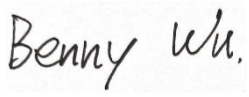
Test Report issued under the responsibility of:

DEKRA

TEST REPORT
IEC 62893-4-1
Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV – Part 4-1: Cables for DC charging according to mode 4 of IEC 61851-1 – DC charging without use of a thermal management system

Report Reference No. ..... :	6129814.54
Date of issue ..... :	2022-07-26
Total number of pages ..... :	18
Name of Testing Laboratory preparing the Report ..... :	DEKRA Testing and Certification (Shanghai) Ltd. 3F #250 Jiangchangsan Road Building 16 Headquarter Economy Park Shibei Hi-Tech Park, Jing'an District Shanghai 200436 China
Applicant's name ..... :	Zhongli Science & Technology Group Co., Ltd.
Address ..... :	No. 8 Changkun Road, Southeast Economic Dev. Zone, 215542 Changshu City, Jiangsu, China
Test specification:	
Standard ..... :	IEC 62893-4-1:2020 in conjunction with IEC 62893-1:2017 + A1:2020 and IEC 62893-2:2017
Test procedure ..... :	KEMA-KEUR & DEKRA Mark
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62893_4_1B
Test Report Form(s) Originator .... :	DEKRA
Master TRF ..... :	2021-01-29
Test item description ..... :	DC charging cables for electric vehicles
Trade Mark ..... :	ZHONGLI SCI-TECH GROUP CO.,LTD
Manufacturer ..... :	Zhongli Science & Technology Group Co., Ltd. No. 8 Changkun Road, Southeast Economic Dev. Zone, 215542 Changshu City, Jiangsu, China
Model/Type reference ..... :	62893 IEC 126 2x10 + px10 + mx2,5…6 + nx0,5…2,5; 2x16…35 + px16 + mx2,5…6 + nx0,5…2,5; 2x50…95 + px25…50 + mx2,5…6 + nx0,5…2,5; p=0 or 1, m=0 or 2, n=4…14 (all colour sheathed) Tested at 62893 IEC 126 2x70 + 1x25 + 2x6 + 14x0,75 (black sheathed)
Ratings ..... :	0,6/1 kV AC, 1,5 kV DC Maximum conductor normal operating temperature is 90 °C

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address.....:		3F #250 Jiangchangsan Road Building 16 Headquarter Economy Park Shibei Hi-Tech Park, Jing'an District Shanghai 200436 China	
Tested by (name + signature).....:		Benny Wu	
Approved by (name + signature).....:		Robert Hong	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name + signature).....:			
Approved by (name + signature).....:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name + signature).....:			
Approved by (name + signature).....:			
Supervised by (name + signature).....:			

List of Attachments (including a total number of pages in each attachment):

N/A

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
Partial tests were carried out at cable sample with length of 50 meter according to Ref. No. 1.1, 1.2, 2, 3 (only tested Ref. No. 1.1 in Table 2 of IEC 62893-1:2017 + A1:2020), 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13 in Table A.1 of IEC 62893-4-1:2020	Sub-contracted to: Shanghai Intelligent Service and Technology Co., Ltd. East Zone, Building 14, No. 1000, Jinhai Road, Pudong New District Shanghai 201206, China

Summary of compliance with National Differences (List of countries addressed):

N/A

☐ **The product fulfils the requirements of _____ (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)**

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

◁DEKRA▷ KEMA-KEUR 62893 IEC 126 2x70 + 1x25 + 2x6 + 14x0,75 0,6/1 kV ZHONGLI SCI-TECH GROUP CO.,LTD

Test item particulars.....:	N/A
Classification of installation and use.....:	N/A
Supply Connection.....:	N/A
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test case does not test to the test object.....:	N/T
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2022-05-25
Date (s) of performance of tests.....:	From 2022-05-26 to 2022-07-12

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Name and address of factory (ies) .....:	Zhongli Science & Technology Group Co., Ltd. No. 8 Changkun Road, Southeast Economic Dev. Zone, 215542 Changshu City, Jiangsu, China

General product information and other remarks:

