YG1403 European Standard DC (liquid cooling) Charging Connector

Technical Specifications

Preparation/Date_____

Review/Date_____

Approval/Date_____

Changes and Revisions

□Change □Revision	Date	Change or revision content	Modified/revised by	Approver
□Change □Revision	2024.6.27	First edition	Zhou Hongbo	Cheng Zeyong
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1 Connector model and description

1.1 Connector Model:

Basic product model	Rated voltage Rated current	Cable specifications	Cable length	Temperature detection device	Actual current range
YG C1403-EV-S5P-500	1000V DC 5 00A	2* 25 + 1*6 + (2*0.75) (P2) + (9 *0.75)	5m	PT1000*4	0 ~ 500A
YG C1403-EV-S5P-600	1000V DC 600A	2* 35 + 1*6 + (2*0.75) (P2) + (9 *0.75)	5m	PT1000*4	0~600A

1.2 Product Description:

1. This product complies with the provisions of IEC62196.1-2022 , IEC62196.3-2022 , and IEC62196.3.1-2022 for connection devices for conductive charging of electric vehicles ;

2. Overall protection level of connector: IP 54 ;

3. The product has a novel appearance design, the shell is one-piece, the product conforms to ergonomics, feels comfortable to hold, and is easy to operate;

4. After the contact is plugged and unplugged 10,000 times, the contact resistance and temperature rise meet the requirements of IEC62196.1-2022 ;

5. Adopting integrated design and implanting the concept of Galaxy Array to enhance product grade and design sense **;**

6. The internal structure of the product is simple in design, which simplifies the molding requirements to the maximum extent and meets the actual production needs;

7. The shell is made of Sabic's new advanced engineering plastic, which can maintain the stability and functionality of the product even in harsh operating environments.

2. Technical parameters

2.1 Electrical performance

■ Rated voltage: 1000V DC;

■ Rated current: 500A, 600A;

■ Insulation resistance: ≥500MΩ 500V DC 1min;

■ Withstand voltage: 3500V AC for 1 minute without breakdown or flickering;

■ Leakage current: ≤10mA ;

2.2 Mechanical properties

■ Mechanical life: ≥10000 times;

■ Insertion and separation force: < 100N;

■ Socket crimping retention force : 35mm² ≥2200N , 25mm² ≥1900N , 6mm² ≥700N , 0.75 mm² ≥90N ;

2.3 Protection level

■ Waterproof level: IPX 4 (after plugging in) ;

■ Dustproof level: IP 5 X

2.4 Usage Environment

■ Pollution level: Level 2

■ Ambient temperature: -30℃～+50℃

2.5 Materials and surface treatment

■ Plug material: PA66+GF ;

■ Flame retardant grade: UL94-V0 ;

