

संदर्भ सं. / Ref. No. IDEMI/ETL/131/14-15

दिनांक :
Date : 17.11.2014

M/s. TAS POWERTEK PVT. LTD.,
W-161, NEAR PAWAR INDUSTRIES,
M.I.D.C., AMBAD,
NASHIK - 422 010
MAHARASHTRA, INDIA

Kind Attn: Mr. Tushar Mogre

विषय : परिक्षण रिपोर्ट
Sub : Test Report

महोदय,

आपके उपकरणों / अवयवों पर किये हुये परिक्षण रिपोर्ट संख्या (TR/ETL/163/14-15) आपको जानकारी के लिए पत्र के साथ भेज रहे हैं। यदि आपको परिक्षित मदों पर स्पष्टीकरण की कोई आवश्यकता हो तो, कृपया परिक्षण रिपोर्ट जारी करने वाले प्राधिकारी को हमारे संदर्भ संख्या और तारीख का उल्लेख करते हुए, रिपोर्ट प्राप्त होने पर चार सप्ताह के अन्दर सम्पर्क करें अथवा लिखें। हम इस पत्र के साथ फीड बैक फॉर्म भेज रहे हैं। कृपया उसे भरके प्रधाननिदेशक, वैमाउअस को भेजे।

धन्यवाद!

भवदीय


प्रधान निदेशक

संलग्न पत्रानुसार

Dear Sir,

TR/ETL/163/14-15

Test Report No. () / on your instruments/ Components/ Equipments are / is enclosed herewith for your information. If you need any clarification on Test Report, please write/contact Test Report issuing officer quoting our reference and date within 4 weeks from the date of receipt of this report. We are also enclosing here with feed back form. Kindly fill up and send to the Principal Director of IDEMI
Thanking you,

Yours faithfully



PRINCIPAL DIRECTOR

Encl. As above

TEST REPORT



Field: Electrical Testing
Work Order No. : WO/ETL/131/14-15
Date : 13.10.2014

Test Report No. : TR/ETL/163/14-15
Date of Testing : 15.10.2014 to 28.10.2014
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Test Item : Automatic Power Factor Controller

Tested for : M/s. TAS Powertek Pvt. Ltd.,
W-61, Near Pawar Industries , M. I. D. C., Ambad, Nashik - 422 010, Maharashtra, India

Tested at : IDEMI, MUMBAI. 400 022

Specification of equipment under test	Specification of Standards Used
Manufacturer : M/s. TAS Powertek Pvt. Ltd., Condition of Item on receipt : Good Aux Supply : 100 - 500 V AC, 50Hz Sr. No. : 5300081400001 Type : APFC - 03	Refer Page No.: 2 for details of Standard / Equipment Used Traceability: Standard Used for Testing are Traceable to National standards

Ambient Conditions :

Temperature : $25^{\circ}\text{C} \pm 2.5^{\circ}\text{C}$ Relative Humidity : 35% to 65%

Remarks : Please refer page 2 to 22 for Test Results.

- 1) Procedure of Test : Please refer page 5 for tests carried out and their standards.
- 2) The Power Factor Controller complies with the requirements for tests carried out.


C. M. PATIL
ASST. DIRECTOR
AUTHORISED SIGNATORY

(Note : This report refers only to the particular item(s) submitted for testing. The report should not be reproduced except in full without the prior permission from the Principal Director IDEMI, Mumbai - 400 022)

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MEASURING INSTRUMENTS, MUMBAI

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Government of India Society
Ministry of Micro, Small & Medium Enterprises

स्वातंत्र्यवीर तात्या टोपे मार्ग, चुनाभट्टी, सायन डाकघर, मुंबई - 400 022.
SWATANTRYAVEER TATYA TOPE MARG, CHUNABHATTI, SION P.O. MUMBAI - 400 022.

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Sr. No.: 5300081400001
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Specification of Standards/Equipment used.

Sr. No.	Name of Standards / Equipment	Sr. No.	Model No.	Make	Calibration Validity
1	Radiated RF EMF Immunity Test System				
i	Signal Generator	101408	SML 02	Rohde & Schwarz	07.06.2015
ii	Power meter with power head	311639 311215 311216	PM 2002 PH 2000 PH2000	Amplifier Research	19.03.2015
2	EMI Test Receiver	100160	ESCI	Rohde & Schwarz	10.06.2015
3	Artificial Mains (LISN)	100124	ESH2-Z5	Rohde & Schwarz	10.06.2015
4	Electrostatic Gun	P 1251107892	ESD 30 N	EM Test	08.06.2015
5	Ultra Compact Simulator	V0944105303	UCS 500 N7	EM Test	12.06.2015
6	Continuous Wave Generator	V1111109081	CWS 500 N1	EM Test	12.06.2015
7	Impulse Generator	1304032	IT 10kV	SCR	18.03.2015
8	Safety Analyzer	10112754	Guardian 6100+	Quadtech	11.12.2014
9	Log periodic & Biconical Antenna	0011X11121 0011X11121	PMMBC-01 PMMLP-01	PMM	09.07.2015


