

Airbag Cable

电缆：典型设计 THE CABLES: TYPICAL DESIGNS

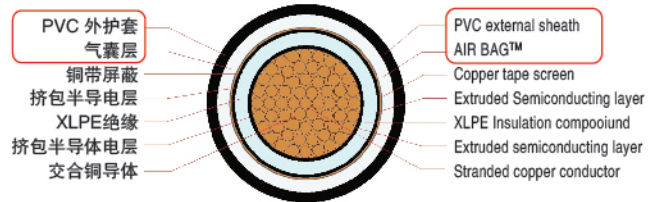
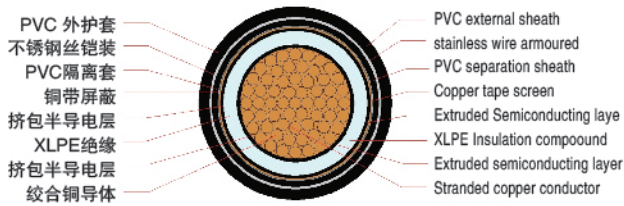
中压 MEDIUM VOLTAGE

电缆型号：YJV72 – 11kV
不锈钢丝铠装 – XLPE
1x185mm²

Cable type: YJV72 – 11kV
stainless wire armoured – XLPE
1x185mm²

电缆型号：YJ(AB)V–11 kV
气囊层–XLPE绝缘
1x185mm²

Cable type:YJ(AB)V – 11kV
AIR BAG™–XLPE insulation
1x185mm²



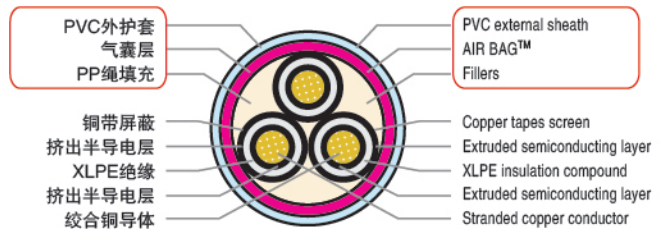
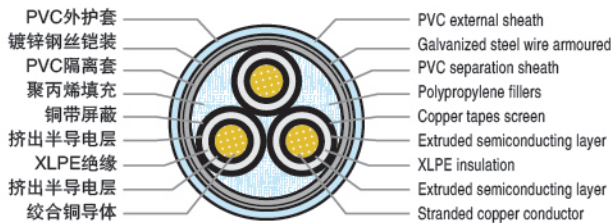
	不锈钢丝铠装 Al wires armoured	气囊电缆 AIRBAG™	DELTA
电缆重量 - kg/m Cable weight - kg/m	3.7	2.48	-33%
每盘标准长度 - m Standard reel length - m	500	750	+50%

电缆型号：ZR–YJV42 – 35kV
钢丝铠装
3x300mm²

Cable type: ZR–YJV42 – 35kV
Steel wires armoured
3x300mm²

电缆型号：ZR–YJ(AB)V – 35kV
气囊层
3x300mm²

Cable type: ZR–YJ(AB)V – 35kV
AIR BAG™
3x300mm²



	钢带铠装 STEEL TAPE ARMOURD	气囊电缆 AIRBAG™	DELTA
电缆重量 - kg/m Cable weight - kg/m	15.5	13	-16%
每盘标准长度 - m Standard reel length - m	250	300	+20%

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气囊电缆

Airbag Cable



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气囊电缆

气囊电缆革新 THE AIR BAG REVOLUTION

普睿司曼设计并拥有专利的新系统，它能提供额外的保护，保留了非铠装电缆的功能优势，甚至优于传统的铠装电缆。**气囊电缆**是一个全新的设计，可以由其自身的变形吸收运动所产生的能量。这样不会有剩余的残余能量损伤电缆的“敏感”结构，如绝缘、屏蔽。金属铠装不会如此充分，冲击的部分能量会传递到电缆的内层，潜在地损伤绝缘的完整性。

气囊电缆的保护性能和可靠性在本质上得到了改进。另外，此电缆与传统的铠装电缆相比较，重量更轻，而且更加灵活与易于安装。

气囊电缆在可靠性和重量减轻等方面的优势，使它广泛的应用于民宅、建筑、工业和公共设施。

Prysmian has designed and patented a revolutionary solution that provides better mechanical protection than traditional metal armoured cable maintaining the functional advantages of unarmoured cables. **AIR BAG™** is a radically new design that absorbs the kinetic energy of a shock by its deformation. In this way no residual energy is left to damage the "sensitive" parts of the cable such as insulation and screens. Metal armouring doesn't behave so efficiently: part of the energy of a shock is transmitted to the inner layers of the cable, potentially prejudicing the insulation's integrity.

