australia
The world's longest land cable
200 MW at 150 kV, 2 x 180 km, year 2002

DirectLink, New South Wales – Queensland
Different tariffs call for trade
3 x 60 MW at 84 kV, 6 x 65 km, year 2000

Tjaereborg, Denmark
Power quality and variable frequency for wind mill parks
8 MW at 10 kV, 2 x 4.5 km, year 2000

Gotland Island, Sweden
Network control at extensive use of wind mills
50 MW at 80 kV, 2 x 70 km, year 1999



ROV, Remote Operated Vehicle for under water monitoring of submarine cable laying



Cable loaded on board the laying vessel, directly from the ABB high voltage cable factory

HVDC Light Cable bipole data

1. Tropical climate. Cables with copper conductor, normal for submarine cables.

Area	Ampacity		80 kV cable bipole				150 kV cable bipole				300 kV cable bipole			
	Close laying	Spaced laying	Close laying	Spaced laying	Weight per cable	Outer cable diam.	Close laying	Spaced laying	Weight per cable	Outer cable diam.	Close laying	Spaced laying	Weight per cable	Outer cable diam.
mm ²	A	A	MW	MW	kg/m	mm	MW	MW	kg/m	mm	MW	MW	kg/m	mm
95	282	338	45	54	4.7	42	85	101	8.5	60	169	203	15	90
120	323	387	52	62	5.5	44	97	116	9.4	61	194	232	16	91
150	363	436	58	70	6.7	47	109	131	10	63	218	262	17	93
185	411	496	66	79	7.4	49	123	149	11	64	247	298	18	95
240	478	580	76	93	8.4	52	143	174	12	67	287	348	20	99
300	544	662	87	106	9.4	56	163	199	13	69	326	397	22	102
400	626	765	100	122	11	61	188	230	16	75	376	459	24	105
500	722	887	116	142	13	66	217	266	18	78	433	532	26	108
630	835	1030	134	165	15	71	251	309	21	83	501	618	30	114
800	960	1187	154	190	17	76	288	356	24	88	576	712	33	118
1000	1092	1355	175	217	21	81	328	407	26	96	655	813	37	122
1200	1188	1474	190	236	24	85	356	442	29	100	713	884	40	126
1400	1297	1614	208	258	27	89	389	484	32	103	778	968	43	130
1600	1397	1745	224	279	30	92	419	524	35	107	838	1 047	47	133
1800	1490	1860	238	298	32	96	447	558	38	110	894	1 116	50	137
2000	1589	1987	254	318	35	99	477	596	41	113	953	1 192	53	140
2200	1676	2086	268	334	40	103	503	626	45	118	1 006	1252	58	145
2400	1764	2198	282	352	42	106	529	659	48	121	1 058	1319	61	148
2600	1848	2307	296	369	45	109	554	692	51	123	1 109	1384	63	150
2800	1927	2401	308	384	48	111	578	720	54	126	1 156	1441	67	152
3000	2007	2512	321	402	50	114	602	754	57	128	1 204	1 507	70	155

Sea soil: Temperature 28 deg.C, burial 1.0 meter, thermal resistivity 1.2 K x W/m

Converter types

80 kV modules			150 kV modules			300 kV modules		
Converter	DC current	Sending power	Converter	DC current	Sending power	Converter	DC current	Sending power
Type	A	MW	Type	A	MW	Type	A	MW
M1	627	102.0	M4	627	191.3	M7	627	382.6
M2	1233	200.5	M5	1233	376.0	M8	1233	752.1
M3	1881	306.1	M6	1881	573.9	M9	1881	1147.9



