	<b>Scope of Work</b>	<b>Engineering</b>
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Title: **Supply and Delivery Contract  
Scope of Work for Contactors and  
Relays**

Document Identifier:

Alternative Reference  
Number:

Area of Applicability: **Kendal Power Station**

Functional Area: **Electrical Engineering**

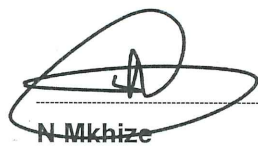
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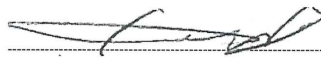
**Compiled by**



**N Mkhize**  
**System Engineer**

Date: 27/10/2021

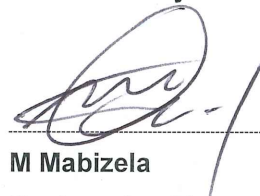
**Functional Responsibility**



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Date: 27-10-2021

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Date: 15/11/2021

## Content

	Page
1. Introduction.....	3
2. Supporting Clauses .....	3
2.1 Scope.....	3
2.1.1 Purpose.....	3
2.1.2 Applicability .....	3
2.1.3 Effective date.....	3
2.2 Normative/Informative References .....	4
2.2.1 Normative.....	4
2.2.2 Informative.....	4
2.3 Definitions .....	4
2.4 Abbreviations .....	4
2.5 Roles and Responsibilities .....	5
2.5.1 Engineering Department.....	5
2.5.2 Technical Support Department.....	5
2.5.3 Inventory Management Department .....	5
2.5.4 Safety and Environment Department.....	6
2.5.5 Quality and Assurance Department.....	6
2.5.6 Projects Department.....	6
2.5.7 Contractor .....	6
2.6 Process for Monitoring.....	6
2.7 Related/Supporting Documents.....	7
2.8 General Considerations.....	7
3. Outage Guidelines.....	7
3.1 Measuring and Testing Equipment.....	7
3.2 Preservation of Product.....	7
3.3 Risk.....	8
3.4 Plant Technical Information .....	8
4. Fuses Supply and Delivery Short Term Contract Scope of Work.....	9
5. Acceptance.....	13
6. Revisions.....	13
7. Development Team .....	13

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## **1. Introduction**

The SIRIUS modular system offers various switching devices for the safe and functional switching of electrical loads. 3RT2 contactors are available in sizes S00 to S3. 3RT1 contactors are available in sizes S6 to S12.

- 3RT.0 power contactors and 3RT12 vacuum contactors for switching motorized loads
- 4-pole 3RT23 contactors for switching resistive loads
- 3-pole 3RT24 / 3RT14 contactors for switching resistive loads
- 4-pole 3RT25 contactors for changing the polarity of hoisting gear motors
- 3RH2 contactor relays for switching in the control circuit
- 3RT26 capacitor contactors for switching capacitive loads (AC-6b)
- 3RT1 / 3RT2 / 3RH2 contactors with extended operating range
  - 3RT10 / 3RT20 / 3RH21 contactors for rail applications
  - 3RT20 / 3RH21 coupling relays for system-compliant interaction with electronic controllers
- 3RT1...-S.36 contactors with fail-safe control inputs for safety-related applications.
- Operation of a motor in two directions of rotation (reversing contactor assembly).
- Starting three-phase motors with reduced starting current peaks (contactor assemblies for star-delta (wye-delta) start).

This scope of work highlights the Supply and Delivery Contract for contactors and relays at Eskom Kendal Power Station.

## **2. Supporting Clauses**

### **2.1 Scope**

The purpose of this report is to formally capture all the relevant information pertaining to the Supply and Delivery Contract Scope of Work for contactors and relays.

#### **2.1.1 Purpose**

The purpose of this document is to clearly define the works that should be carried out during Supply and Delivery Contract Scope of Work for contactors and relays.

#### **2.1.2 Applicability**

This document is applicable to Kendal Power Station, Electrical Engineering Department and Stores Department.