The level of protection achieved with **AIR BAG™** and, by consequence, the reliability is substantially improved. Additionally, the cable is much lighter, flexible and easy to install than a traditional armoured cable.

Thanks to **AIR BAG™** versatility the range of applications is wide and covers residential, infrastructures, industry and utilities, always giving the same benefits in terms of reliability and weight reduction.

防护免受机械损伤 PROTECTION AGAINST MECHANICAL DAMAGE

电缆会在许多不同情况下受到损伤，事实上在所有的生产环境中。

机械滥用经常会损伤电缆绝缘以及保护屏蔽，而导致过早的和不可预期的事故，降低了长期可靠性。由此造成的经济损失和服务的中断是很容易统计的。

制造商通常使用金属铠装（钢带、钢丝等）保护电缆，或者安装在管道内。

这些解决方法都增加了额外的费用和安装时间，特别是传统的金属铠装电缆和重量、灵活性、连接安装等方面与标准的非铠装电缆相比有很大的劣势。

Cables can be damaged in many different circumstances and in virtually all operative environments.

Mechanical abuse can often damage cable insulation and protective screens, leading to a premature and unexpected failure and, in any case, to a dramatic decrease of long term reliability. The economic consequences of this and the disruptive effects on service continuity are easy to quantify.

Industry's response has been traditionally to protect cables with metal armouring (applied in tapes, wires, etc) or to install them with additional external protection such as covered trays, pipes etc. Both solutions involve significant additional costs and longer installation time. In particular the traditional metal armoured cables show a significant

disadvantage in terms of weight, flexibility, difficult jointing compared to a standard unarmoured cable.



在工厂
IN INDUSTRY



在敷设和挖掘过程中
DURING LAYING AND
DIGGING OPERATIONS

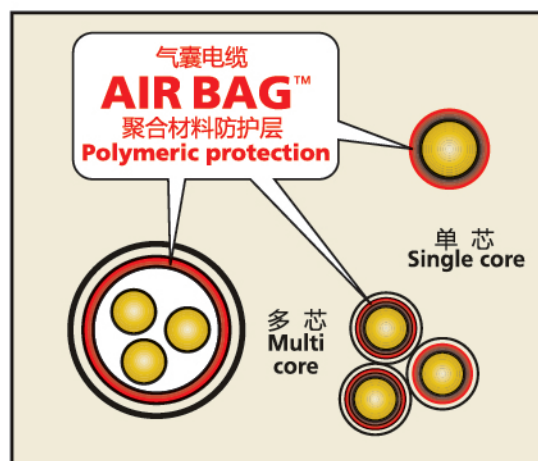


在城市建设中
IN CIVIL WORKS

设计 DESIGN

气囊电缆提供了一种机械防护，可以广泛用于多芯和单芯电缆。按照不同的要求可以设计不同的结构。聚合材料的共挤层如同一个系统一样工作，能够对冲击提供非常有效的防护。

The **AIR BAG™** system is a mechanical protection that can be applied to multicore and single core cables. Depending on specific applications different architectures are possible. The polymeric extruded layers work together as a system and provide a very effective defence against impact.



气囊电缆

它是怎样工作的 HOW IT WORKS



实验设备:
挤出高压电缆法国标准
(spec. HN 33-5-52 cl. 5.3.2.1.)

TEST DEVICE:
French specification for extruded
HV cables
(spec. HN 33-5-52 cl. 5.3.2.1.)



气囊特殊挤出层，如同一个减震缓冲器。
The Air Bag special extruded layers act like a shock absorber



金属铠装会损伤内层。
Metal armouring can damage the inner layers

金属铠装 METAL ARMoured



金属铠装具有很高的模数，即使冲击能量造成很小的变形，也会给电缆内层传递高危险的特种压力。

Metal armour has a much higher Modulus, thus impact energy is dissipated with a lower deformation (L) and a high dangerous specific force is transmitted to inner layers of the cable.

