

# TESTING of CAPACITORS

# ZEZ SILKO manufactures and supplies a wide range of PP film capacitors

LV PFC capacitors



MV capacitors



Power Electronics Capacitors



Induction heating caps



Energy storage caps



Reactors

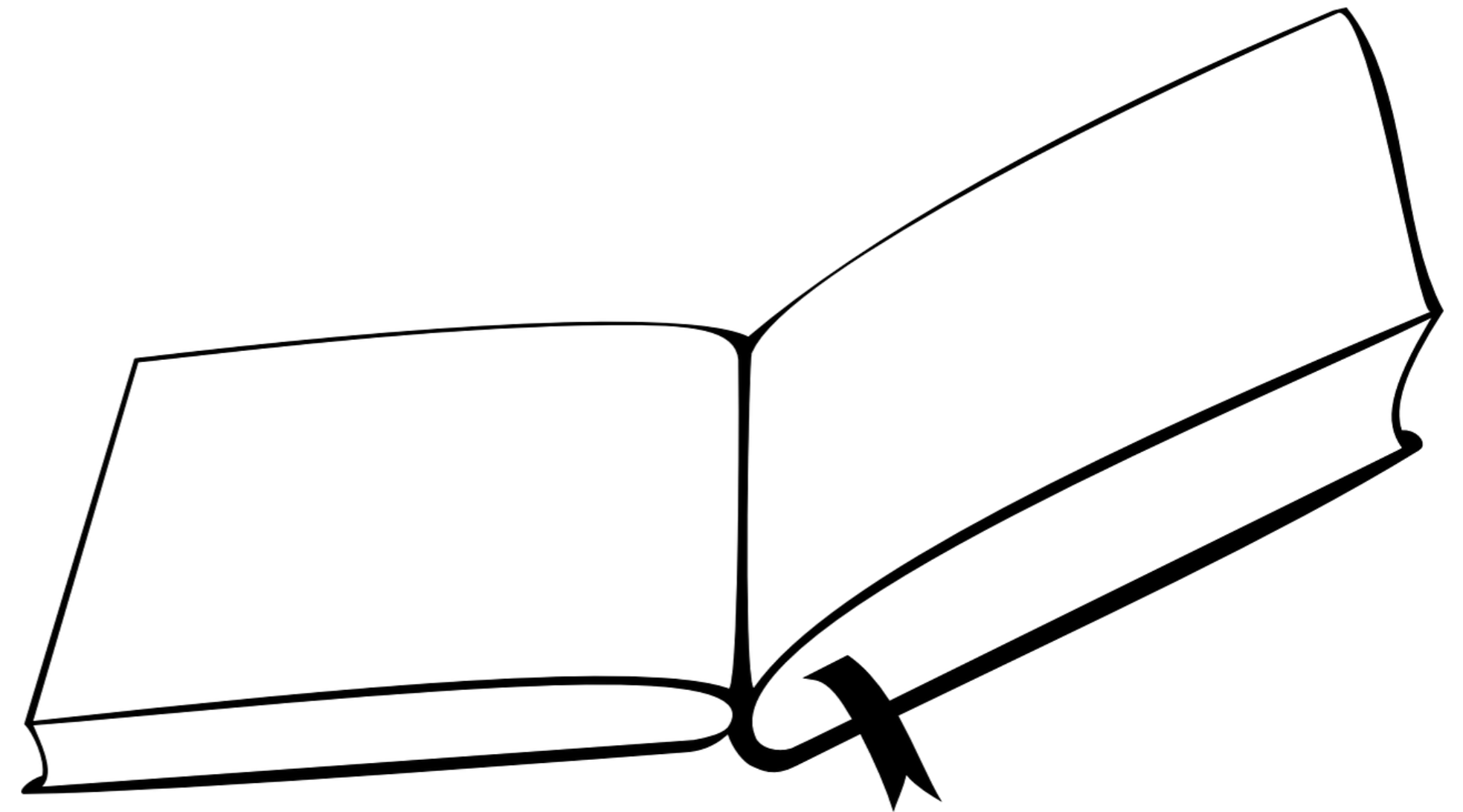


Capacitor banks



## CONTENTS

- ✓ Certificates
- ✓ Testing of capacitors – LV PFC
- ✓ Testing of capacitors – MV PFC
- ✓ Testing of capacitors – PEC
- ✓ Special testing on request





