

EPIL TEST REPORT

Project No.: H13-60004

Equipment under Test: MV Capacitor

Model	: PK 200/11.56 EDRI
Serial Number	: T-T-11.56
Rated Volage	: 11.56 kV
Rated Power	: 200 kVAR
Rated Capacitance	: 4.76 μ F
Rated Frequency	: 50 Hz
Rated Current	: 17.33 A
Insulation Level	: 28/95 kV
Temperature Category	: -40/55°C

Manufactured by: Parto Khazen Co.

Applicant: Parto Khazen Co.



Trade Mark:

Tested According to: IEC 60871-1:2014, Client Request

Testing Date: 10-March-2021

Issue Date: 06-April-2021

Test Result: See pages 5 to 10

No. of Pages: 17

Prepared and Tested by: Test Engineer
E. Ranjbar

Verified by: Technical Manager
H. Jahangir

Chief Executive Officer
S. M. Mirsadri

Approved:

Engineering Deputy of
Test and Inspection
Prof. B. Vahidi



Technical Department

ISO IEC 17025

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1. GENERAL INFORMATION

1.1. Product Information

Equipment Under Test	: MV Capacitor
Manufacturer	: Parto khazen Co.
Model	: PK 200/11.56 EDRI
Serial Number	: T-T-11.56
Rated Voltage	: 11.56 kV
Rated Power	: 200 kVAR
Rated Capacitance	: 4.76 μ F
Rated Frequency	: 50 Hz
Insulation Level	: 28/95 kV
Temperature Category	: -40/55°C
Normative document	: IEC 60871-1:2014, Client Request

1.2. Client Information

Applicant	: Parto khazen Co.
Telephone	: +98-21-88882956
Fax	: +98-21-88882959

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1.3. Tests Performed

Test	Test According to	Result
Capacitance Measurement	Client request	Passed
Measurement of the Tangent of the Loss Angle ($\tan \delta$) of the Capacitor	Client request	Performed
Voltage Test between Terminals	IEC 60871-1	Passed
AC Voltage Test between Terminals and Container (Routine Test)	IEC 60871-1	Passed
Sealing Test	IEC 60871-1	Passed
AC Voltage Test between Terminals and Container (Type Test)*	IEC 60871-1	Passed

* The test is performed only in dry condition. It is responsibility of the manufacturer to supply a separate type test report showing that the bushing will withstand the wet test voltage for 1 min.

1.4. Test Results and Descriptions:

See pages 5 to 10.



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2. PERFORMANCE and RESULTS of TESTS

2.1 Capacitance Measurement

2.1.1 Test data

Equipment Under Test (EUT) : MV Capacitor
Manufacturer : Parto khazen Co.
Location : Parto khazen Co.
Date : 10-March-2021
Test Expert : Mr. Ranjbar
Normative Document : IEC 60871-1:2014, Client Request

2.1.2 Ambient conditions

Ambient Temperature : 21.1 °C
Relative Humidity : 27.1 %

2.1.3 Performance of test

The capacitance is measured according to client request using a LCR meter e.g. at a low voltage.

2.1.4 Acceptance conditions of test


The capacitance shall not differ from the rated capacitance by more than -5 % to + 10 %.

2.1.5 Result of test

Table 1. Result of EUT capacitance measurement

Measured capacitance(μF)	Rated Capacitance(μF)	Tolerance %
4.707	4.76	1.11

✓ Passed


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2.2 Measurement of the Tangent of the Loss Angle ($\tan \delta$) of the Capacitor

2.2.1 Test data

Equipment Under Test (EUT)	: MV Capacitor
Manufacturer	: Parto khazen Co.
Location	: Parto khazen Co.
Date	: 10-March-2021
Test Expert	: Mr. Ranjbar
Normative Document	: Client Request

2.2.2 Ambient conditions

Ambient Temperature	: 21.1 °C
Relative Humidity	: 27.1 %

2.2.3 Performance of test

The tangent of the loss angle is measured according to client request using a LCR meter e.g. at a low voltage. The requirements regarding capacitor losses shall be agreed upon between manufacturer and purchaser.