气囊电缆 AIR BAG™



气囊电缆气囊电缆设计就像是一个减震缓冲器。

AIR BAG™ acts as a shock absorber.

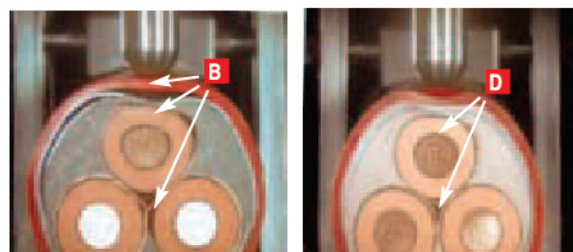
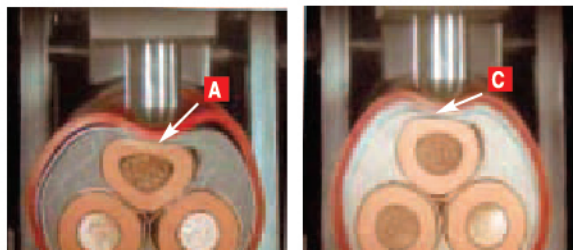
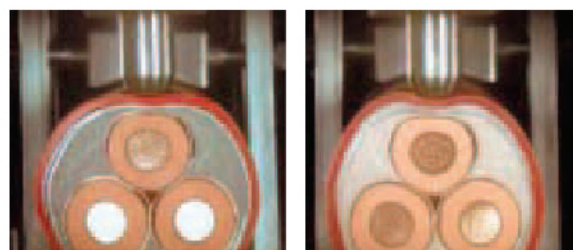
冲击试验 IMPACT TEST

70 焦耳的冲击照片以每秒 2000 成像的高速照相机，拍摄于意大利米兰 Politecnico di Milano 大学普睿司曼研究实验室。
20kV 3x150mm² 铜导体，EPR 绝缘。

70 joule impact at 2000 frames/second Pictures taken with high speed camera in Prysmian R&D labs by the "Politecnico di Milano" University, Milan Italy.
20 kV 3x150 mm² Copper conductor, EPR insulation.

钢带铠装 STEEL TAPE ARMoured

气囊电缆™
电缆系统
AIR BAG™
CABLE SYSTEM



- A** 对于钢带铠装，较严重的破坏将会集中在很小的区域内。
- B** 由于金属铠装的永久性破坏，缆芯将无法恢复原状，导体屏蔽会被永久的破坏，铜屏蔽将严重分离。
- C** 气囊电缆设计就像是一个减震缓冲器。
- D** 气囊电缆只承受很少或者几乎没有任何损坏。

- A** Steel tape armour shows high deformation concentrated in a small area
- B** Due to permanent deformation of metal armour, cable cores cannot recover initial shape, insulation of conductor is permanently damaged, copper screens have been badly detached.
- C** AIR BAG™ acts like a shock absorber
- D** AIR BAG™ avoids core damage

Airbag Cable

优势 BENEFITS

与铠装电缆相比

- 较好的抗冲击性能
- 直径减小
- 重量较轻
- 电缆长度加长
- 灵活性加强
- 相同的防火性能
- 相同的防油及化学品的性能
- 相同的防水能力
- 安装更便捷
- 对地面接地电流及谐振的敏感度要求降低（例如在电力铁路线附近安装）
- 较低的屏蔽 / 铠装损失

vs ARMoured CABLE

- Better Impact performance
- Reduced Diameter
- Lower Weight
- Longer cable length on standard drums
- Improved flexibility
- Same Fire performances
- Same resistance to oils / chemicals
- Same resistance to effects of water
- Easier installation (easier spliceability)
- Lower sensitivity to ground stray currents and harmonics (e.g. in installations close to electrified railway lines)
- Lower screen/armour losses

代替传统的金属铠装，提供了更好的冲击性能，并具有非铠装电缆的重量轻、易于安装的特点。

Replaces traditional metal armour, giving even better impact performances, with lightness and ease of installation typical of unarmoured cables.

附件 ACCESSORIES



气囊缆完全可以和传统的电缆附件相兼容，并且安装程序与传统的附件相同。

The AIRBAG range is fully compatible with traditional joints and terminations. The installation procedures are the same as for traditional accessories.