The test item has been already tested and certified according to IEC 62893-4-1:2020 with the sheathing material type TPU 1690 supplied by Changshu Zhonglian Photoelectricity New Stuff Co., Ltd. in orange or black, which referred to KEMA-KEUR CERTIFICATE 31-121949, DEKRA Mark CERTIFICATE 31-122227 and DEKRA test report 6101815.54 and 6101815.55 in details. Issue of this test report dues to accept the modification mentioned as below:

As requested by applicant, a new sheathing material type TPU 1185 in all colour supplied by Lubrizol Specialty Chemicals Manufacturing (Shanghai) Co., Ltd. is applicable to be alternatively used for Zhongli Science & Technology Group Co., Ltd. The list of components below is also updated.

By review and evaluation, the tests mentioned on page 2 Summary of testing were considered necessary at cable type 62893 IEC 126 2x70 + 1x25 + 2x6 + 14x0,75 with sheath in black by new sheathing material TPU 1185.

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
CONSTRUCTION			
Number of power cores	2 or more	3	P
Insulation for power cores	Compound of type EVI-2	EVI-2	P
Insulation for pilot, auxiliary power, control or temperature sensor cores	Compound of type EVI-1 or EVI-2	EVI-2	P
Assembly of cores	The cores shall be twisted together		P
Centre filler	Optional	PP rope in white	P
Filling	Optional	PP rope in white	P
Screen(s)	Optional, over a core or an assembly of cores	Over an assembly of cores	P
Sheath	Compound of type EVM-1 or EVM-2 or EVM-3	EVM-1, black	P
MARKING			
Indication of origin	Indelible, clearly discernible, name continuous and easily legible		P
Distance between the markings mm	550 max.	378	P
Core identification	Clearly identifiable and durable		
Colour scheme		BU / BN / YE/GN RD / BK RD/WH / YE/WH / GN/WH OG / GY / VT	P
Colour distribution on green/yellow core %	Any 15 mm >30 <70	YE/GN: 66/34	P
ELECTRICAL TESTS			
Voltage test			P
Complete sample 5 min, 3 500 V AC or 7 000 V DC	No breakdown	No breakdown	P
Cores 5 min, 3 500 V AC	No breakdown		N/T
Insulation resistance			
at 90 °C MΩ·km	min.		N/T

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

Long term resistance of insulation to d.c.			N/T
Cores	No damage to the insulation		N/T
Water temp. 85°C			N/T
5 m, 240 h, 900 V dc	No breakdown		N/T

CONDUCTORS								
Power cores								
Material		Copper						P
Tinned or plain			Plain					P
Number of wires			2294	2294				P
Diameter of wires	mm	0,51 max.	0,19	0,19				P
Resistance at 20 °C	Ω/km	0,272 max.	0,256	0,263				P
PE conductor (optional)								
Material		Copper						P
Tinned or plain			Plain					P
Number of wires			796					P
Diameter of wires	mm	0,41 max.	0,19					P
Resistance at 20 °C	Ω/km	0,780 max.	0,741					P
Auxiliary power cores (optional)								
Material		Copper						P
Tinned or plain			Plain					P
Number of wires			196	196				P
Diameter of wires	mm	0,31 max.	0,19	0,19				P
Resistance at 20 °C	Ω/km	3,30 max.	3,11	3,11				P
Control or pilot cores / Temperature sensor cores (optional)								
Material		Copper						P
Tinned or plain			Plain					P
Number of wires			45+11	45+11	45+11			P
Diameter of wires	mm	0,21 max.	0,14	0,14	0,14			P
Resistance at 20 °C	Ω/km	26,0 max.	24,1	24,1	24,1			P
Number of wires			45+11	45+11	45+11			P
Diameter of wires	mm	0,21 max.	0,14	0,14	0,14			P
Resistance at 20 °C	Ω/km	26,0 max.	24,1	24,1	24,1			P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

Colour of insulation							
Power cores		BU	BN				P
PE conductor (optional)		YE/GN					P
Auxiliary power cores (optional)		RD	BK				P
Control or pilot cores / Temperature sensor cores (optional)		RD/WH	YE/WH	GN/WH			P
		OG	GY	VT			