2.2.4 Result of Test

Measured tangent of the loss angle ($\tan \delta$): 9.7×10^{-4}

✓ **Performed**

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2.3 Voltage Test between Terminals

2.3.1 Test data

Equipment Under Test (EUT)	: MV Capacitor
Manufacturer	: Parto khazen Co.
Location	: Parto khazen Co.
Date	: 10-March-2021
Test Expert	: Mr. Ranjbar
Normative Document	: IEC 60871-1:2014

2.3.2 Ambient conditions

Ambient Temperature	: 21.1 °C
Relative Humidity	: 27.1 %

2.3.3 Performance of test

The test has been performed according to clause 9 of IEC 60871-1 by applying DC voltage between terminals with a duration of 10 s.

2.3.4 Acceptance conditions of test

During the test, neither puncture nor flashover shall occur.


2.3.5 Result of Test

Table 2 shows the results of the test.

Table 2. Result of voltage test between terminals

Applied voltage (kV)	Duration (s)	Result of test
46.24	10	passed

✓ **Passed**


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2.4 AC Voltage Test between Terminals and Container (Routine Test)

2.4.1 Test data

Equipment Under Test (EUT)	: MV Capacitor
Manufacturer	: Parto khazen Co.
Location	: Parto khazen Co.
Date	: 10-March-2021
Test Expert	: Mr. Ranjbar
Normative Document	: IEC 60871-1:2014

2.4.2 Ambient conditions

Ambient Temperature	: 21.1 °C
Relative Humidity	: 27.1 %

2.4.3 Performance of test

The EUT (with two terminals insulated from the container) is subjected to a test voltage according to clause 18.1 of IEC 60871-1 between the terminals (joined together) and the container for a duration of 10 s.

2.4.4 Acceptance conditions of test

During the test, neither puncture nor flashover shall occur.

2.4.5 Result of Test

Table 3. Result of AC voltage test between terminals and container (routine test)

Applied voltage (kV)	Duration (s)	Result of test
28	10	passed

✓ **Passed**



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2.5 Sealing Test

2.5.1 Test data

Equipment Under Test (EUT)	: MV Capacitor
Manufacturer	: Parto khazen Co.
Location	: Parto khazen Co.
Date	: 10-March-2021
Test Expert	: Mr. Ranjbar
Normative Document	: IEC 60871-1:2014

2.5.2 Ambient conditions

Ambient Temperature	: 21.1 °C
Relative Humidity	: 27.1 %

2.5.3 Performance of test

The test has been performed according to clause 12 of IEC 60871-1. Unenergized capacitor is heated for 2 hours while all parts of the EUT reach a temperature of 75 °C.

2.5.4 Acceptance conditions of test

No leakage shall occur during the test.

2.5.5 Result of Test

The EUT was tested according to IEC 60871-1 and it passed the test.

✓ **Passed**



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2.6 AC Voltage Test between Terminals and Container (Type Test)

2.6.1 Test data

Equipment Under Test (EUT)	: MV Capacitor
Manufacturer	: Parto khazen Co.
Location	: Parto khazen Co.
Date	: 10-March-2021
Test Expert	: Mr. Ranjbar
Normative Document	: IEC 60871-1:2014

2.6.2 Ambient conditions

Ambient Temperature	: 21.1 °C
Relative Humidity	: 27.1 %

2.6.3 Performance of test

The EUT (with two terminals insulated from the container) is subjected to a test voltage according to clause 18.1 of IEC 60871-1 between the terminals (joined together) and the container for a duration of 10 s.

2.6.4 Acceptance conditions of test

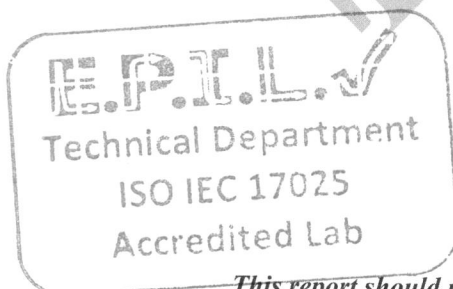
During the test, neither puncture nor flashover shall occur.