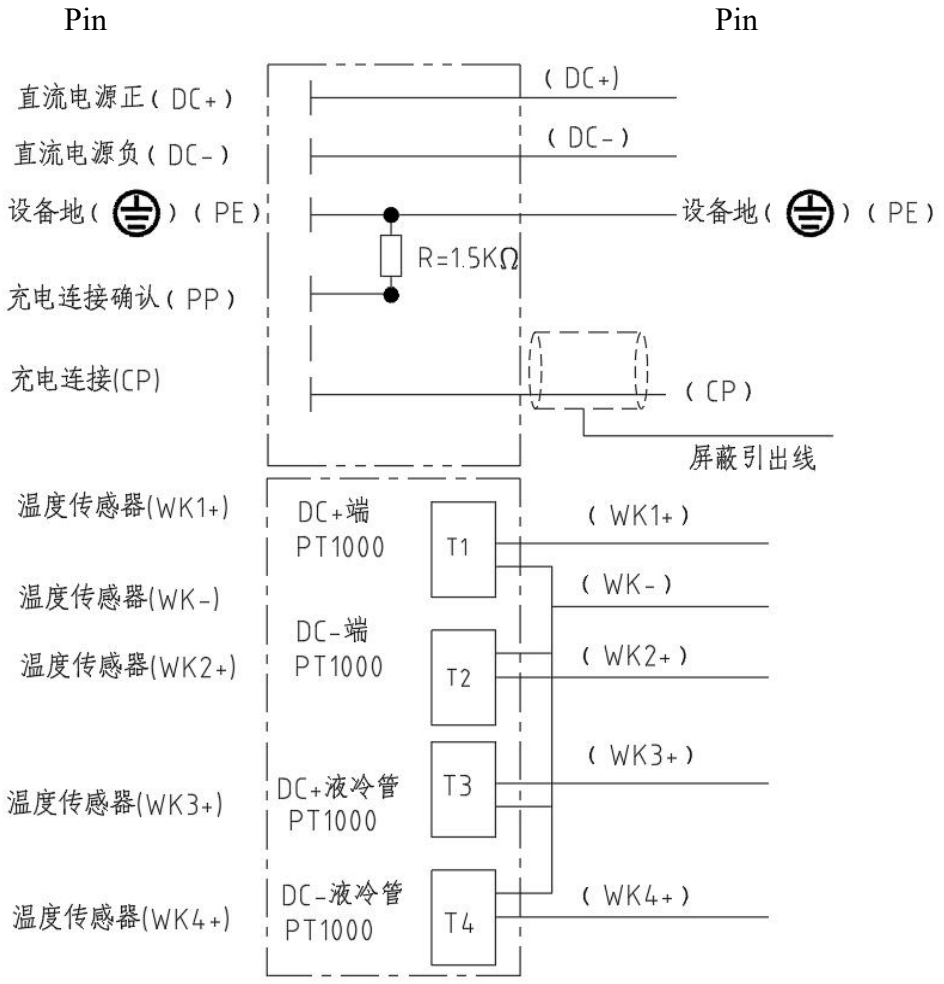
■ Socket material and surface treatment: copper silver-plated + passivation, brass silver-plated + passivation;

2.6 Product Specifications

Product Name	European standard DC charging cable CCS2
Model	YG****A……xxx
	**** indicates rated current, ... indicates cable length, and xxx indicates No.
Rated voltage	1000V DC
Current	DC: 500A, 600A (rated current)
	Signal: 2A (max)
Contacts	Power: 2 Ground: 1 Signal: 2
Work Environment	-35~+50℃ (Do not use in condensation or freezing conditions)
	Use below 2000m above sea level
Protection level	IP 5 4
Size	Charging gun: 267(L)*74(D)*168.5(W)
	Cable: Length can be customized (customized length cannot exceed 7 m)

Note: The product complies with RoHS2.0 and REACH requirements

2.7 Wiring principle:



2.8 Cable identification definitions and specifications

No.	Function Definition	Core wire color	Terminals	Conductor cross-sectional area (mm²)			
				500A	600A	…	…
1	DC power supply positive pole	brown	DC+	25	35		
2	DC power supply negative pole	blue	DC-	25	35		
3	Equipment ground	Yellow/Green	PE	6	6		