INSULATION APPLICATION			
Insulation	To fit closely to remove without damage		P

THICKNESS									
Power cores									
Specified value	mm	1,2 min.	1,4	1,4					P
Minimum value	mm	0,98 min.	1,20	1,23					P
PE conductor (optional)									
Specified value	mm	1,0 min.	1,2						P
Minimum value	mm	0,80 min.	0,98						P
Auxiliary power cores (optional)									
Specified value	mm	0,8 min.	0,9	0,9					P
Minimum value	mm	0,62 min.	0,77	0,77					P
Control or pilot cores / Temperature sensor cores (optional)									
Minimum value	mm	0,33 min.	0,46	0,41	0,46				P
			0,46	0,42	0,43				

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

Colour of insulation								N/T

MECHANICAL PROPERTIES OF INSULATION								
Before ageing								
TS	N/mm²	8,0 min.	16,0	16,9	11,1			P
EB	%	200 min.	500	520	400			P
After ageing in air oven, 168 h, 135 °C								
TS	N/mm²	--						--
EB	%	--						--
Difference								
TS	%	± 30 max.						N/T
EB	%	± 30 max.						N/T
Compatibility test, 168 h, 100 °C								
TS	N/mm²	--	13,5	14,4	9,3			--
EB	%	--	450	510	390			--
Difference								
TS	%	± 30 max.	-16	-15	-16			P
EB	%	± 30 max.	-10	-2	-3			P

HOT SET TEST								
Load	0,20 N/mm²							N/T
Temperature	200 °C							N/T
Duration	15 min							N/T
Elongation under load	%	100 max.						N/T
Elongation after cooling	%	25 max.						N/T

PRESSURE TEST AT HIGH TEMPERATURE				
Force	N			N/A
Temperature	120 °C			N/A
Duration	h			N/A
Impression	%	50 max.		N/A