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1. EQUIPMENT UNDER TEST (EUT)

1.1. Brief Description

TAS Power Tek offers a range of Contactorisrd **Power Factor** Controllers to improve the power distribution quality in the industrial, residential and agricultural sector.

Features:

1. Power factor controller for universal application, requires no settings and is self-configuring.
2. Microcontroller based logic for measurements and control.
3. 16 character, 2 lines, alpha-numeric, dot matrix LCD display with backlight.
4. 7 keys, tactile keypad for user interaction.
5. Front panel flashing LED indication for controller healthy status.
6. Phase-to-Phase input voltage measurement, with transient protection.
7. Single phase load current CT input, selectable for 1Amp or 5Amp.
8. Suitable for up to 16 capacitor banks control.
9. Independent fuse protection for control outputs for banks 1 to 8 and 9 to 16.
10. Potential free, "normally open" relay contact outputs for external contactor control.
11. Two auxiliary outputs, "normally open" relay contacts for external interlocking.
12. THD measurements of supply voltage and load current. Odd harmonics up to 15th of fundamental.
13. Unequal bank selection. Including user defined bank values in KVAR in Expert mode.
14. Capacitor banks protection against Over/under voltage at measurement input. Harmonic overload, both for voltage and current Over temperature of controller Over/Under AC mains line frequency.
15. DIN Standard 144 x 144 mm Panel Cut-out for flush mounting arrangement. Max depth 87 mm from the front plate.
16. Screw terminal type rear side terminals for easy field wiring.
17. Optional "Expert Configuration" allows Line-to-Neutral as voltage sensing input.
18. Wide range SMPS with externally accessible input fuse protection.
19. The most important and advanced feature is the "BASIC Configuration".
20. Controller in this configuration has the following features:
 - Automatic detection and usage of the optimum capacitor step.
 - Fully automatic capacitor bank value setting and self-adapting.
 - System parameters (voltage, current, active power, reactive power, apparent power, Maximum values of these parameters, KVAR value of every bank that are connected) are displayed in terms of percentage of its rated values.

1.2. Operating condition of EUT During the Tests

EUT energized with 230 V, 50 Hz, & in normal operating condition


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1.3 Performance Check during immunity test

The Power factor controller device should not switch OFF or malfunction.

1.4 Acceptance Criteria

Performance Criteria – 'A'

The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed.

Performance Criteria – 'B'

The EUT shall continue to operate as intended during and after the test. During the test degradation of performance is however allowed. No change of actual operating state or stored data is allowed.

Performance Criteria – 'C'

Temporary loss of function is allowed, provided the function is self – recoverable or can be restored by the operation of the controls.


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SUMMARY OF TESTS

TEST	STANDARDS	RESULT
Insulation Resistance Test	IS 14697:1999	Complied
High Voltage Test	IS 14697:1999	Complied
Impulse voltage test	IS 14697:1999	Complied
Radiated Electromagnetic Field Disturbance Test	IEC 61000-4-20 : 2010	Complied
Conducted RF susceptibility test	IEC 61000-4-6: 2008	Complied
Electrostatic discharge (ESD) test	IEC 61000-4-2: 2008	Complied
Electrical fast transient/burst test	IEC 61000-4-4: 2011	Complied
Surge immunity test	IEC 61000-4-5: 2005	Complied
Voltage Dips And Short Interruptions Test	IEC 61000-4-11: 2004	Complied
Power frequency magnetic field test	IEC 61000-4-8 : 2009	Complied
Conducted Emission	CISPR 11 : 2010	Complied
Radiated Emission	CISPR 11 : 2010	Complied

- The above test is been carried out as per the above standard & as per customer requirements.


