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IEn CERTIFICATE

No. DZC.521.80.2022

Issue No. 01 of 2022.09.02

(STATEMENT)

Name and address of the Certificate Holder:	**ERKO sp. z o.o. sp. k.** **ul. Lipowa 24, 11-042 Jonkowo**
Name of the product:	**The Shark family of connectors dedicated to Al and Cu winding wires**
Type:	**AL-R1, R1, AL-R1S, R1S, AL-R2, AL-RM1, RM1, AL-RM2, RM2, AL-RD1, RD1, AL-RD2, RD2, AL-RT1, RT1, AL-RT2, RT2, AL-SRD1, AL-SRD2**
Manufacturer:	**ERKO sp. z o.o. sp. k.** **ul. Lipowa 24, 11-042 Jonkowo, Poland**
Parameters and application of product:	**According to appendix** **Connectors for enameled round or profiled, aluminum or copper winding wires.**
The product meets requirements of the:	**WTO No. 1/2020 of January 29, 2020, developed on the basis of the requirements of the PN-EN 61238-1: 2004 standard**
According to the report made by:	**Instytut Energetyki**
Number of the evaluation report:	**DZC.521.80.2022**
Period of validity:	**from 02nd of September 2022 until 08th of August 2025**

The right to use the certificate of conformity within its validity period applies only to:

- **these copies that meet the requirements specified above and have the same characteristics (parameters) as the model / product samples submitted for testing,**
- **certificate holder or his authorized representative.**

The list of evidenced parameters is included in the appendices to the certificate of conformity.
Number of appendices: 1

based on the type 1a product certification program acc. to PN-EN ISO/IEC 17067:2014-01
(product parameters confirmed by type test)

DIRECTOR OF
INSTYTUT ENERGETYKI
dr hab. inż. Tomasz Gałka, prof. IEn

Warsaw, 2022.09.02

APPENDIX TO THE CERTIFICATE OF IEn
No. DZC.521.80.2022
Issue No. 01 of 2022.09.02

LIST OF EVIDENCED PARAMETERS

Element type	Scope of application on enameled winding wires [mm^2]	
	Cu[1)]	Al[2)]
AL-R1	1,77 ÷ 4,9	4,9 ÷ 9,9
R1	1,77 ÷ 4,9	-
AL-R1S	1,77 ÷ 9,9	4,3 ÷ 15,75
R1S	9,9	-
AL-R2	-	4,3 ÷ 15,75
AL-RM1	0,4 ÷ 1,4	0,785 ÷ 2,83
RM1	0,4 ÷ 1,4	-
AL-RM2	0,4 ÷ 1,4	0,785 ÷ 2,83
RM2	0,4 ÷ 1,4	-
AL-RD1	9,9 ÷ 22,4	12,5 ÷ 24
RD1	9,9 ÷ 22,4	-
AL-RD2	9,9 ÷ 22,4	12,5 ÷ 39,5
RD2	9,9 ÷ 20,8	-
AL-RT1	0,4 ÷ 1,2	0,785 ÷ 1,77
RT1	0,4 ÷ 1,2	-
AL-RT2	0,4 ÷ 1,2	0,785 ÷ 1,77
RT2	0,4 ÷ 1,2	-
AL-SRD1	9,9	12,5 ÷ 32
AL-SRD2	9,9	12,5 ÷ 32
Product class	A	
Heating current	Current density for Al wires: 6 [A/mm^2] Current density for Cu wires: 9 [A/mm^2]	
Short-circuit current: for 1 [s]	Current density for Al wires: 75 [A/mm^2] Current density for Cu wires: 150 [A/mm^2]	
Initial scatter δ[3)]	≤ 0,30	
Mean scatter β[4)]	≤ 0,30	
Resistance factor ratio λ[5)]	≤ 2,0	
Change in resistance factor D[6)]	≤ 0,15	
Maximum temperature θ_{max}[7)]	≤ θ_{ref}	
Permissible tensile force [N]	≤ 40xA[8)] for Al wires ≤ 60xA[8)] for Cu wires	

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LIST OF EVIDENCED PARAMETERS

NOTES:

1) [1]) Cu wires according to: PN-EN60317-26:1998, PN-EN60317-29:2002 standards.
2) [2]) Al wires according to: PN-EN60317-25:2010, PN-EN60317-69:2017 standards.
3) [3]) The average value of the resistance factors of six connectors before the first heating cycle.
4) [4]) The average value of the resistance factors of six connectors calculated from last 11 measurements readings. It specifies if all connectors of given type are characterized by similar changes in resistance during the heat cycles.
5) [5]) Resistance factor ratio of tested connector during the heat cycle test in relation to the initial resistance factor.
6) [6]) The value specifies the size of the resistance factor change based on last 11 measurements readings.
7) [7]) Temperature of the connector referenced to the temperature of the reference section.
8) [8]) Nominal cross-sectional area.