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
BENDING AT LOW TEMPERATURE			
Number of turns			N/T
Diameter of mandrel mm			N/T
Temperature -40 °C			N/T
Cooling time h			N/T
Results to be obtained	No cracks		N/T
ELONGATION TEST AT LOW TEMPERATURE			
Temperature -40 °C			N/A
Cooling time h			N/A
Elongation without break %	30 min.		N/A
HARDNESS			
Shore D	50 min.		N/A
IRHD	80 min.		N/T
SCREEN(S) APPLICATION			
Braid	Tinned or plain copper	Tinned copper	P
Optical coverage %	80 min.	95	P
SHEATH APPLICATION			
Adherence to cores	Not allowed		P
MEAN OVERALL DIMENSIONS			
Mean value mm		35,8	N/A
Ovality %	15 max.	3	P
SHEATH THICKNESS			
Specified value mm	2,5 min.	3,5	P
Minimum value mm	2,03 min.	2,31	P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
MECHANICAL PROPERTIES OF SHEATH			
Before ageing			
TS N/mm²	20,0 min.	31,5	P
EB %	300 min.	470	P
After ageing in air oven, 168 h, 110 °C			
TS N/mm²	--	26,0	--
EB %	300 min.	570	P
Difference			
TS %	± 30 max.	-17	P
EB %	± 30 max.	+21	P
After immersion in mineral oil test, 168 h, 100 °C			
TS N/mm²	--	29,6	--
EB %	300 min.	590	P
Difference			
TS %	± 40 max.	-6	P
EB %	± 30 max.	+26	P
After water resistance test, 168 h, 80 °C			
TS N/mm²	--	26,2	--
EB %	300 min.	570	P
Difference			
TS %	± 30 max.	-17	P
EB %	± 30 max.	+21	P
After resistance against acid solution, 168 h, 23 °C			
TS N/mm²	--	29,6	--
EB %	100 min.	530	P
Difference			
TS %	± 40 max.	-6	P
After resistance against alkaline solution, 168 h, 23 °C			
TS N/mm²	--	30,6	--
EB %	300 min.	520	P
Difference			
TS %	± 40 max.	-3	P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
Compatibility test, 168 h, 100 °C			
TS N/mm²	--	28,0	--
EB %	300 min.	520	P
Difference			
TS %	± 30 max.	-11	P
EB %	± 30 max.	+11	P
HOT SET TEST			
Load 0,20 N/mm²			N/A
Temperature 250 °C			N/A
Duration 15 min			N/A
Elongation under load %	100 max.		N/A
Elongation after cooling %	25 max.		N/A
PRESSURE TEST AT HIGH TEMPERATURE			
Force 10,80 N			P
Temperature 100 °C			P
Duration 6 h			P
Impression %	50 max.	9	P
BENDING AT LOW TEMPERATURE			
Number of turns			N/A
Diameter of mandrel mm			N/A
Temperature -40 °C			N/A
Cooling time h			N/A
Results to be obtained	No cracks		N/A
ELONGATION TEST AT LOW TEMPERATURE			
Temperature -40 °C			P
Cooling time 4 h			P
Elongation without break %	30 min.	327	P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
HEAT SHOCK TEST			
Number of turns 4			P
Diameter of mandrel 8 mm			P
Temperature 150 °C			P
Duration 1 h			P
Results to be obtained	No cracks	No cracks	P
OZONE RESISTANCE TEST			
Temperature 40 °C			P
Relative humidity 55 %			P
Duration 72 h			P
Ozone concentration %	(200±50) x 10^{-6}		P
Result to be obtained	No cracks	No cracks	P
TEAR RESISTANCE			
Tear strength N/mm	25 min.	45,0	P
DETERMINATION OF SAPONIFICATION VALUE			
Value obtained mg of KOH/g	200 max.	112	P
WEATHERING/UV RESISTANCE TEST			
Xenon arc source			P
102 min dry radiation 18 min rain exposure			P
Duration 720 h (360 cycles)			P
After weathering/UV resistance			
TS N/mm^2	--	30,7	--
EB %	--	510	--
Difference			
TS %	- 30 max.	-3	P
EB %	- 30 max.	+9	P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
IMPACT TEST AT -35°C			
Mass of hammer 2 000 g			P
Temperature -35 °C			P
Cooling time 16 h			P
Results to be obtained	No cracks	No cracks	P
SHRINKAGE TEST			
Temperature 80 °C			P
Duration 5 h			P
Maximum shrinkage %	4 max.	1	P
MECHANICAL STRENGTH OF COMPLETED CABLE			
Bending test			
Force F applied 75 N			P
Swinging angel ± 90°			P
Number of cycles	5 000		P
Rate of flexing 15/min			P
Current during test	No interruption	No interruption	P
Voltage test 5 min 3 500 V	No breakdown	No breakdown	P
CRUSH RESISTANCE TEST			
Speed 10 mm/min			P
Crush force kN	15,0 min.	> 40,0	P
RESISTANCE AGAINST CHEMICALS			
Test medium: - Lubricating oil engine severe duty Diesel & gasoline service (15W40)			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Brake fluid, automotive polyglycol base			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
RESISTANCE AGAINST CHEMICALS			
Test medium: - Hydraulic fluid synthetic			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Gasoline automotive unleaded; EN 228			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Urea solution (32,5 %)			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Diesel fuel			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Anti freezing agent, Ethylenglycol ($C_2H_6O_2$) – water (mixing 1:1			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P
Test medium: - Solvent cleansing compound			P
Duration 1 h			P
Result by visual inspection	No cracks	No cracks	P