气囊范围 AIRBAG™ RANGE

电压 VOLTAGE	绝缘 INSULATION	按要求可选择的附加性能 ADDITIONAL OPTIONAL PERFORMANCE ON REQUEST	
从低压到 高压 FROM LV TO HV	PVC PE LSOH EPR XLPE	LSOH (IEC 1034, IEC 754) 阻燃 (IEC 332.1) 防火 (IEC 332.3-C)	LSOH (IEC 1034, IEC 754) 阻燃 (IEC 332.1) 防火 (IEC 332.3-C)

与非铠装电缆相比

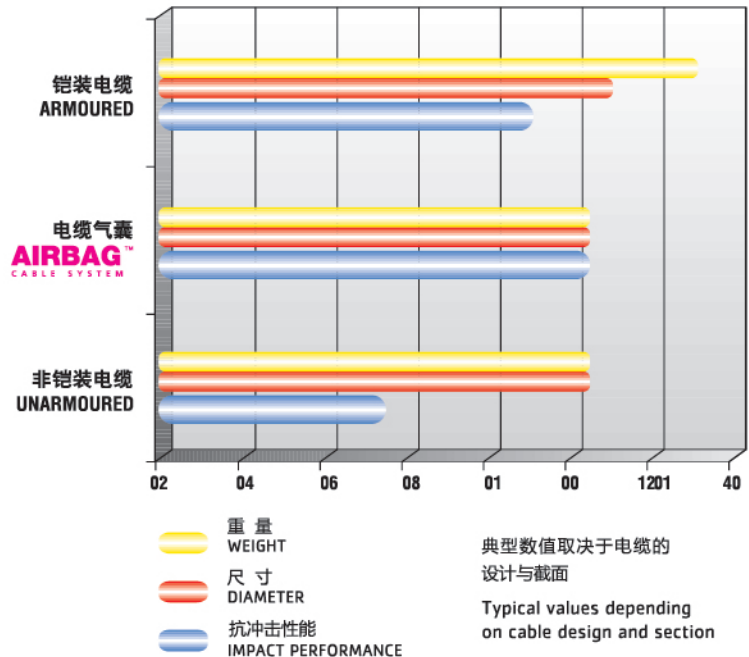
- 抵抗冲击的能力大大增强了
- 直径：无较大区别
- 重量：无较大区别
- 相同的灵活性
- 相同的防火性能
- 相同的防油及化学品的性能
- 相同的防水能力
- 相同的安装难易程度

vs UNARMoured CABLE

- Double Impact performance
- Diameter: no significant variation
- Weight: no significant variation
- Same flexibility
- Same Fire performances
- Same resistance to oils/chemicals
- Same resistance to effects of water
- Same ease of installation

在机械防护方面，给予了显著的改进，并且在重量和灵活性方面没有大的变动。

Gives a dramatic improvement in mechanical resistance, with no significant variation in terms of weight and rigidity.