#### **2.1.3 Effective date**

N/A

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## 2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

### 2.2.1 Normative

- [1]. ISO 9001 Quality Management Systems
- [2]. \*1017753 Maintenance standard for Kendal transformers
- [3]. \*1017755 Hand condition monitoring for Kendal power transformers
- [4]. \*1017374 Kendal Quality Manual
- [5]. \*1015695 Document and Record Management
- [6]. \*1017482 Control and Approval of Quality Control Plan
- [7]. 240-56357579 Standard for commissioning of large transformers
- [8]. 240-65216748 Test procedure for power transformers
- [9]. \*1017357 Non-conformance, Corrective and Preventive Action
- [10]. \*1017483 Control of monitoring and measuring equipment

### 2.2.2 Informative

- [1]. \*1017583 Kendal Low Voltage Switchboard Maintenance Standards.
- [2]. \*1023822 Kendal Outage Philosophy.

## 2.3 Definitions

N/A

## 2.4 Abbreviations

Abbreviation	Explanation
A	Ampere
AC	Alternating Current
DC	Direct Current
I	Current
kV	Kilo-Voltage
LV	Low Voltage
MCC	Motor Control Centre
MV	Medium Voltage
TCC	Time Current Characteristics
V	Voltage

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## **2.5 Roles and Responsibilities**

This document shall apply to all Kendal Power Station Stores Department, the supply and delivery of contactors and relays are a station responsibility. Every department plays a pivotal role in making sure that planned replacement are successful and sub-systems are returned to service on time and efficiently, refer to the Kendal Power Station business Organisation Roles and Responsibilities\*1017523. Below are the roles and responsibilities of each department:

### **2.5.1 Engineering Department**

- Is responsible for the outage/planned maintenance philosophy
- Compiles outage scope of work that aligns with outage philosophy
- Participate in the outage philosophy review.
- Formulate the contents of the outage philosophy
- Ensuring plant and documents are technically compatible
- Proposing and implementation of modifications
- Assist with the review of quality control plans

### **2.5.2 Technical Support Department**

- The supervision of outage activities to ensure quality and productivity targets are achieved
- The control of spares and consumables
- The development of work instructions and procedures
- The developments of bill of materials
- Technical review of work instructions at pre-determined intervals
- Provision of quality work history
- The notification of all failures not attributed to normal wear and tear and/or frequent/repeated failures of components.
- To assist in the investigation of incidents and the root cause analysis
- Monitor spares stock holding

### **2.5.3 Inventory Management Department**

- Maintaining the approved stock levels
- Storage of stock according to approved methods
- Forward planning to ensure stock availability
- Ensure reviewing of stock levels
- Stock accuracy and control

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- Stock Optimisation
- Issuing of materials to end users
- Receiving of goods

#### **2.5.4 Safety and Environment Department**

- Implementation of SHE systems.
- Ensure compliance with OHS Act and putting in place of enforcement mechanism.
- Regular internal communication at all levels by way of meetings and discussions concerning health and safety.
- Identify hazards in different areas and conduct task risk assessments regarding employee's acts.
- Coordinate and identify SHE training gaps.
- Development and implementation of safety policies and procedures.
- Report incidents.

#### **2.5.5 Quality and Assurance Department**

- Ensure quality control processes are in place.
- Ensure adherence to Eskom operating procedures, policies, guidelines and plant safety regulations.
- Review and accept quality plans.

#### **2.5.6 Projects Department**

- Implement projects in line with the outage programme
- Management of contract services for the projects
- Ensure quality control of activities during projects
- Management of time cost and quality of projects

#### **2.5.7 Contractor**

- The responsibilities of the contractor are as per NEC and compliance to the relevant standards.

### **2.6 Process for Monitoring**

Inspections and quality control documents will be used to monitor progress and quality of the work.