Submarine and land HVDC Light cables



The precision work of submarine cable laying is closely monitored in every step

2. Tropical climate. Cables with aluminium conductor, normal for land cables.

for higher transmission capacity, see cables with copper conductor

Area	Ampacity		80 kV cable bipole				150 kV cable bipole				300 kV cable bipole			
	Close laying	Spaced laying	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.
mm ²	A	A	MW	MW	kg/m	mm	MW	MW	kg/m	mm	MW	MW	kg/m	mm
95	211	258	34	41	1.2	33	-	-	-	-	-	-	-	-
120	240	298	38	48	1.3	34	-	-	-	-	-	-	-	-
150	269	332	43	53	1.5	36	81	100	2	50	-	-	-	-
185	305	378	49	60	1.6	38	92	113	3	52	-	-	-	-
240	351	439	56	70	1.9	40	105	132	3	54	211	263	5	80
300	400	503	64	80	2.1	43	120	151	3	57	240	302	6	82
400	456	581	73	93	3	46	137	174	4	60	274	349	6	86
500	536	672	86	108	3	50	161	202	4	63	322	403	7	89
630	591	744	95	119	3	53	177	223	5	67	355	446	8	93
800	711	898	114	144	4	57	213	269	5	71	427	539	8	97
1000	811	1026	130	164	5	61	243	308	6	75	487	616	9	101
1200	888	1123	142	180	6	65	266	337	7	79	533	674	10	105
1400	980	1242	157	199	6	69	294	373	8	83	588	745	11	108
1600	1044	1326	167	212	7	72	313	398	9	86	626	796	12	112
1800	1129	1434	181	229	8	75	339	430	9	89	677	860	13	115
2000	1198	1524	192	244	8	78	359	457	10	92	719	914	14	118
2200	1265	1600	202	256	9	81	380	480	11	95	759	960	15	121
2400	1330	1681	213	269	10	84	399	504	11	98	798	1 009	16	123
2600	1394	1762	223	282	10	86	418	529	12	100	836	1 057	16	126
2800	1455	1840	233	294	11	89	437	552	13	103	873	1 104	17	128
3000	1513	1916	242	307	12	91	454	575	14	105	908	1 150	18	131

Soil: Temperature 28 deg.C, burial 1.0 meter, thermal resistivity 1.2 K x W/m

Converter types

80 kV modules			150 kV modules			300 kV modules		
Converter	DC current	Sending power	Converter	DC current	Sending power	Converter	DC current	Sending power
Type	A	MW	Type	A	MW	Type	A	MW
M1	627	102.0	M4	627	191.3	M7	627	382.6
M2	1233	200.5	M5	1233	376.0	M8	1233	752.1
M3	1881	306.1	M6	1881	573.9	M9	1881	1147.9



Cable laying vessel at the ABB harbor



Trenching and laying of land cables in Australia

HVDC Light Cable bipole data

3. Moderate climate. Cables with copper conductor, normal for submarine cables.

Area	Ampacity		80 kV cable bipole				150 kV cable bipole				300 kV cable bipole			
	Close laying	Spaced laying	Close laying	Spaced laying	Weight per cable	Outer cable diam.	Close laying	Spaced laying	Weight per cable	Outer cable diam.	Close laying	Spaced laying	Weight per cable	Outer cable diam.
mm ²	A	A	MW	MW	kg/m	mm	MW	MW	kg/m	mm	MW	MW	kg/m	mm
95	343	404	55	65	4.7	42	103	121	8.5	60	206	242	15	90
120	392	463	63	74	5.5	44	118	139	9.4	61	235	278	16	91
150	441	523	71	84	6.7	47	132	157	10	63	265	314	17	93
185	500	596	80	95	7.4	49	150	179	11	64	300	358	18	95
240	583	697	93	112	8.4	52	175	209	12	67	350	418	20	99
300	662	797	106	128	9.4	56	199	239	13	69	397	478	22	102
400	765	922	122	148	11	61	230	277	16	75	459	553	24	105
500	883	1072	141	172	13	66	265	322	18	78	530	643	26	108
630	1023	1246	164	199	15	71	307	374	21	83	614	748	30	114
800	1175	1438	188	230	17	76	353	431	24	88	705	863	33	118
1000	1335	1644	214	263	21	81	401	493	26	96	801	986	37	122
1200	1458	1791	233	287	24	85	437	537	29	100	875	1 075	40	126
1400	1594	1962	255	314	27	89	478	589	32	103	956	1 177	43	130
1600	1720	2123	275	340	30	92	516	637	35	107	1 032	1 274	47	133
1800	1830	2265	293	362	32	96	549	680	38	110	1 098	1 359	50	137
2000	1953	2407	312	385	35	99	586	722	41	113	1 172	1 444	53	140
2200	2062	2540	330	406	40	103	619	762	45	118	1 237	1 524	58	145
2400	2170	2678	347	428	42	106	651	803	48	121	1 302	1 607	61	148
2600	2275	2814	364	450	45	109	683	844	51	123	1 365	1 688	63	150
2800	2373	2937	380	470	48	111	712	881	54	126	1 424	1 762	67	152
3000	2473	3066	396	491	50	114	742	920	57	128	1 484	1 840	70	155