气囊电缆

电缆描述 cable description	标称直径 nominal diam.(mm)			电缆重量 cable weight (kg/km)	20°C时导体最大直流 maximam DC resistance at 20°C		导体短路电流 conductor short circuit current		截流量(空气中) max current carrying capacity in air 30°C		截流量(土壤中) max current carrying capacity in ground	
	铠装前 under armour	铠装后 over armour	直径 outer		(Ω/km)		(kA/sec)		(A)		(A)	
					Cu	Al	Cu	Al	Cu	Al	Cu	Al
6/10KV 1X95 YJ(AB)V	23.0	27.0	30.6	1541	0.19	0.32	13.6	8.9	349	245	326	240
6/10KV 1X120 YJ(AB)V	24.4	28.4	32.0	1801	0.15	0.25	17.2	11.3	404	280	370	270
6/10KV 1X150 YJ(AB)V	25.9	29.9	33.7	2106	0.12	0.21	21.5	14.1	460	320	416	305
6/10KV 1X185 YJ(AB)V	27.5	31.5	35.3	2480	0.10	0.16	26.5	17.4	526	365	468	345
6/10KV 1X240 YJ(AB)V	29.8	33.8	37.8	3075	0.08	0.13	34.4	22.6	627	435	542	400
6/10KV 1X300 YJ(AB)V	32.1	36.1	40.3	3705	0.06	0.10	43.0	28.2	721	500	611	455
6/10KV 1X400 YJ(AB)V	35.0	39.0	43.4	4567	0.05	0.08	57.2	37.6	833	595	692	525
6/10KV 1X500 YJ(AB)V	38.4	43.4	48.0	5738	0.04	0.06	71.5	47.2	964	697	781	572
6/10KV 1X630 YJ(AB)V	41.7	46.7	51.5	7149	0.03	0.05	90.1	59.5	1114	813	878	652
8.7/15KV 1X95 YJ(AB)V	25.3	29.3	33.1	1674	0.19	0.32	13.6	8.9	354	249	326	232
8.7/15KV 1X120 YJ(AB)V	26.7	30.7	34.5	1940	0.15	0.25	17.2	11.3	408	287	370	263
8.7/15KV 1X150 YJ(AB)V	28.2	32.2	36.2	2251	0.12	0.21	21.5	14.1	464	327	415	395
8.7/15KV 1X185 YJ(AB)V	29.8	33.8	37.8	2631	0.10	0.16	26.5	17.4	532	376	458	334
8.7/15KV 1X240 YJ(AB)V	32.1	36.1	40.3	3236	0.08	0.13	34.4	22.6	632	445	543	388
8.7/15KV 1X300 YJ(AB)V	34.4	38.4	42.8	3876	0.06	0.10	43.0	28.2	727	512	612	438
8.7/15KV 1X400 YJ(AB)V	37.3	42.3	46.9	4815	0.05	0.08	57.2	37.6	839	600	693	502
8.7/15KV 1X500 YJ(AB)V	40.6	45.6	50.4	5936	0.04	0.06	71.5	47.2	971	701	783	574
8.7/15KV 1X630 YJ(AB)V	44.0	49.0	54.0	7363	0.02	0.05	90.1	59.5	1121	817	882	654
12/20KV 1X95 YJ(AB)V	27.8	31.8	35.9	1815	0.19	0.32	13.6	8.9	357	257	326	232
12/20KV 1X120 YJ(AB)V	29.2	33.2	37.2	2103	0.15	0.25	17.2	11.3	412	289	370	264