# CERTIFICATES

- ✓ ISO 9001
- ✓ ISO 14001
- ✓ ISO 45001
- ✓ IRIS ISO/TS 22163
- ✓ UL 810
- ✓ EN15085 Welding
- ✓ RoHS, REACH

www.zez-silko.com



TESTING of CAPACITORS



**Lloyd's Register**

Current issue date: 13 December 2020  
 Expiry date: 27 November 2023  
 Certificate identity number: 10316334

Original approval(s): ISO 9001 - 13 December 2020

## Certificate of Approval

This is to certify that the Management System of:

ZEZ SILKO, s.r.o.

Pod Černým lesem 683, 564 01 Žamberk, Czech Republic

has been approved by Lloyd's Register to the following standards:

**ISO 9001:2015**

Approval number(s): ISO 9001 – 0

The scope of this approval is app...  
 Development, production, sale and s...  
 Design, production, installation and t...

This certificate is a continuation of a...  
 Previous original ISO 9001 approval



**Lloyd's Register**



**IRIS Certification**

## CERTIFICATE

awarded to

**ZEZ SILKO s.r.o.**  
 Pod Černým lesem 683  
 56401, Žamberk  
 Czech Republic

**LRQA Limited**

confirms, as an IRIS Certification® approved certification body, that the Management System of the above organization has been assessed and found to be in accordance with the

**IRIS Certification® Conformity assessment:2020  
 and based on  
 ISO/TS 22163:2017**

for the activities of Design and Development and Manufacturing  
 for the scope of certification: 04 (Power system, drive unit)  
 Power capacitors

Certificate valid from: 28/11/2020

Certificate valid until: 27/11/2023\*



**Paul Graaf**  
 Area Operations Manager North Europ  
 Issued by: Lloyd's Register EMEA  
 for and on behalf of: Lloyd's Register C

Lloyd's Register Group Limited, its affiliates and any other entities, referred to in this certificate, are not liable for any damage or expense caused by reliance on the information provided in this certificate or by any other act or omission in reliance on the validity of the information in this certificate. Lloyd's Register EMEA, 1 Taborská 3, Praha 1, 110 00, Czech Republic.





## CERTIFICATE

Environmental Management System

This certificate is issued to confirm that the introduced and maintained Environmental Management System management system complies with the standard.

ISO 14001:2015

ZEZ SILKO, s.r.o.

Pod Černým lesem 683, 564 01 Žamberk  
 TAX reg. No.: 15030334





## CERTIFICATE

Occupational Health and Safety Management System

This certificate is issued to confirm that the introduced and maintained Occupational Health and Safety Management System complies with the standard.

ISO 45001:2018

ZEZ SILKO, s.r.o.

Pod Černým lesem 683, 564 01 Žamberk  
 TAX reg. No.: 15030334

Site of Business:  
 Pod Černým lesem 683, 564 01 Žamberk

Scope of certification:  
 Designing, manufacture, sale, and provision of power capacitors and choke coils

### CERTIFICATE OF COMPLIANCE

<b>Certificate Number</b>	20130930-E362473
<b>Report Reference</b>	E362473-20130930
<b>Issue Date</b>	2013-SEPTEMBER-30
<b>Issued to:</b>	ZEZ SILKO LTD. Pod Černým lesem 683 564 22 Žamberk CZECH REPUBLIC
<b>This is to certify that representative samples of</b>	COMPONENT - CAPACITORS, CONSTRUCTION ONLY PVAJP Series
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
<b>Standard(s) for Safety:</b>	UL 810, Standard for Capacitors UL 746C, Standard for Safety for Polymeric Materials – Use in Electrical Equipment Evaluations
<b>Additional Information:</b>	See the UL Online Certifications Directory at <a href="http://www.ul.com/database">www.ul.com/database</a> for additional information

Only those products bearing the UL Recognized Component Mark should be considered as being covered by UL's Recognition and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark, , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Recognized Component Mark on the product.



William R. Conroy, Director, North American Certification Programs  
 UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at [globalcustomerservice@ul.com](mailto:globalcustomerservice@ul.com).