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## 2.7 Related/Supporting Documents

- All 380V Switchgear Schedules.
- Standard Switchgear Schematics

## 2.8 General Considerations

Description	Reference
<b>Competency</b>	
Competency shall be as indicated in Kendal Quality Manual, section 6.2.2	*1017374
<b>Safety</b>	
Kendal Power Station SHE specifications for principal contractors	
Kendal Power Station Occupational Health and Safety Hazard Identification	*1017372
<b>Environment</b>	
Waste Management procedure	*1014102
Kendal Environmental Procedures for Contractors	*1018332
Kendal Power Station Occupational Health and Safety Hazard Identification	*1017372
<b>Quality</b>	
To comply to Kendal Quality Manual	*1017374
Kendal Document and Records Management Procedure	*1015682
Occupational Health and Safety Act no. 85 of 1993	Act no. 85 of 1993
<b>Existing Defects(04 Defects)</b>	
None	

## 3. Outage Guidelines

### 3.1 Measuring and Testing Equipment

All measuring and testing equipment shall comply with Kendal Quality Manual \*1017374, section 7.6. Therefore all equipment that will be used must be calibrated and calibration certificate must be provided upfront and approved.

### 3.2 Preservation of Product

Unless specified, product handling shall comply with the following;

1. Eskom Procurement and Supply Chain Management – 32-1034

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2. Critical Spare procedures
3. Maintenance procedures

### **3.3 Risk**

Risk management during the outage shall comply with \*1017401 - Integrated Risk Management

### **3.4 Plant Technical Information**

#### AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RT1 contactors are climate-proof. They are finger-safe according to EN 50274.

Size S00 contactors have an auxiliary contact integrated in the basic unit. The basic units of sizes S0 to S3 contain only the main current paths.

All basic units can be extended with auxiliary switch blocks. For size S0 and higher, complete units with 2 NO + 2 NC are available (connection designation according to EN 50012). The auxiliary switch block can be removed.

The contactors can be operated with AC (40 to 60 Hz) as well as with DC.

#### Connection methods

The 3RT1 contactors are available with screw terminals (box terminals and connecting bars) or with Cage Clamp terminals. The size S3 contactors have removable box terminals for the main conductor connections. This permits connection of ring terminal lugs or busbars.

#### Contact reliability

If voltages  $\leq 110$  V and current  $\leq 100$  mA are to be switched, the auxiliary contacts of the 3RT1 contactor or 3RH11 contactor relay should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for solid-state circuits with currents  $\geq 1$  mA at a voltage of 17 V.

#### Withdrawable Coils

For simple coil replacement, e.g. if the application is replaced, the solenoid coil can be pulled out upwards after the release mechanism has been actuated and can be replaced by any other coil of the same size.

#### Control Supply Voltage

The contactors are equipped with wide-range operating mechanisms and can thus cover a wide range of control supply voltages, for example rated operating range ( $U_{smin}$ -  $U_{smax}$ ) of 110V ... 127V

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or 220V ... 240V. In addition, both voltage types, AC as well as DC, are covered by the same operating mechanism.

#### Operating Mechanism Types

Two types of solenoid operation are available:

- Conventional operating mechanism
- Solid-state operating mechanism (with 3 performance levels)