2.6.5 Result of Test

Table 4. Result of AC voltage test between terminals and container (type test)

Applied voltage (kV)	Duration (s)	Result of test
28	60	passed

✓ **Passed**



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3. FIGURES

Capacitor according to IEC60871	
Type	PK 200/11.56 EDRI
Rated voltage at 50 Hz	11.56 KV
Rated output at 50 Hz	200 KVAR
Rated Capacitance	4.76 μ F
Rated Current at 50 Hz	17.33A
Rated Frequency	50Hz
Insulation level	28/95 Kv
Internal fuse	NO
Temperature category	-40/+55C
Discharge device	
Impregnation	
Connection symbol	
Project NO:	T-T-11.56
Made in Iran -Parto khazen	

NON-PCB

Figure 1: Nameplate of equipment under test

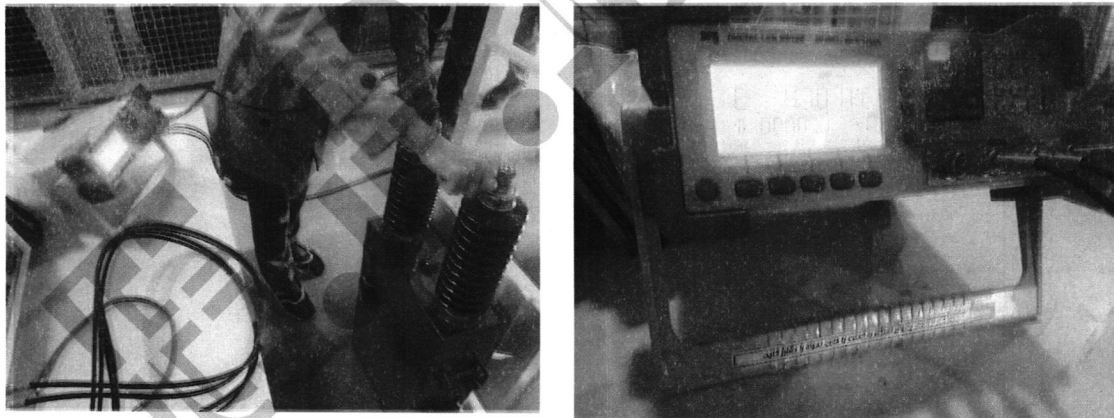


Figure 2: Measurement of capacitance and $\tan \delta$ at ambient temperature

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Review No:06

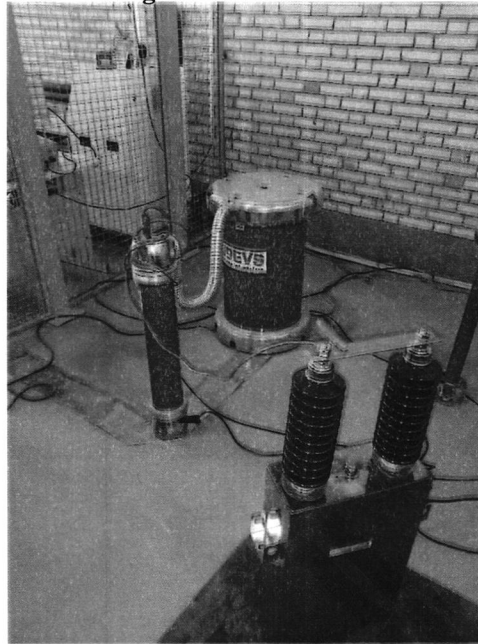


Figure 3: AC voltage test between terminals and container

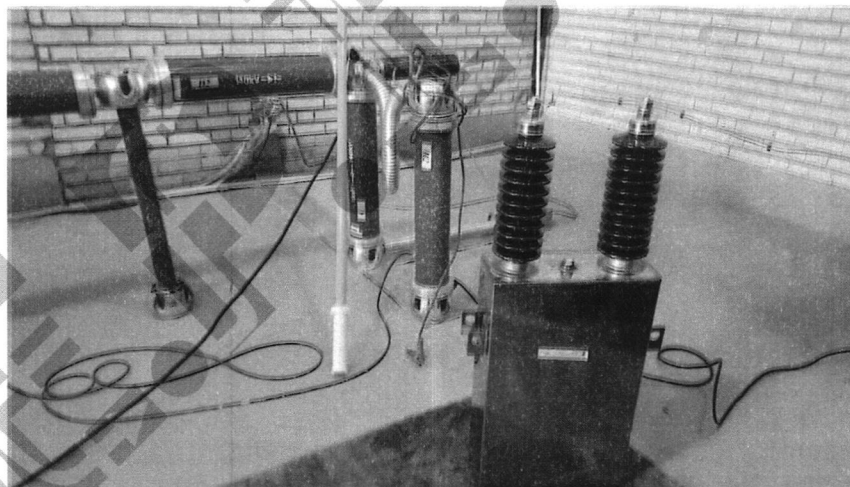


Figure 4: Voltage test between terminals

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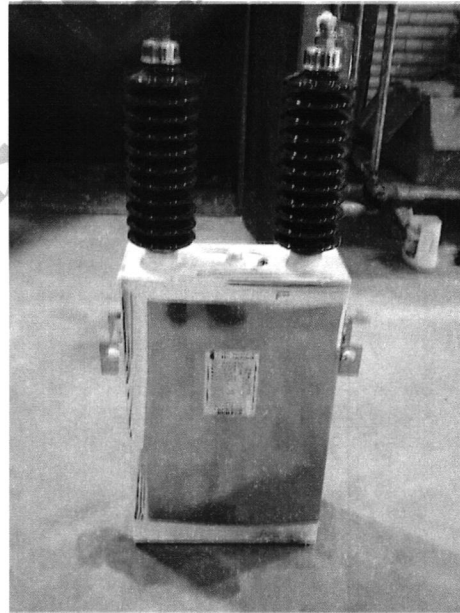
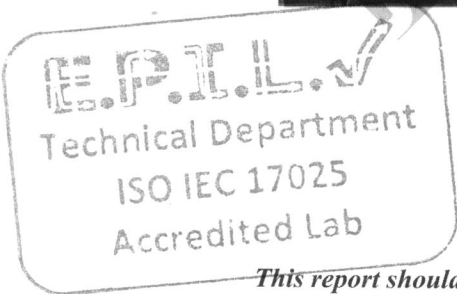


Figure 5: Sealing test



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4. ANNEX1: Calibration Certificate of the Testing Equipment



شرکت دانش بنیان
مهندسی سنجش کوشا