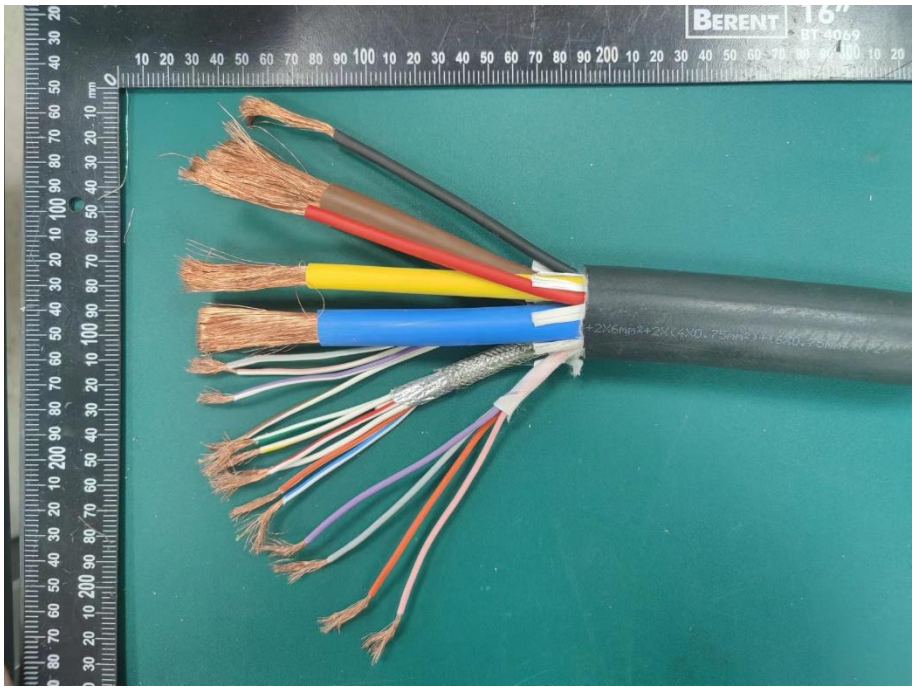
IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

TEST UNDER FIRE CONDITIONS			
Flame applied for s	120		P
The distance between the lower edge of the top support and the onset of charring	great than 50 mm	365	P
Charring extends downwards to a point from the lower edge of the top support	not great than 540 mm	529	P

ASSESSMENT OF HALOGENS FOR ALL NON-METALLIC MATERIALS			
Requirements for extruded material			P
Insulation material	Halogen free		P
IEC 60754-2			P
pH	4,3 min.	5,9	P
Conductivity µS/mm	10 max.	1,17	P
IEC 60754-1			
Chlorine and bromine content expressed as HCl %	0,5 max.	< 0,5	P
Halogen Fluorine 5.3 of IEC 62821-2:2015	If negative: stop test		N/A
	If positive test according to IEC 60684-2	Skip Annex C to fluorine content	P
IEC 60684-2			
Fluorine content %	0,1 max.	< 0,02	P
Filler material	Halogen free		N/A
IEC 60754-2			N/A
pH	4,3 min.		N/A
Conductivity µS/mm	10 max.		N/A
IEC 60754-1			N/A
Chlorine and bromine content expressed as HCl %	0,5 max.		N/A
Halogen Fluorine 5.3 of IEC 62821-2:2015	If negative: stop test		N/A
	If positive test according to IEC 60684-2		N/A
IEC 60684-2			N/A
Fluorine content %	0,1 max.		N/A

IEC 62893-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
Wrapping tape material	Halogen free		N/A
IEC 60754-2			N/A
pH	4,3 min.		N/A
Conductivity µS/mm	10 max.		N/A
IEC 60754-1			N/A
Chlorine and bromine content expressed as HCl %	0,5 max.		N/A
Halogen Fluorine 5.3 of IEC 62821-2:2015	If negative: stop test		N/A
	If positive test according to IEC 60684-2		N/A
IEC 60684-2			N/A
Fluorine content %	0,1 max.		N/A
Sheathing material	Halogen free		P
IEC 60754-2			P
pH	4,3 min.	7,9	P
Conductivity µS/mm	10 max.	33,87	P
IEC 60754-1			
Chlorine and bromine content expressed as HCl %	0,5 max.	< 0,5	P
Halogen Fluorine 5.3 of IEC 62821-2:2015	If negative: stop test		N/A
	If positive test according to IEC 60684-2	Skip Annex C to fluorine content	P
IEC 60684-2			
Fluorine content %	0,1 max.	< 0,02	P

ANNEX PICTURES:



62893 IEC 126 2x70 + 1x25 + 2x6 + 14x0,75 (black sheathed)

END OF TEST REPORT