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1. INSULATION RESISTANCE :

Insulation resistance was measured by applying 500V DC; for 1 minute between following

Sr. No.	Point of application of test voltage	Measured Insulation Resistance
1.	Between Auxiliary supply & body	> 50GΩ
2.	Between supply current C.T. & body	> 50GΩ

2. HIGH VOLTAGE TEST :

The Test Voltage of 2 kV AC, 50Hz was applied for 1 minute between following points

Sr. No.	Point of application of test voltage	Observation	Result
1.	Between Auxiliary supply & body	No breakdown or flash over occurred during the testing	Withstood
2.	Between supply current C.T. & body	No breakdown or flash over occurred during the testing	Withstood


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3. IMPULSE TEST :

a. Test Rationale:

To check Immunity characteristics of EUT when subjected to impulse over voltages,

b. Test Condition:

Set Up	:	As per IS 14697 : 1999
Test Voltage	:	± 6 kV
Pulse	:	1.2/50 μ sec
No. of pulses	:	5
Polarity	:	Positive & Negative
EUT Operating condition	:	EUT in non-operating condition
Simulation	:	Between following Combination

- Between Auxiliary supply & body
- Between supply current C.T. & body

c. Requirements:

No Breakdown or flashover shall occur during and after the test.

d. Observation:

No Breakdown or flashover occurred during and after the test. The Controller found to be working satisfactorily.

e. Result:

Complied.


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4. RADIATED RF SUSCEPTIBILITY

a. Test Rationale :

To study immunity characteristics of the EUT when subjected to continuous Radiated RF Field.

b. Test Condition

Set-up	:	As per IEC 61000-4-20 : 2010
Field Strength	:	3 V/m
Frequency Band	:	80 MHz - 1000 MHz
Modulation	:	80% AM @ 1 kHz
Dwell Time	:	3 Sec.
Incremental Steps in Frequency:	:	1%
Operating condition	:	EUT operating condition as per Sr. No. 1.2

c. Requirements

Performance Criteria 'A'

d. Observations

No degradation in the essential performance was observed during and after the test. The performance was found to be normal.

e. Results

Complied. (Meets Criteria 'A')


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5. CONDUCTED RF SUSCEPTIBILITY TEST

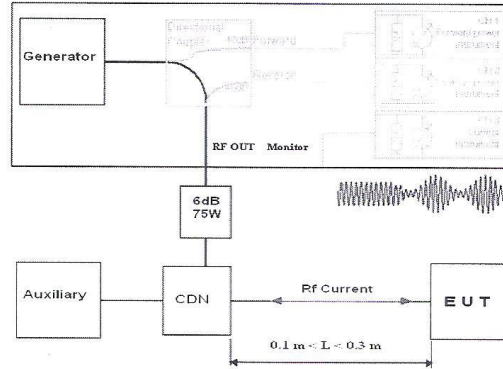
a. Test Rationale:

To check Immunity characteristics of EUT when subjected to continuous conducted Noise

b. Test Condition:

Set-up : As per IEC 61000-4-6 : 2008
Frequency : 150 kHz - 80 MHz
Modulation : 80% AM @ 1kHz
Amplitude : 3 V
Simulation : Direct Injection
EUT Operating Condition : EUT operating condition as per Sr. No. 1.2

c. Test Procedure



Noise in the above frequency range was superimposed on AC mains using a 150 Ω CDN and the operation of the equipment was monitored.

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d. Requirements:

Performance Criteria 'A'

e. Observations:

No degradation in the essential performance was observed during and after the test. The performance was found to be normal.

f. Results:

Complied (Meets Criteria 'A')


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6. ELECTROSTATIC DISCHARGE (ESD) TEST:

a. Test Rationale:

To check Immunity characteristics of the EUT against Discharge of Static Electricity that may occur when a charged operator touches the EUT.

b. Test Condition:

Set-up	:	As per IEC 61000-4-2: 2008
Mode of simulation	:	Contact Discharge on conductive surfaces Air Discharge on non-conductive surfaces
Test Voltage	:	Contact Discharge: ± 6 kV Air Discharge: ± 8 kV
No. of Discharge	:	10
Polarity	:	Positive & Negative (for both)
Points of Discharges	:	Contact Discharge Maintenance Screw Air Discharge Function keys Display
Simulation	:	Using ESD Gun
EUT Operating Condition	:	EUT in operating condition as per sr. no. 1.2

c. Test Procedure:

At susceptible points, ten single discharges were applied.

d. Requirements:

Performance criteria 'B'


e. Observations:

No degradation in the essential performance was observed during and after the test. The performance was found to be normal.

f. Result:

Complied (Meets Criteria 'A')


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7. ELECTRICAL FAST TRANSIENT/BURST TEST (Mains)

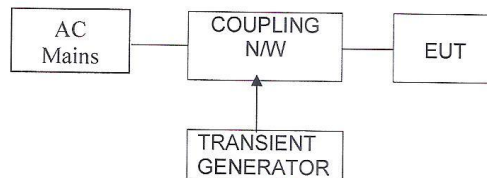
a. Test Rationale

To check Immunity characteristics of EUT against transient generated by inductive load switching. Relay contact bouncing, switching of high voltage switchgear, etc.