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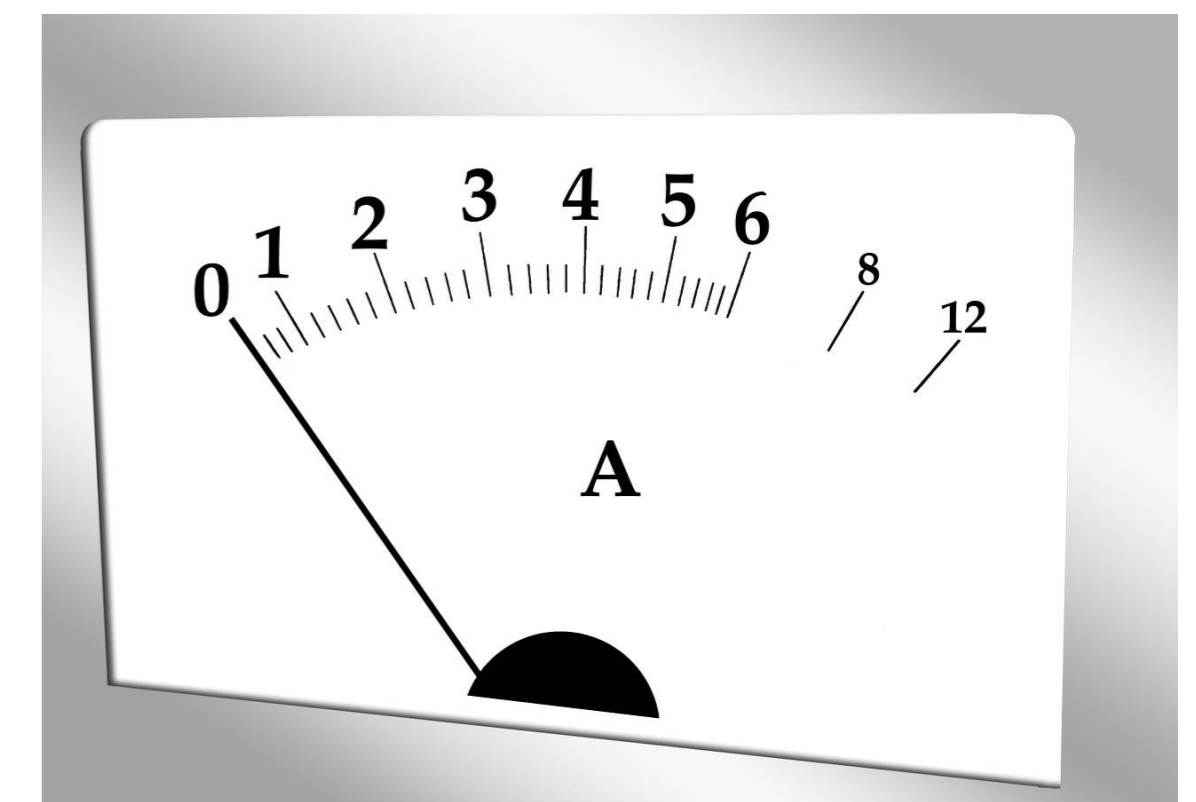
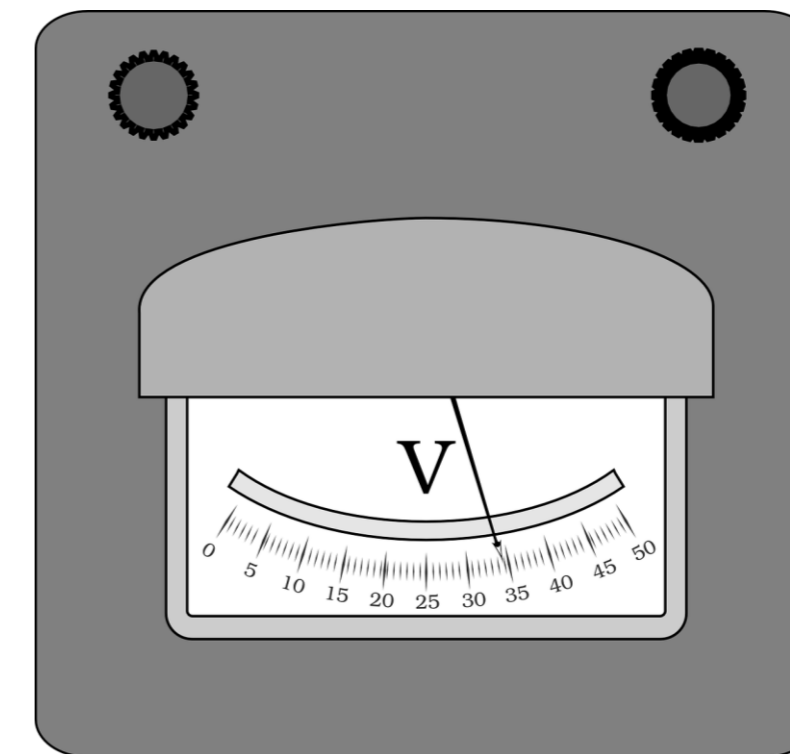
\* Providing that the subsequent surveillance audits are successful before the validity date of the previous audit.  
 Certification body address: 1 Trinity Park, Bickenhill Lane, B37 7ES Birmingham, United Kingdom