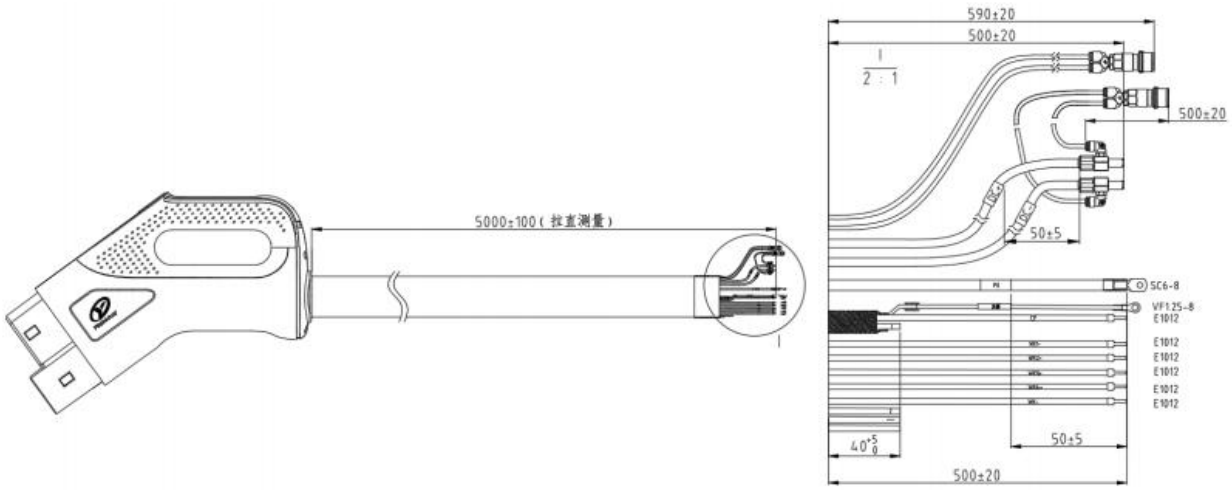
	wire						
4	Charging connection confirmation	/	PP (resistor lead)	0.75	0.75		
5	Charging Control Guide	White	CP	0.75	0.75		
6	Temperature sensor (DC+)	White	WK1+	0.75	0.75		
7	Temperature sensor collinear	White	WK-	0.75	0.75		
8	Temperature sensor (DC-)	White	WK2+	0.75	0.75		
9	Temperature sensor (cooling pipe +)	White	WK3+	0.75	0.75		
10	Temperature sensor (cooling pipe-)	White	WK4+	0.75	0.75		

3 Product images:

3.1. Outline view

3.2. Nameplate information:

3.3. Harness parameters:



Tail feature definition:

No.	Function Definition	Core color/marking	Functional Description	Parameter
1	DC power supply positive pole	DC+	DC+	Mounting hole Φ8.4
2	DC power supply negative pole	DC-	DC-	Mounting hole Φ8.4
3	Equipment ground wire	Yellow/Green	PE	SC 6 -8

4	Charging connection confirmation	/	PP (resistor lead)	/
5	Charging Control Guide	White	CP	1012
6	Temperature sensor (DC+)	White	WK1+	1012
7	Temperature sensor collinear	White	WK-	1012
8	Temperature sensor (DC-)	White	WK2+	1012
9	Temperature sensor (cooling pipe +)	White	WK3+	10 12
10	Temperature sensor (cooling pipe-)	White	WK4+	10 12
11	Cooling pipe DC+	White (DC+)	Liquid return	Lead pipe 6/8
12	Cooling pipe DC-	White (DC-)	Liquid return	Lead pipe 6/8
13	Cooling pipe	White (DC+/DC-)	Liquid inlet	2 *6/8

Remark:

① Cooling pipe 6/8 inner diameter Φ6mm, outer diameter Φ8mm, the lead-out pipe length can be customized, it is recommended not to exceed 1.5m;

②The tail cooling pipe can rotate 360° based on the terminal plane;

③ Coolant flow rate ≥ 2.8L/min (the flow rate can be controlled by the liquid cooling system);

④The working pressure cannot exceed 6bar;

⑤ Cable length can be customized (cable length 7 m (max).

4 Implementation standards:

■ IEC 62196.1-20 22 , IEC 62196.3-20 22 , IEC 62196.3.1-20 22 , IEC 62893-4-1:2020, IEC 62893-4-2:2020

Appendix

Appendix 1: Reference standards and tests

Table B: Test items and standards

project		Criteria
1	Appearance	The easily accessible surface of the charging gun should be free of burrs, flash and similar sharp edges; the outer shell of the charging gun should be marked with information such as the manufacturer's name or trademark, product model, rated voltage and rated current
2	Size	The dimensions of the charging gun comply with the requirements of IEC62196-3 standard
3	Temperature rise	The maximum allowable temperature rise should not exceed 50K
4	Insulation resistance	＞10MΩ (Applied voltage: 500V DC, 1 minute)
5	Pressure resistance	3500V AC leakage current ≤10mA, no breakdown or flashover for 1 minute
6	Charging gun insertion and	< 100N
7	Cable retention	The cable must not fall out of the charging gun housing .
8	Drop test	The specimen must not be damaged , and no parts inside the gun housing should be separated or fall off.
9	Vehicle rolling test	The specimen must not be damaged , and no parts inside the gun housing should be separated or fall off.
10	Service life test	10,000 plug-in and unplug without power supply , After the test, the following should not occur: 1. No deterioration of casing or partitions; 2. No electrical or mechanical connections are loose ; 3. Maintain the continuity of signal transmission between contacts ; 4. There should be no flashover or breakdown during the dielectric strength test (voltage reduction 500V) ;
11	Protection level	IP67 (House), whole gun IP54
12	High temperature resistance test	The sample is not damaged and can be used normally (Check samples after returning to room temperature.)
13	Low temperature resistance test	The style is not damaged and can be used normally (Check samples after returning to room temperature.)