b. Test Condition

Set-up	:	As IEC 61000-4-4: 2011
Pulse	:	5/50 n sec
Modes	:	Common & Differential
Pulse Amplitude	:	± 2 kV
Pulse Rep. Rate	:	5 kHz
Polarity	:	Positive & Negative
Duration of test in each Mode	:	60 s
Simulation Method	:	Mains: Direct Injection
EUT Operating Condition	:	EUT operating condition as per sr. no. 1.2

c. Test Procedure



- Transients generated by the generator were coupled to the mains through a coupling / decoupling (CDN) Network.
- The level was stepped up from minimum to the specified severity in steps of 0.5 KV to determine threshold of failure.


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d. Requirements:

Performance criteria 'B'

e. Observations:

No degradation in the essential performance was observed during and after the test. The performance was found to be normal.

f. Results:

Complied (Meets Criteria 'A')


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8. SURGE IMMUNITY TEST

a. Test Rationale

To check immunity characteristics of the EUT against Surges generated because of capacitive bank Switching Faults, Lightning and the like.

b. Test condition

Set up : As IEC 61000-4-5 : 2005
Pulse : 1.2/50 μ s
Pulse Amplitude : Mains: Line – Earth : \pm 2 kV
Line to Line : \pm 1 kV
No of Transients : Five in Each Mode
Simulation Method : Mains direct injection
EUT Operating condition : EUT operating condition as per Sr. No. 1.2

c. Requirements

Performance criteria 'B'.

d. Observations

No degradation in the essential performance was observed during and after the test. The performance was found to be normal.

e. Result

Complied (Meets Criteria 'A')


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9. VOLTAGE DIPS AND SHORT INTERRUPTIONS TEST

a. Test Rationale:

To check Immunity characteristics of EUT when subjected to voltage dips, short interruptions and voltage variations

b. Test Condition:

Set-up : As IEC 61000-4-11: 2004
Test Level : Voltage Dips & interruption

Reduction (%)	Voltage Dips			Interruption
	0%	40%	70%	< 5 %
No of Cycles	0.5	10	25	250
Performance Criteria	B	B	B	C

EUT Operating Condition : EUT operating condition as per Sr. No. 1.2

c. Test Procedure

- EUT is subjected to voltage dips & interruptions for above levels & performance of the EUT is observed.

d. Observations:

Voltage Dips & Interruption		Observation
Dips in %	Cycle	
0%	0.5	No degradation in the essential performance was observed during and after the test.
40%	10	No degradation in the essential performance was observed during and after the test.
70%	25	No degradation in the essential performance was observed during and after the test.
< 5 %	250	During Test EUT Reset. The performance was found to be normal after the test.

e. Results:

Complied (Meets Criteria 'B')

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10. POWER FREQUENCY MAGNETIC FIELD TEST

a. Test Rationale:

To check Immunity characteristics of EUT when subjected to magnetic disturbances at power frequency

b. Test Condition:

Set-up : As IEC 61000-4-8 : 2009
Test Level : 30 A
Power Frequency : 50 Hz
Orientation : X, Y, Z
EUT Operating Condition : EUT operating condition as per Sr. No.1.2

c. Test Procedure

➤ EUT is subjected to power magnetic field with different orientations.

d. Requirements:

Performance criteria 'A'

e. Observations:

Orientation	Field	Observation
X	30	No degradation was observed during & after the test. The performance was found to be normal.
Y	30	
Z	30	

f. Results:

Complied (Meets Criteria 'A')


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11. CONDUCTED EMISSION

a. Test Rationale:

To Measure Emission of the EUT (Referenced to Earth) on Power Mains and to compare them with specified limits to ascertain that the EUT will not disturb other equipments.