FLIGHT & ISO/IEC 17025 STANDARDS ACCREDITED LABS
Calibration & measurement Certificate / test report



Certificate No :	9900560-03	شماره گواهی :
Customer Name :	شرکت پرتو خازن	نام مشتری :
Equipment / Tools :	DIGITAL LCR METER	نام دستگاه :
Model :	GPS-3131B	مدل :
SerialNo:	3131B1508541	سریال :
Code :	R40	کد :
Manufacture :	GPS	سازنده :
Receipt Date :	1399/04/08	تاریخ پذیرش :
Calibration Date :	1399/04/30	تاریخ کالیبراسیون :
Issue Date :	1399/04/30	تاریخ صدور :
Due Date :		تاریخ انقضاء :

Traceability : The reference standards are traceably calibrated at an accredited calibration laboratory or a national metrology institute.

Ambient Condition : Temperature : (23±2)°C Humidity : (40±15)%

Method(s) : IDS331

- Reference(s) :
- 1- Standard Resistor Model SR1010 / 10 KOHM (C/N:9702173-07)
 - 2- Standard Resistor Model SR1010/ 100 KOHM (C/N:9702173-08)
 - 3- Precision Decade Capacitor Model 1413 (C/N:9702190-10)
 - 4- Decade Inductor Model 1491-G (C/N:9802146-01)
 - 5- Digital Multimeter Model 34401A (C/N:CEL/017/0025/01)

Uncertainty : The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor (k=2), providing a level of confidence of approximately 95%

- Remarks :
- 1- The test report or calibration certificate shall not be reproduced except in full, without written approval of the SKE laboratory.
 - 2- This certificate without the SKE laboratory stamp is not valid.