Appendix II: Test Methods

Test conditions

- Ambient temperature **20±5℃,** relative humidity 65±20%

Table **C** Test Methods

Project		**Test methods**
1	Appearance	Visual and manual inspection of surface condition.
2	Size	Interoperability test
3	Temperature rise	Supply current according to product specifications and measure the temperature at the following points. Test point: - DC terminal contact surface - Shell surface - Cable surface
4	Insulation resistance	Use an insulation resistance tester to add 500V DC voltage to measure the insulation resistance between adjacent terminals and between each terminal and the shell.
5	Pressure resistance	Apply 3500V AC voltage between adjacent power terminals and between the power terminals and the housing for 1 minute
6	Charging gun insertion and extraction force	With the vehicle charging station fixed , measure the insertion /extraction force of the charging gun tip at a specified speed (excluding the insertion / extraction force on the rubber seal of the vehicle charging station).
7	Cable retention	the charging gun fixed , apply a pulling force of 750N from the charging gun to the cable output direction for 1 minute ; then apply a torque of 11Nm for 1 minute , and the cable displacement does not exceed 5mm.
8	Drop test	Lift the test sample to a predetermined height, then let it fall freely in a predetermined state and collide with the impact table.
9	Vehicle rolling test	Flip the connector naturally placed on the concrete floor with 2T vehicle wheels
10	Service life test	10,000 plugging and unplugging without power on .
11	Protection level	The top is 0.15-1 meter away from the water surface for 30 minutes without any impact on performance or water leakage .
12	High temperature resistance test	Place the charging gun in a constant temperature box (105℃×1000 hours).
13	Low temperature resistance test	Place the charging gun in a constant temperature box (-35℃×120 hours).

Appendix 3 : Temperature Monitoring

1. DC+ and DC- are monitored by PT1000 temperature resistance sensors and connected to the power supply equipment through cable conductors: WK-, WK1+, WK2+, WK3+, WK4+.

2. DC+ and DC- are monitored by PT1000 temperature resistance sensors. It is recommended that the threshold values of the pile end temperature WK1+ and WK2+ be set to ≤110℃; the threshold values of WK3+ and WK4+ be set to ≤85℃. When the threshold values are reached, current limiting or charging will be stopped.

3. The relationship between temperature and impedance is shown in the figure below;

Tolerance class: 2B

Pt1000 TC 3750ppm

Permissible deviation : $Dt = \pm 2(0.3°C + 0.005 \cdot | t |)$

Temperature	Resistance Rt	Sensibility	Permissible deviation	
°C	Q	Q°C	°C	Q
-40	846.580	3.863	1.000	3.863
-39	850.440	3.861	0.990	3.823
-38	854.300	3.860	0.980	3.783
-37	858.160	3.858	0.970	3.743
-36	862.010	3.857	0.960	3.703
-35	865.870	3.856	0.950	3.663
-34	869.730	3.854	0.940	3.623
-33	873.580	3.853	0.930	3.583
-32	877.430	3.851	0.920	3.543
-31	881.280	3.850	0.910	3.503
-30	885.130	3.849	0.900	3.464
-29	888.980	3.847	0.890	3.424
-28	892.830	3.846	0.880	3.384
-27	896.670	3.844	0.870	3.345
-26	900.510	3.843	0.860	3.305
-25	904.360	3.842	0.850	3.266
-24	908.200	3.840	0.840	3.226
-23	912.040	3.839	0.830	3.186
-22	915.880	3.838	0.820	3.147
-21	919.710	3.836	0.810	3.108
-20	923.550	3.835	0.800	3.068