12/20KV 1X150 YJ(AB)V	30.7	34.7	38.7	2405	0.12	0.21	21.5	14.1	468	329	415	296
12/20KV 1X185 YJ(AB)V	32.3	36.3	40.5	2809	0.10	0.16	26.5	17.4	536	379	468	335
12/20KV 1X240 YJ(AB)V	34.6	38.6	43.0	3424	0.08	0.13	34.4	22.6	637	448	543	388
12/20KV 1X300 YJ(AB)V	36.9	40.9	45.3	4055	0.06	0.10	43.0	28.2	731	514	612	438
12/20KV 1X400 YJ(AB)V	39.8	44.8	49.4	5009	0.05	0.08	57.2	37.6	844	603	693	503
12/20KV 1X500 YJ(AB)V	43.1	48.1	52.9	6145	0.04	0.06	71.5	47.2	976	704	785	574
12/20KV 1X630 YJ(AB)V	46.5	51.5	56.5	7586	0.03	0.05	90.1	59.5	1127	820	885	655
18/30KV 1X95 YJ(AB)V	33.4	37.4	41.6	2200	0.19	0.32	13.6	8.9	358	258	327	233
18/30KV 1X120 YJ(AB)V	34.8	38.8	43.0	2485	0.15	0.25	17.2	11.3	413	290	371	265
18/30KV 1X150 YJ(AB)V	36.3	40.3	44.7	2819	0.12	0.21	21.5	14.1	469	330	416	297
18/30KV 1X185 YJ(AB)V	37.9	41.9	46.3	3221	0.10	0.16	26.5	17.4	537	380	469	336
18/30KV 1X240 YJ(AB)V	40.2	45.2	49.8	3927	0.08	0.13	34.4	22.6	638	449	544	389
18/30KV 1X300 YJ(AB)V	42.5	47.5	52.3	4604	0.06	0.10	43.0	28.2	732	515	613	439
18/30KV 1X400 YJ(AB)V	45.4	50.4	55.4	5524	0.05	0.08	57.2	37.6	845	604	694	504
18/30KV 1X500 YJ(AB)V	48.8	53.8	59.0	6693	0.04	0.06	71.5	47.2	977	705	786	575
18/30KV 1X630 YJ(AB)V	52.2	57.2	62.6	8168	0.03	0.05	90.1	59.5	1128	821	886	656
26/35KV 1X95 YJ(AB)V	38.7	43.7	48.3	2676	0.19	0.32	13.6	8.9	335	259	293	227
26/35KV 1X120 YJ(AB)V	40.1	45.1	49.7	2976	0.15	0.25	17.2	11.3	384	298	332	257
26/35KV 1X150 YJ(AB)V	41.6	46.6	51.4	3326	0.13	0.21	21.5	14.1	436	338	372	288
26/35KV 1X185 YJ(AB)V	43.2	48.2	53.0	3743	0.10	0.16	26.5	17.4	498	387	419	326
26/35KV 1X240 YJ(AB)V	45.5	50.5	55.5	4406	0.08	0.13	34.3	22.6	587	456	485	377
26/35KV 1X300 YJ(AB)V	47.8	52.8	58.0	5105	0.06	0.10	42.9	28.2	671	522	547	425
26/35KV 1X400 YJ(AB)V	50.7	55.7	61.1	6052	0.05	0.08	57.2	37.6	778	510	623	487
26/35KV 1X500 YJ(AB)V	56.0	62.0	67.6	7528	0.04	0.06	71.5	47.2	897	710	707	556
26/35KV 1X630 YJ(AB)V	59.4	65.4	71.2	9027	0.03	0.05	90.1	59.5	1033	826	803	635