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## TESTING of CAPACITORS – LV PFC

Routine test - 100% of production  
Standard IEC EN 60831

- ✓ Visual inspection
- ✓ Voltage test between terminals
- ✓ Voltage test between terminals and container
- ✓ Test of internal discharge device
- ✓ Capacitance and tan ( $\delta$ ) measurement
- ✓ Sealing test

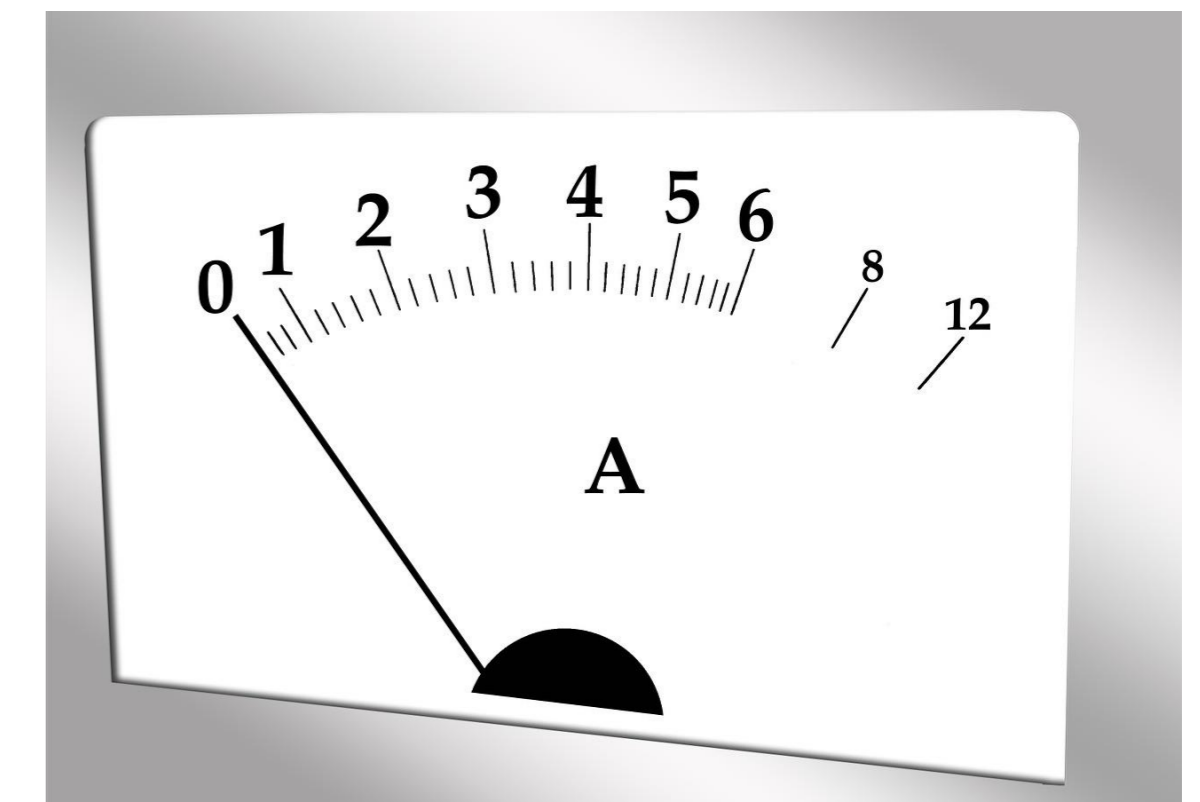
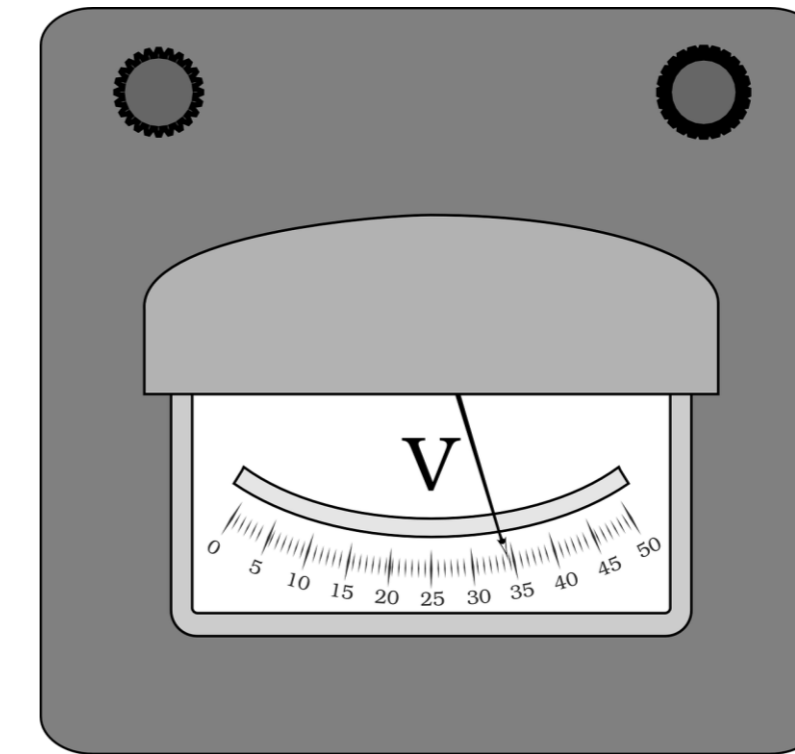