-19	927.380	3.834	0.790	3.029
-18	931.220	3.833	0.780	2.989
-17	935.050	3.831	0.770	2.950
-16	938.880	3.830	0.760	2.911
-15	942.710	3.829	0.750	2.872
-14	946.540	3.827	0.740	2.832
-13	950.360	3.826	0.730	2.793
-12	954.190	3.825	0.720	2.754
-11	958.010	3.824	0.710	2.715
-10	961.840	3.822	0.700	2.676
-9	965.660	3.821	0.690	2.637
-8	969.480	3.820	0.680	2.598
-7	973.300	3.819	0.670	2.559
-6	977.120	3.817	0.660	2.520
-5	980.930	3.816	0.650	2.481
-4	984.750	3.815	0.640	2.442
-3	988.560	3.814	0.630	2.403
-2	992.380	3.813	0.620	2.364
-1	996.190	3.811	0.610	2.325
0	1000.000	3.810	0.600	2.286
1	1003.810	3.809	0.610	2.323
2	1007.620	3.808	0.620	2.361
3	1011.430	3.807	0.630	2.398
4	1015.230	3.805	0.640	2.435
5	1019.040	3.804	0.650	2.473
6	1022.840	3.803	0.660	2.510
7	1026.640	3.802	0.670	2.547
8	1030.440	3.801	0.680	2.584
9	1034.240	3.799	0.690	2.622
10	1038.040	3.798	0.700	2.659
11	1041.840	3.797	0.710	2.696
12	1045.640	3.796	0.720	2.733
13	1049.430	3.795	0.730	2.770
14	1053.220	3.793	0.740	2.807
15	1057.020	3.792	0.750	2.844

16	1060.810	3.791	0.760	2.881
17	1064.600	3.790	0.770	2.918
18	1068.390	3.789	0.780	2.955
19	1072.180	3.787	0.790	2.992
20	1075.960	3.786	0.800	3.029
21	1079.750	3.785	0.810	3.066
22	1083.530	3.784	0.820	3.103
23	1087.320	3.783	0.830	3.139
24	1091.100	3.781	0.840	3.176
25	1094.880	3.780	0.850	3.213
26	1098.660	3.779	0.860	3.250
27	1102.440	3.778	0.870	3.287
28	1106.210	3.776	0.880	3.323
29	1109.990	3.775	0.890	3.360
30	1113.760	3.774	0.900	3.397
31	1117.540	3.773	0.910	3.433
32	1121.310	3.772	0.920	3.470
33	1125.080	3.770	0.930	3.507
34	1128.850	3.769	0.940	3.543
35	1132.620	3.768	0.950	3.580
36	1136.390	3.767	0.960	3.616
37	1140.150	3.766	0.970	3.653
38	1143.920	3.764	0.980	3.689
39	1147.680	3.763	0.990	3.726
40	1151.440	3.762	1.000	3.762
41	1155.210	3.761	1.010	3.798
42	1158.970	3.760	1.020	3.835
43	1162.730	3.758	1.030	3.871
44	1166.480	3.757	1.040	3.908
45	1170.240	3.756	1.050	3.944
46	1174.000	3.755	1.060	3.980
47	1177.750	3.754	1.070	4.016
48	1181.500	3.752	1.080	4.053
49	1185.250	3.751	1.090	4.089

50	1189.010	3.750	1.100	4.125
51	1192.750	3.749	1.110	4.161
52	1196.500	3.748	1.120	4.197
53	1200.250	3.746	1.130	4.233
54	1204.000	3.745	1.140	4.270
55	1207.740	3.744	1.150	4.306
56	1211.480	3.743	1.160	4.342
57	1215.230	3.742	1.170	4.378
58	1218.970	3.740	1.180	4.414
59	1222.710	3.739	1.190	4.450
60	1226.450	3.738	1.200	4.486
61	1230.180	3.737	1.210	4.521
62	1233.920	3.736	1.220	4.557
63	1237.650	3.734	1.230	4.593
64	1241.390	3.733	1.240	4.629
65	1245.120	3.732	1.250	4.665
66	1248.850	3.731	1.260	4.701
67	1252.580	3.730	1.270	4.737
68	1256.310	3.728	1.280	4.772
69	1260.040	3.727	1.290	4.808
70	1263.760	3.726	1.300	4.844
71	1267.490	3.725	1.310	4.879
72	1271.210	3.724	1.320	4.915
73	1274.940	3.722	1.330	4.951
74	1278.660	3.721	1.340	4.986
75	1282.380	3.720	1.350	5.022
76	1286.100	3.719	1.360	5.057
77	1289.820	3.718	1.370	5.093
78	1293.530	3.716	1.380	5.129
79	1297.250	3.715	1.390	5.164
80	1300.960	3.714	1.400	5.199
81	1304.680	3.713	1.410	5.235
82	1308.390	3.711	1.420	5.270