#### **4. Fuses Supply and Delivery Short Term Contract Scope of Work**

<b>Material</b>	<b>Material Description</b>	<b>Unit</b>
0119731	CONTACTOR,MAIN 500A 3PH 110V DC COIL 2M	EA
0121189	CONTACTOR:MOTOR PROTECTION;600 V;220 VAC	EA
0125572	CONTACTOR:3TB4717-0AM0;CONTROL;380/525 V	EA
0125577	CONTACTOR:3TF5622-0AM0;MOTOR;600 VAC;3	EA
0125747	CONTACTOR:LC1-D503Q;MOTOR;660 VAC;80 A	EA
0125774	CONTACTOR:LC1D4011M5;MOTOR;600 VAC;60 A	EA
0125802	CONTACTOR:3RT1016-1AP01;CONTROL;220 VAC	EA
0125803	CONTACTOR:3RT1024-1AP00;CONTROL;600 V	EA
0125804	CONTACTOR:PART NO:3TF42-22 OAPO;CONTROL	EA
0125805	CONTACTOR:3TB4817-0AM0;CONTROL;600 VAC	EA
0125806	CONTACTOR:MOTOR;380/400 VAC;220 VAC;3	EA
0125807	CONTACTOR:3TF68/44/OAM;660 V;220 VAC;3	EA
0125827	CONTACTOR:VACUUM;220 VAC;400 A;3	EA
0125830	CONTACTOR:CONTROL;660 VAC;220 VAC;25 A;4	EA
0125831	CONTACTOR:MOTOR;660 VAC;24 V;25 A;3	EA
0125832	CONTACTOR:MOTOR;660 V;380 VAC;45 A;3	EA
0125833	CONTACTOR:CONTROL;660 V;220 V;30 A;4;1NC	EA
0125834	CONTACTOR:SEPARATOR CONTROL;750 V;380 V	EA
0125836	CONTACTOR:SEPARATOR CONTROL;500 V;35 A	EA
0125837	CONTACTOR:MAGNETIC SEPARATOR;380 VAC;3	EA
0125845	CONTACTOR:CONTROL;380 V;110 VAC;4 A;4	EA
0125855	CONTACTOR:B123022;CONTROL;660 VAC;24 A	EA
0125873	CONTACTOR:B12-30-10;CONTROL;220/380 VAC	EA
0125914	CONTACTOR:3TC4417-0AM4/VDE0660;CONTROL	EA
0125917	CONTACTOR:CONTROL;600 V;220 V;50 A;3	EA
0125929	CONTACTOR:CA3-16;CONTROL;660 VAC;220 VAC	EA
0125930	CONTACTOR:CONTROL;380 VAC;220 VAC;10 A;4	EA
0125979	CONTACTOR:CONTROL;690 VAC;220-230 VAC;4	EA
0125980	CONTACTOR:CONTROL;690 VAC;220 VAC;40 A;3	EA
0125982	CONTACTOR:CONTROL;690 V;220 VAC;28 A;4	EA