Airbag Cable

电缆描述 cable description	标称直径 nominal diam.(mm)			电缆重量 cable weight (kg/km)	20°C时导体最大直流 maximam DC resistance at 20°C		导体短路电流 conductor short circuit current		截流量(空气中) max current carrying capacity in air 30°C		截流量(土壤中) max current carrying capacity in ground	
	铠装前 under armour	铠装后 over armour	直径 outer		(Ω/km)		(kA/sec)		(A)		(A)	
					Cu	Al	Cu	Al	Cu	Al	Cu	Al
6/10KV 3X35 YJ(AB)V	36.7	41.7	46.3	2449	0.52	0.87	5.0	3.3	183	115	183	130
6/10KV 3X50 YJ(AB)V	39.5	44.5	49.3	2942	0.39	0.64	7.2	4.7	219	145	216	155
6/10KV 3X70 YJ(AB)V	43.0	48.0	53.0	37066	0.27	0.44	10.0	6.6	272	175	263	190
6/10KV 3X95 YJ(AB)V	46.4	51.4	56.8	2298	0.19	0.32	13.6	8.9	330	210	314	225
6/10KV 3X120 YJ(AB)V	49.4	54.4	60.0	5524	0.15	0.25	17.2	11.3	380	245	357	255
6/10KV 3X150 YJ(AB)V	52.7	58.7	64.5	6430	0.12	0.21	21.5	14.1	430	280	398	285
6/10KV 3X185 YJ(AB)V	56.1	62.1	68.1	7653	0.10	0.16	26.5	17.4	487	320	447	325
6/10KV 3X240 YJ(AB)V	61.1	67.1	73.5	9490	0.08	0.13	34.4	22.6	575	375	517	380
6/10KV 3X300 YJ(AB)V	66.0	72.0	78.6	11416	0.06	0.10	43.0	28.2	656	430	581	430
8.7/15KV 3X35 YJ(AB)V	41.7	46.7	51.7	2809	0.52	0.87	5.0	3.3	186	115	189	130
8.7/15KV 3X50 YJ(AB)V	44.5	49.5	54.7	3346	0.39	0.64	7.2	4.7	222	145	215	150
8.7/15KV 3X70 YJ(AB)V	48.0	53.0	58.4	4107	0.27	0.44	10.0	6.6	275	175	263	190
8.7/15KV 3X95 YJ(AB)V	51.4	57.4	63.0	5105	0.19	0.32	13.6	8.9	334	210	314	225
8.7/15KV 3X120 YJ(AB)V	54.4	60.4	66.2	5929	0.15	0.25	17.2	11.3	380	245	354	255
8.7/15KV 3X150 YJ(AB)V	57.6	63.6	69.6	6955	0.12	0.21	21.5	14.1	430	280	396	285
8.7/15KV 3X185 YJ(AB)V	61.1	67.1	73.5	8158	0.10	0.16	26.5	17.4	491	320	447	325
8.7/15KV 3X240 YJ(AB)V	66.1	72.1	78.7	10005	0.08	0.13	34.4	22.6	578	375	517	380
8.7/15KV 3X300 YJ(AB)V	71.0	77.0	84.0	12022	0.06	0.10	43.0	28.2	660	430	582	430
12/20KV 3X35 YJ(AB)V	47.1	52.1	57.5	3262	0.52	0.87	5.0	3.3	188	125	183	132
12/20KV 3X50 YJ(AB)V	49.9	54.9	60.5	3795	0.39	0.64	7.2	4.7	224	149	215	155
12/20KV 3X70 YJ(AB)V	53.3	59.3	65.1	4667	0.27	0.44	10.0	6.6	277	185	263	189
12/20KV 3X95 YJ(AB)V	56.8	62.8	68.8	5647	0.19	0.32	13.6	8.9	333	223	312	226
12/20KV 3X120 YJ(AB)V	59.8	65.8	72.0	6538	0.15	0.25	17.2	11.3	383	256	354	257
12/20KV 3X150 YJ(AB)V	63.0	69.0	75.4	7475	0.12	0.21	21.5	14.1	433	290	396	287
12/20KV 3X185 YJ(AB)V	66.5	72.5	79.1	8722	0.10	0.16	26.5	17.4	493	331	447	325
12/20KV 3X240 YJ(AB)V	71.4	77.4	84.4	10663	0.08	0.13	34.4	22.6	581	388	517	376
12/20KV 3X300 YJ(AB)V	76.4	82.4	89.6	12677	0.06	0.10	43.0	28.2	660	443	581	425
18/30KV 3X50 YJ(AB)V	62.1	68.1	74.3	5063	0.39	0.64	7.2	4.7	225	150	216	156
18/30KV 3X70 YJ(AB)V	65.5	71.5	77.9	5874	0.27	0.44	10.0	6.6	278	186	264	190
18/30KV 3X95 YJ(AB)V	69.0	75.0	81.8	6927	0.19	0.32	13.6	8.9	334	224	313	227
18/30KV 3X120 YJ(AB)V	72.0	78.0	85.0	7897	0.15	0.25	17.2	11.3	384	257	355	258
18/30KV 3X150 YJ(AB)V	75.2	81.2	88.4	8883	0.12	0.21	21.5	14.1	434	291	397	288
18/30KV 3X185 YJ(AB)V	78.7	84.7	92.1	10208	0.10	0.16	26.5	17.4	494	332	448	326
18/30KV 3X240 YJ(AB)V	88.6	94.6	102.6	14259	0.08	0.13	34.4	22.6	582	389	518	377
18/30KV 3X300 YJ(AB)V	83.6	89.6	97.2	12132	0.06	0.10	43.0	28.2	661	444	582	426
26/35KV 3X50 YJ(AB)V	76.8	82.8	90.0	7219	0.39	0.64	7.2	4.7	202	157	175	135
26/35KV 3X70 YJ(AB)V	76.8	82.8	90.0	7219	0.27	0.44	10.0	6.6	246	191	211	164
26/35KV 3X95 YJ(AB)V	80.3	86.3	93.7	8231	0.19	0.32	13.6	8.9	296	229	251	195
26/35KV 3X120 YJ(AB)V	83.3	89.3	96.9	9242	0.15	0.25	17.2	11.3	338	262	287	223
26/35KV 3X150 YJ(AB)V	86.5	92.5	100.3	10245	0.12	0.21	21.5	14.1	381	296	322	249
26/35KV 3X185 YJ(AB)V	90.0	96.0	104.2	11636	0.10	0.16	26.5	17.4	434	337	363	282
26/35KV 3X240 YJ(AB)V	94.9	100.9	109.3	13678	0.08	0.13	34.4	22.6	507	395	419	326
26/35KV 3X300 YJ(AB)V	99.9	105.9	114.7	15944	0.06	0.10	43.0	28.2	576	449	471	367
26/35KV 3X400 YJ(AB)V	106.1	112.1	121.3	18864	0.05	0.08	57.2	37.6	662	520	547	430