83	1312.100	3.710	1.430	5.306
84	1315.810	3.709	1.440	5.341
85	1319.520	3.708	1.450	5.376
86	1323.230	3.707	1.460	5.412
87	1326.930	3.705	1.470	5.447
88	1330.640	3.704	1.480	5.482
89	1334.340	3.703	1.490	5.518
90	1338.040	3.702	1.500	5.553
91	1341.740	3.701	1.510	5.588
92	1345.440	3.699	1.520	5.623
93	1349.140	3.698	1.530	5.658
94	1352.840	3.697	1.540	5.693
95	1356.540	3.696	1.550	5.729
96	1360.230	3.695	1.560	5.764
97	1363.930	3.693	1.570	5.799
98	1367.620	3.692	1.580	5.834
99	1371.310	3.691	1.590	5.869
100	1375.000	3.690	1.600	5.904
101	1378.690	3.689	1.610	5.939
102	1382.380	3.687	1.620	5.974
103	1386.070	3.686	1.630	6.009
104	1389.750	3.685	1.640	6.043
105	1393.440	3.684	1.650	6.078
106	1397.120	3.683	1.660	6.113
107	1400.800	3.681	1.670	6.148
108	1404.480	3.680	1.680	6.183
109	1408.160	3.679	1.690	6.217
110	1411.840	3.678	1.700	6.252
111	1415.520	3.677	1.710	6.287
112	1419.190	3.675	1.720	6.322
113	1422.870	3.674	1.730	6.356
114	1426.540	3.673	1.740	6.391
115	1430.210	3.672	1.750	6.426

116	1433.880	3.671	1.760	6.460
117	1437.550	3.669	1.770	6.495
118	1441.220	3.668	1.780	6.529
119	1444.890	3.667	1.790	6.564
120	1448.560	3.666	1.800	6.598
121	1452.220	3.665	1.810	6.633
122	1455.890	3.663	1.820	6.667
123	1459.550	3.662	1.830	6.702
124	1463.210	3.661	1.840	6.736
125	1466.870	3.660	1.850	6.770
126	1470.530	3.659	1.860	6.805
127	1474.190	3.657	1.870	6.839
128	1477.840	3.656	1.880	6.873
129	1481.500	3.655	1.890	6.908
130	1485.150	3.654	1.900	6.942
131	1488.810	3.653	1.910	6.976
132	1492.460	3.651	1.920	7.010
133	1496.110	3.650	1.930	7.045
134	1499.760	3.649	1.940	7.079
135	1503.410	3.648	1.950	7.113
136	1507.050	3.646	1.960	7.147
137	1510.700	3.645	1.970	7.181
138	1514.350	3.644	1.980	7.215
139	1517.990	3.643	1.990	7.249
140	1521.630	3.642	2.000	7.283
141	1525.270	3.640	2.010	7.317
142	1528.910	3.639	2.020	7.351
143	1532.550	3.638	2.030	7.385
144	1536.190	3.637	2.040	7.419
145	1539.820	3.636	2.050	7.453
146	1543.460	3.634	2.060	7.487
147	1547.090	3.633	2.070	7.521
148	1550.730	3.632	2.080	7.555

149	1554.360	3.631	2.090	7.588
150	1557.990	3.630	2.100	7.622

4. Other specifications of temperature sensors can be selected (such as: PT 1000 other accuracy levels, NTC, etc.)