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0126000	CONTACTOR:CONTROL;24 V;150 A;2	EA
0126002	CONTACTOR:A16-30-01;CONTROL;1 KVAC;30 A	EA
0126024	CONTACTOR:LP1 D123MA65;CONTROL;660 V;3	EA
0126027	CONTACTOR:CONTROL;380 V;220 VAC;20 A;3	EA
0126028	CONTACTOR:MOTOR;400 VAC;220 VAC;9 A;3	EA
0126059	CONTACTOR:3TD1017-OCFO;CONTROL;220/660 V	EA
0126065	CONTACTOR:CONTROL;500 V;110 VAC;22 A;4	EA
0126066	CONTACTOR:CA2EN240-M;CONTROL;660 V;6 A;3	EA
0126067	CONTACTOR:CA2EN240;CONTROL;660 V;6 A;3	EA
0126131	CONTACTOR:3TC4417-0AM4;CONTROL;600 VDC	EA
0126132	CONTACTOR:3RT1036-1AP00;CONTROL;220 VAC	EA
0126133	CONTACTOR:3RT1036-1AP00;CONTROL;220 VAC	EA
0126134	CONTACTOR:3TB5417-0AM0;STARTER;380 VAC	EA
0126176	CONTACTOR:MOTOR;600 V;220 V;45 A;3	EA
0126177	CONTACTOR:CONTROL;380 VAC;220 VAC;3;OPEN	EA
0126178	CONTACTOR:MOTOR;1 KVAC;220 VAC;250 A;3	EA
0126282	CONTACTOR:HL40-22E;CONTROL;600 V;220 VAC	EA
0126283	CONTACTOR:CONTROL;750 V;220 VAC;80 A;3	EA
0126284	CONTACTOR:CA3-43-N;MOTOR;380 VAC;220 VAC	EA
0126506	CONTACTOR:LC1-D259A65-M;CONTROL;600 V	EA
0126842	CONTACTOR:DILM9-10;CONTROL;600 VAC;20 A	EA
0126914	CONTACTOR:I0S16;CONTROL;500 V;220 VAC;3	EA
0127337	CONTACTOR:CONTROL;380 V;220 V;22 A;3	EA
0127357	CONTACTOR:MOTOR;220/660 VAC;220 VAC;30 A	EA
0128153	CONTACTOR:3RT 1034-1AP00;MOTOR;380 VAC	EA
0128612	CONTACTOR:CONTROL;660 VAC;110 VDC;32 A;3	EA
0128650	CONTACTOR:CA3-9;MOTOR;660 VAC;220 VAC;3	EA
0139285	CONTACTOR:15BL 183001 R8610;CONTROL;3	EA
0142227	CONTACT MVEBL:KL370;CONTACTOR MAIN	EA
0142233	CONTACTOR:CONTROL;660 VAC;24 VDC;100 A;3	EA
0142251	CONTACTOR:DIL08-62S;CONTROL;380 V;110 V	EA
0142327	CONTACTOR:3TH8244-0BM4;FIELD SUPPRESSION	EA
0142328	CONTACTOR:3TC4817-0AM4;CONTROL;600 VDC	EA
0142333	CONTACTOR:CONTROL;660 VAC;220 VDC;10 A;3	EA
0142334	CONTACTOR:1 KVAC;220 VDC;85 A;2;OPEN	EA
0142335	CONTACTOR:CONTROL;500 V;220 VDC;25 A;3	EA
0142340	CONTACTOR:MOTOR;660 VAC;220 V;80 A;3	EA
0142341	CONTACTOR:CONTROL;660 VAC;380 VAC;410 A	EA
0142525	CONTACTOR:MOTOR;380 VAC;220 VAC;9 A;3	EA
0142556	CONTACTOR:MOTOR;660 VAC;220 VAC;16 A;4	EA
0142564	CONTACTOR:MOTOR;380 VAC;240 VAC;25 A;4	EA

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0142925	CONTACTOR:3RT1065-6LA06;MOTOR;600 VAC	EA
0143392	CONTACTOR:LC1D1210Q5;CONTROL;750 VAC;4	EA
0151375	CONTACTOR:CONTROL;750 VAC;220 V;80 A;3	EA
0173764	CONTACTOR:LCI-D1210M 250VOLT, 50HZ;250 V	EA
0173765	CONTACTOR:LC1-D1810M;AC MAGNETIC;220 V	EA
0178628	CONTACTOR:MOTOR;6.6 KV;220 VAC;400 A;3	EA
0178629	CONTACTOR:VACUUM;3.3 KV;220 VDC;400 A;3	EA
0223934	CONTACTOR:MOTOR PROTECTION;380 VAC;18 A	EA
0231696	CONTACTOR:CONTROL;380 V;220 V;45 A;3	EA
0236588	CONTACTOR:3TH4244-OAFO;220 V;220 V;10 A	EA
0242421	CONTACTOR:AUXILIARY;380 VAC;220 VAC;28 A	EA
0242422	CONTACTOR:SWITCHGEAR;380 VAC;220 VAC;3	EA
0254912	CONTACTOR:400 V;220 VAC;125 A;4;4NO	EA
0501120	CONTACTOR:3RT1076-6AP36;220 V;500 A	EA
0584908	CONTACTOR:3RT 1036-1BB40;AUXILIARY;380 V	EA
0590373	CONTACTOR:A-LINE;1000 VAC;100-250 VAC/DC	EA
0597772	CONTACTOR:3RT1024-1AP00;AUXILIARY;400 V	EA
0625863	CONTACTOR:3RT2027-1AP00;MAIN;400 VAC;3	EA
0646788	CONTACTOR:3RT1015-1AF02;SCREW CONNECTION	EA
0664799	CONTACTOR:MOTOR;400 VAC;230 VAC;22 A;4	EA
0125531	RELAY:DIRECT CURRENT FAILURE;220 VDC	EA
0125566	RELAY OVRLD:3UA5000-0J;0.63-1 A;THERMAL	EA
0125571	RELAY OVRLD:3UA5800-2FA7;32-50 A;THERMAL	EA
0125815	RELAY CTRL:3TH8280-0AM0;220 V 10 A;8NO	EA
0125818	RELAY OVRLD:3UA5900-0G;0.4-0.6 A;THERMAL	EA
0125822	RELAY OVRLD:3UA5200-2A;10-16 A;THERMAL	EA
0125885	RELAY OVRLD:3UA6000-2H;55-80 A;THERMAL	EA
0125908	RELAY:60-13;AUXILIARY;24 VDC;3NO 3NC	EA
0125919	RELAY T-DELAY:H3BA;ON 0-10 S;2NO 2NC	EA
0125994	RELAY:FLAME DETECTOR;240 VAC;2NO 2NC	EA
0125998	RELAY OVRLD:63-90 A;THERMAL;1NO 1NC	EA
0126001	RELAY:SP430;FAILURE;220/500 VAC;2NO 2NC	EA
0126019	RELAY OVRLD:CT3-12;0.62-1 A;THERMAL	EA
0126031	RELAY OVRLD:3UA 5000-1G;3-6.3 A;THERMAL	EA
0126035	RELAY CTRL:CA2DN1229A65;660 VAC 10 A	EA
0126082	RELAY CTRL:KFA6-SR2-EX1.W;230 V 4 A	EA
0126138	RELAY OVRLD:0.25-0.4 A;THERMAL;1NO 1NC	EA
0126180	RELAY OVRLD:CT3-12;2.5-4 A;THERMAL	EA
0126181	RELAY:CONTROL;24 VDC;3NO 3NC;3PDT	EA
0126504	RELAY:MONITORING;230 VAC;1NO 1NC;SPDT	EA
0127028	RELAY OVRLD:3UA5000-1C;1.6-2.5 A;THERMAL	EA