Accomplished by :

111



Page No. 1 of 2

Approved by :

محمد حسین جواد نیا

LAB.Stamp:

9900560-03

تهران، خیابان آزادی، بعد از دانشگاه صنعتی شریف، روبروی بلوار استاد معین، بلوار شهید اکبری، کوی عباس شرقی، بلاک 9
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Form No: SCF 70802

Rev No: 00

Rev Date: Nov 2019

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Calibration & measurement Certificate / test report



REQUESTED PARAMETER AND RANGE

PARAMETER	REF. SETTING	UUT READING	ERROR	EXP. UNC. (±)	
RESISTANCE TEST: @ 1 kHz	39.000 kΩ	39.00 kΩ	0.00 kΩ	0.0060 kΩ	
	47.000	47.00	0.00	0.0060 kΩ	
	56.000	56.00	0.00	0.0060 kΩ	
	68.000	68.00	0.00	0.0060 kΩ	
	82.000	82.00	0.00	0.0060 kΩ	
	@ 120 Hz	120.000	119.86	- 0.14	0.0062 kΩ
	150.000	149.84	- 0.16	0.0066 kΩ	
	220.000	219.48	- 0.52	0.0067 kΩ	
	270.000	269.58	- 0.42	0.0071 kΩ	
	330.000	327.50	- 2.50	0.0077 kΩ	
	470.00	469.7	- 0.3	0.060 kΩ	
	680.00	679.3	- 0.7	0.060 kΩ	
	1.0000 MΩ	998.4	- 1.6	0.060 kΩ	
	CAPACITANCE TEST: @ 120 Hz	1.00000 μF	1.0003 μF	+0.0003 μF	0.0068 μF
9.0726		9.075	+0.0024	0.073 μF	
120.750		120.42	- 0.330	0.91 μF	
1025.60		1026.5	+0.90	8.00 μF	
INDUCTANCE TEST: @ 120 Hz	100.00 μH	100.8 μH	+0.8 μH	0.117 μH	
	1.3000 mH	1.2905 mH	- 0.0095 mH	0.0013 mH	
	5.1000	5.104	+0.004	0.0051 mH	
	6.6000	6.637	+0.037	0.0067 mH	
	8.0000	7.999	- 0.001	0.0080 mH	
	65.100	65.02	- 0.08	0.0653 mH	
PARAMETER	UUT VALUE	REF. READING	ERROR	EXP. UNC. (±)	
FREQUENCY TEST:	100 Hz	100.01 Hz	- 0.01 Hz	0.60 Hz	
	120	120.02	- 0.02	0.60 Hz	
	1 kHz	1.000 kHz	0.000 kHz	0.60 kHz	
	10	10.00	0.00	0.60 kHz	
AC LEVEL TEST:	0.3 VAC	0.322 VAC	- 0.022 VAC	0.060 V	
	1.0	1.06	- 0.06	0.060 V	

توضیح: به درخواست مشتری پارامترها و نقاط ذکر شده کالیبره گردید.

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9900560-03

Abbreviations:

UUT : Unit Under Test

REF. : Reference

TOL. : Tolerance

EXP. UNC. : Expanded Uncertainty

Form No. SOI 70802

Rev No. 00

Rev. Date: Nov 2019

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شماره شناسی: FRG/702/11



REPORT NUMBER: ۴۴۸۸۰ د شماره سریال گواهی:

گواهی کالیبراسیون
CERTIFICATE OF CALIBRATION

ISSUED BY LAKSAR CO REFERENCE STANDARD LABORATORY صادره از آزمایشگاه استاندارد مرجع شرکت لکسر

شرکت لکسر
LAKSAR CO
صفحه ۱ از ۲
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DATE OF CALIBRATION: 1399/04/16 تاریخ انجام کالیبراسیون:
DATE OF ISSUE: 1399/04/17 تاریخ صدور گواهی:
RE-CAL DATE: پیشنهادی
SUGGESTED CLIENT: مراجع مشتری

Issued for: شرکت پرنو خارن
Address: شهریار - شهرک صنعتی صفا دشت - هفتم شرقی

Calibrated Instrument: (Digital Thermometer with Thermocouple Sensor) ابزار کالیبره شده: (دماسنج دیجیتال ترموکوپلی)

Manufacturer/S.N: TES/010607138	سارنده شماره سریال ساخت:	Description: Digital Thermometer, Res. 0.1 °C	مشخصات:
Installation Location: -----	محل استقرار:	Sensor's type: Type K Thermocouple	نوع حسگر:
Model: 1307	مدل:	Customer ID: R 50	شماره شناسایی مشتری/اموال:

Calibration Report:

1- Calibration Conditions:

Ambient temperature: 23±2 Degree C دمای محیط:
Ambient Humidity: Less than 55%RH رطوبت محیط:

2-Calibration procedure:

The Procedure is based on guideline EURAMET Cg-8. The calibration is done by comparison method, reference sensors & equipments which according to International Temperature Scale (ITS 90) are traceable to International references as stated in next item. All the reported results after Steady state conditions have been reached & actual values obtained from the average of two reference thermometers.

۱- شرایط کالیبراسیون:
در انبساط و انقباض بین طاقی EURAMET Cg-8 به روش مقایسه ای. با استفاده از حسگرها و تجهیزات (ITS 90) قابل ردیابی به مراجع بین المللی ذکر شده در بند زیر می باشد. نتایج نتایج گزارش شده بعد از شرایط پایدار و زمانی از میانگین دو حسگر مرجع به دست آمده است.

3- Traceability:

This is to certify that the instrument has been examined and calibrated by Laksar calibration laboratory using accurately controlled temperature equipment(s).

۲- رویه کالیبراسیون:
بر اساس راهنمای بین طاقی EURAMET Cg-8 به روش مقایسه ای. با استفاده از حسگرها و تجهیزات (ITS 90) قابل ردیابی به مراجع بین المللی ذکر شده در بند زیر می باشد. نتایج نتایج گزارش شده بعد از شرایط پایدار و زمانی از میانگین دو حسگر مرجع به دست آمده است.

All references are calibrated by calibration standards S/N S63687& 0096 which are traceable to NPL references by TEMPESENS CALIBRATION CENTER Laboratory

۳- قابلیت ردیابی:
این مدرک برای تصدیق این است که ابزار بوسیله تجهیزات (جهت کنترل آزمایشگاه کالیبراسیون لکسر) مورد کالیبراسیون قرار گرفته است.
کلیه مراجع مورد استفاده توسط استانداردهای اندازه گیری به شماره سریال SPPFAV و 0096 کالیبره شده اند و توسط آزمایشگاه TEMPESENS CALIBRATION CENTER به مراجع NPL قابل ردیابی هستند.

4-Vocabulary:

Error: مقدار خوانده شده منهای مقدار واقعی

Actual value: مقدار واقعی، دمای خوانده شده از روی نمایشگر مرجع

UUC Reading: مقدار خوانده شده، دمای خوانده شده از روی نمایشگر ابزار مورد کالیبراسیون



- 1- This document is a certificate of calibration and it is not a certificate of conformity.
- 2- The user must not use the instrument during a specified period of time.
- 3- This certificate shall not be reproduced or reproduced other than in full.
- 4- This certificate is not valid without special stamp & hologram of issuer laboratory.
- 5- The expanded uncertainty of measurement is estimated for accreditation in accordance with the reference document EA-4/02 related to European co-operation organization, with attention to coverage factor K=2 for normal distribution, providing a level of confidence of approximately 95%.

- ۱- این مدرک یک گواهی کالیبراسیون است و گواهی اطمینان نیست.
- ۲- استفاده کننده باید در فاصله زمانی من نسبت به کالیبراسیون مجدد اقدام نماید.
- ۳- این گواهی تنها بر روی اصل آن قابل استفاده است و هرگونه کپی و یا تفسیر غیر از متن اصلی معتبر نیست.
- ۴- این گواهی بدون مهر مخصوص و هولوگرام آزمایشگاه صادر کننده فاقد اعتبار است.
- ۵- عدم قطعیت بسط داده گردی طاقی با مدرک مرجع EA-4/02 مربوط به سازمان همکاری اروپا برای تأیید صلاحیت می باشد. محاسبه شده که با در نظر گرفتن ضریب پوشش K=2 برای توزیع نرمال با سطح اطمینان 95٪ می باشد.

Address: No.28, Khosrow Alley, Nojabad St, Karimkhan Zand Ave., Tehran. Tel: 88990132, 88966338 Fax: 88203819
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