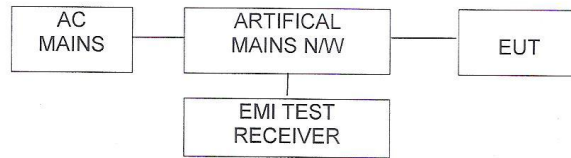
b. Test Condition

Set-up	:	As per CISPR 11 : 2010
Measurement Range	:	150 kHz - 30 MHz
Line Voltage	:	230 V
Line Frequency	:	50 Hz
Length of Mains	:	< 1m (LISN to EUT)
Operating condition	:	EUT operating condition as per Sr. No. 1.2

c. Receiver

Bandwidth	:	9 kHz
Detectors	:	Average, Peak
Configuration	:	Conforming to CISPR 16-1 & 16-2

d. Test Procedure




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e. Requirements

Switch ON the EUT and run it. EUT emission shall be below following limits
CISPR 11 : 2010

Freq (MHz)	Limits (dB μ V)	
	QP	Avg.
0.15-0.5	79	66
0.5-5	73	60
5-30	73	60

f. Observation

The Average & Peak Emission of the EUT was found within limits.
(Please see page 19)

g. Result

Complied


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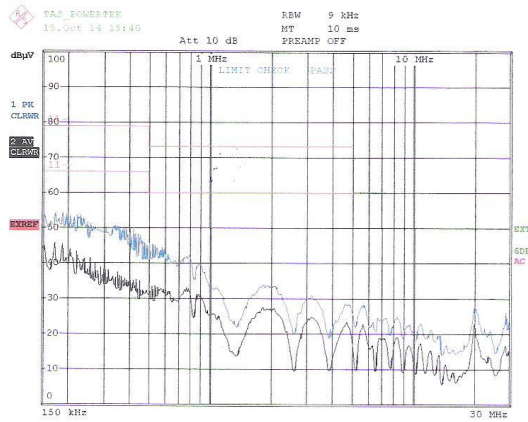
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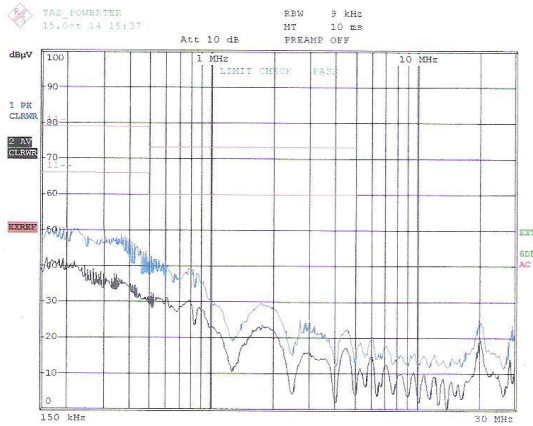
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Conducted emission Graph for Live (Phase)



Conducted emission Graph for Neutral



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12. RADIATED EMISSION

a. Test Rationale:

To Measure Emission of the EUT radiated into the space and to compare them with specified limits to ascertain that the EUT will not disturb other equipments by generating such emissions above a certain limit.

b. Test Condition

Set-up : CISPR - 11 : 2010
Type of Antenna : Log periodic & Biconical Antenna
Measurement Range : 30MHz - 1000 MHz
Measurement : 3 M
Operating condition : EUT operating condition as per Sr. No. 1.2.

c. Receiver

Bandwidth : 120 kHz
Measurement Detectors : Quasi Peak
Configuration : Conforming to CISPR 16-1

d. Test Procedure

- Emission measurements were carried out in an open area test site
- Ambient measurements was carried out with EUT in off Conditions
- EUT was switched ON and highest Emmited peak was noted.
- Ambient Noise is discarded from the max emission peak
- Antenna height and position is set to position were maximum emission is received.
- Ambient and emission peaks were compared, peak with a difference of less than 6 db were discarded.


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e. Requirements

EUT emission shall be below following limits

Freq. (MHz)	Limits as per the standard (dBuV/m)
30-230	QP 50
230-1000	57

f. Observations

Sr No.	Frequency (MHz)	Emission (db μ V/m)	Limit (db μ V/m)
1.	60.01	13.23	50
2.	469.71	27.75	57
3.	741.67	28.13	57
4.	865.29	24.27	57
5.	914.69	29.83	57

Measurement has been carried out from 30 MHz to 1000 MHz
Only significant peaks have been reported.

g. Results

Complied


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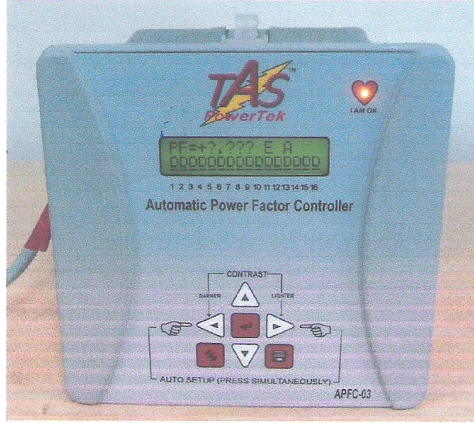


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EUT PHOTOGRAPHS



*** END OF TEST REPORT ***

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