## TESTING of CAPACITORS – MV PFC

Routine test - 100% of production  
Standard IEC EN 60871

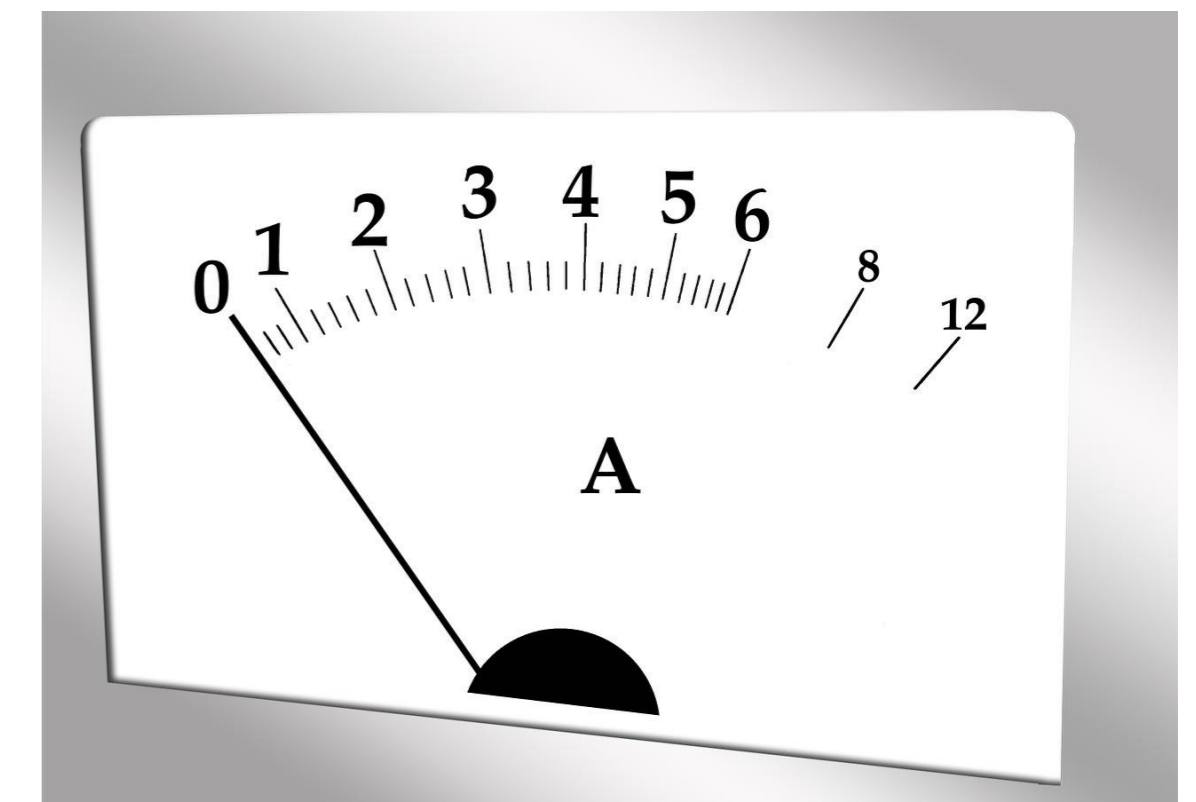
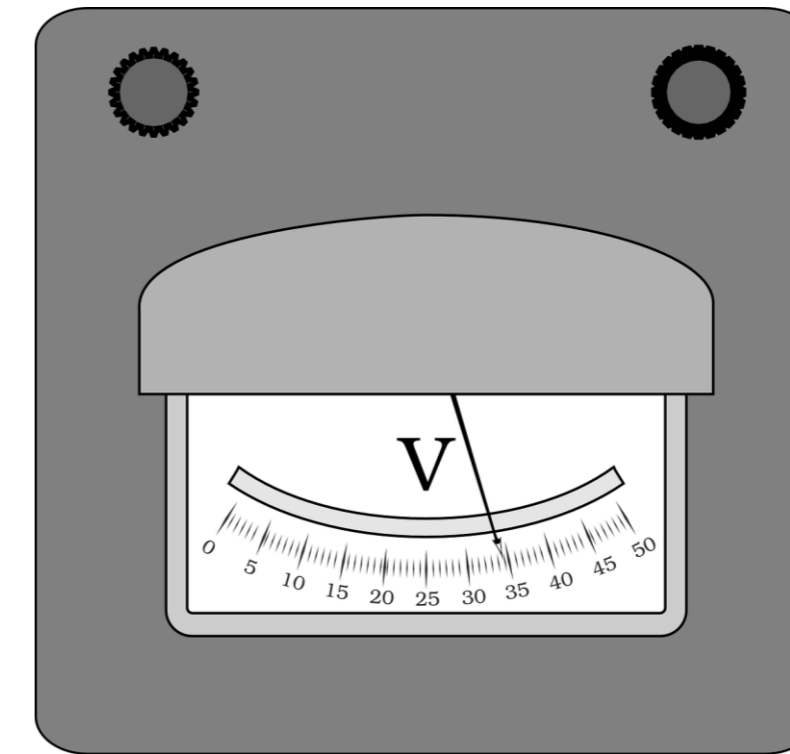
- ✓ Visual inspection
- ✓ Voltage test between terminals
- ✓ Voltage test between terminals and container
- ✓ Test of internal discharge device
- ✓ Capacitance and  $\tan(\delta)$  measurement
- ✓ Sealing test
- ✓ Discharge test of internal fuses



## TESTING of CAPACITORS – PEC

Routine test - 100% of production  
Standard IEC EN 61071, EN 61881

- ✓ Visual inspection
- ✓ Voltage test between terminals
- ✓ Voltage test between terminals and container
- ✓ Test of internal discharge device (if applicable)
- ✓ Capacitance and  $\tan(\delta)$  measurement
- ✓ Sealing test



## SPECIAL TESTING on request

### 1. Internal

- ✓ Type tests
- ✓ Lifetime test
- ✓ Thermal stability test
- ✓ Partial discharge test
- ✓ Cyclic discharge test

### 2. External

- ✓ Shock and vibrations EN61373
- ✓ Climatic tests EN60068
- ✓ Fire protection EN45545





# ZEZ SILKO advantages

- ✓ 90 years of capacitor production
- ✓ Experienced technical support
- ✓ Tailor made solution
- ✓ Flexibility
- ✓ High quality
- ✓ Full range of products
- ✓ Short delivery time





***Thank you very much for your attention!***

JOSEF ŠINDELÁŘ

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