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0129226	RELAY CTRL:DIL08-62;6 A;8NO;110 VAC;8PST	EA
0142149	RELAY OVRLD:3KL6130-1AG00;6.3-10 A	EA
0187444	RELAY T-DELAY:ON/OFF 3-60 MIN;2NO 2NC	EA
0210910	RELAY:SOLID STATE;24 VDC;1NO 1NC	EA
0223935	RELAY:INTERPOSING;220 VAC;3NO 2NC;3PST	EA
0224240	RELAY OVRLD:40-110 A;ELECTRONIC;3NO 3NC	EA
0227562	RELAY:TURCK;15 VDC;2NO 2NC;DPDT;PANEL	EA
0256063	RELAY SLD STATE:DIGITAL MONITORING;2NC	EA
0584893	RELAY:INTERPOSING;220 VAC;3NO 2NC;3PST	EA
0590718	RELAY CTRL:6 A;1NO;48 VDC;DPDT;VARIABLE	EA
0612792	RELAY:PLC-RSC-230UC/21-2AU;PLC;2NO 2NC	EA
0612801	RELAY:7VE6320-5EB92-0DAO/DD-LOS;1A	EA
0612802	RELAY:G08-D024;AUXILIARY TRIPPING;24 VDC	EA
0613299	RELAY:DIFFERENTIAL;125-250 VAC/DC;8NC	EA
0641964	RELAY:3RS1800-1BW00;COUPLING;24-240 VDC	EA
0646787	RELAY OVRLD:193-EECBC;690/1000 V;3	EA

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## **5. Acceptance**

This document has been seen and accepted by:

<b>Name</b>	<b>Designation</b>
Remember Sigawuke	Electrical Engineering Manager
Malibongwe Mabizela	Engineering Manager (Acting)
Ayanda Mahlobo	System Engineer

## **6. Revisions**

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
October 2021	0.0	N Mkhize	Supply and Delivery Short Term Contract Scope of Work for Contactors and Relays

## **7. Development Team**

The following people were involved in the development of this document:

- Nathi Mkhize

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