Sea soil: Temperature 15 deg.C, burial 1.0 meter, thermal resistivity 1.0 K x W/m

Converter types

80 kV modules			150 kV modules			300 kV modules		
Converter	DC current	Sending power	Converter	DC current	Sending power	Converter	DC current	Sending power
Type	A	MW	Type	A	MW	Type	A	MW
M1	627	102.0	M4	627	191.3	M7	627	382.6
M2	1233	200.5	M5	1233	376.0	M8	1233	752.1
M3	1881	306.1	M6	1881	573.9	M9	1881	1147.9



Laying the submarine HVDC Light cable to the Troll A gas platform in the North Sea



Cable on turntable on the cable laying vessel

4. Moderate climate. Cables with aluminium conductor, normal for land cables.

for higher transmission capacity, see submarine cables with copper conductor

Area		Ampacity		80 kV cable bipole				150 kV cable bipole				300 kV cable bipole			
Conductor	Close laying	Spaced laying	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.	Close laying	Spaced sep. trenches	Weight per cable	Outer cable diam.	
mm ²	A	A	MW	MW	kg/m	mm	MW	MW	kg/m	mm	MW	MW	kg/m	mm	
95	258	310	41	50	1.2	33	-	-	-	-	-	-	-	-	
120	294	357	47	57	1.3	34	-	-	-	-	-	-	-	-	
150	330	402	53	64	1.5	36	99	121	2	50	-	-	-	-	
185	374	458	60	73	1.6	38	112	137	3	52	-	-	-	-	
240	432	533	69	85	1.9	40	130	160	3	54	259	320	5	80	
300	492	611	79	98	2.1	43	148	183	3	57	295	367	6	82	
400	565	705	90	113	3	46	170	212	4	60	339	423	6	86	
500	659	816	105	131	3	50	198	245	4	63	395	490	7	89	
630	727	964	116	154	3	53	218	289	5	67	436	578	8	93	
800	877	1094	140	175	4	57	263	328	5	71	526	656	8	97	
1000	1001	1252	160	200	5	61	300	376	6	75	601	751	9	101	
1200	1096	1371	175	219	6	65	329	411	7	79	658	823	10	105	
1400	1211	1517	194	243	6	69	363	455	8	83	727	910	11	108	
1600	1291	1621	207	259	7	72	387	486	9	86	775	973	12	112	
1800	1395	1752	223	280	8	75	419	526	9	89	837	1 051	13	115	
2000	1482	1866	237	299	8	78	445	560	10	92	889	1 120	14	118	
2200	1571	1963	251	314	9	81	471	589	11	95	943	1 178	15	121	
2400	1652	2066	264	331	10	84	496	620	11	98	991	1 240	16	123	
2600	1729	2166	277	347	10	86	519	650	12	100	1 037	1 300	16	126	
2800	1806	2263	289	362	11	89	542	679	13	103	1 084	1 358	17	128	
3000	1878	2356	300	377	12	91	563	707	14	105	1 127	1 414	18	131	

Soil: Temperature 15 deg.C, burial 1.0 meter, thermal resistivity 1.0 K x W/m

Converter types

80 kV modules			150 kV modules			300 kV modules		
Converter	DC current	Sending power	Converter	DC current	Sending power	Converter	DC current	Sending power
Type	A	MW	Type	A	MW	Type	A	MW
M1	627	102.0	M4	627	191.3	M7	627	382.6
M2	1233	200.5	M5	1233	376.0	M8	1233	752.1
M3	1881	306.1	M6	1881	573.9	M9	1881	1147.9



For additional information please contact you local ABB Sales Office

Brochure issued by:

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