

# GIS ELK-04C/145KV I&C Training

## Level 3 Field Service Engineer Training

TRAINING CENTER CHINA – COURSE DESCRIPTION

PREPARED BY ZhiWu Wu	STATUS Approved	SECURITY LEVEL Internal		
APPROVED BY Sam-QingZhong Shen	APPROVAL DATE 2022-12-28			
OWNER Head of Training Function	DOCUMENT KIND Agenda			
TITLE GIS ELK-04C/145 I&C Training				
OWNING ORGANIZATION 2657-Service CN	DOCUMENT ID 2GHE004105	REV. B	LANG. en	PAGE 1/7

## Course goal:

The course conveys profound knowledge on the assembly of GIS type ELK-04C/145KV .

## Main learning objectives:

- ❖ Understand the functions of all GIS components of ELK-04C/145KV
- ❖ Known about all relevant documents (drawings, instructions, protocols) to perform an installation
- ❖ Perform a complete GIS ELK-04C coupling

## Prerequisites:

- ❖ SF<sub>6</sub>-Gas-handling course with certificate
- ❖ Heavy load course with certificate
- ❖ Good English skills (written and spoken)
- ❖ Ability to read wiring diagrams is required
- ❖ On-site experience on GIS Installation and/or Commissioning
- ❖ Attended the local required Health & Safety Training
- ❖ First aid course with certificate
- ❖ Own PSE
- ❖ Computer with admin rights

## Topics:

- ❖ Circuit-breaker and breaker operating mechanism
- ❖ Disconnecter, earthing switch, fast acting earthing switch
- ❖ Statically components like connecting elements, bus-bars
- ❖ Lateral dismantling elements, compensators
- ❖ SF<sub>6</sub>-gas to-air bushing

- ❖ Surge arrester
- ❖ Site assembly instructions

## Assembly steps and procedures:

- ❖ Overview and detailed drawings of assembly units, packing list and layouts
- ❖ Positioning and alignment of Bays
- ❖ Coupling and alignment of bays
- ❖ Secondary systems commissioning
- ❖ Isolator and earth switch testing
- ❖ Protocols and Reports

**This is a theoretical and practical training course.**

## Certification:

A confirmation will be issued after successful participation in this course, as part of the certification process.

Within a 12 months period, an on-site assessment must be carried out along with a final review to complete certification.

## Duration:

20 days

## Enrolments:

Send your request to

[cn-hvtraining@hitachienergy.com](mailto:cn-hvtraining@hitachienergy.com)

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Day	Subject	Location
<b>Welcome / Introduction to Hitachi Energy China</b>		
	<ul style="list-style-type: none"> <li>❖ Training Introduction / Presentation</li> <li>❖ Safety Induction</li> <li>❖ Certification Process</li> <li>❖ Hitachi Energy China GIS-Product Portfolio</li> </ul>	
<b>Product overview and components</b>		
<b>1</b>	<ul style="list-style-type: none"> <li>❖ Comparison “single line diagram” and “products” (x-ray view)</li> <li>❖ Circuit breaker arcing chamber</li> <li>❖ “MSD-operation mechanism” components and function</li> <li>❖ Disconnecter / Earthing Switch component and function incl. mechanism</li> <li>❖ Fast Earthing Switch components and function incl. drive mechanism</li> <li>❖ Transversal/lateral dismantling modules, compensators, elbow elements,</li> <li>❖ Insulators</li> <li>❖ Cable termination (transformer and cable housing)</li> <li>❖ Current and voltage transformers,</li> <li>❖ Bushings</li> <li>❖ Density monitors and sensors working principle</li> </ul>	Classroom
<b>Documentation</b>		
<b>Preparation previous the job</b>		
<b>2</b>	<ul style="list-style-type: none"> <li>❖ Documentation flow with Product Service Center (PSC) and Project Manager (PM)</li> <li>❖ Site preparation check list</li> <li>❖ Documentation map list (from installation PM to technician)</li> </ul>	Classroom
<b>During the job on site</b>		
	<ul style="list-style-type: none"> <li>❖ Checklist for installation start</li> <li>❖ Protocols (gas Q, path resistance, shock indicators, etc.)</li> <li>❖ Spare parts list, building acceptance and local H&amp;S aspects</li> <li>❖ Non-Conform Report (NCR)</li> <li>❖ Field service daily and monthly site report (logbook)</li> <li>❖ As built documents / correction (red marks)</li> </ul>	

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Day	Subject	Location
3	<b>Project specific documents</b>	Classroom
	❖ Site I&C “test manual” and/or instruction (site inspection mapping, tools, drawing, etc.)	
	❖ Site layouts (earthing, civil work, loading plan, assembly and supports)	
	❖ Single line gas diagram	
	❖ Electrical diagrams	
	❖ Cable tray arrangement	
	❖ Packing list and/or shipping documents	
	❖ Resistance measurement paths and calculation	
	❖ Gas volume table	
	❖ Time schedule Continuation components	
	❖ Manual operation and locking device for disconnectors, earthing switches and fast acting earthing switches	
	❖ Gas monitoring system	
	❖ Density Monitor	
❖ Factory tour to respective assembly line		
4	<b>Place and level the CB</b>	Classroom
	❖ Working area preparation (e.g. shelves, tools, drawings, organization)	
	❖ Building foundations check according to protocol (measurement of X/Y/Z axes)	
	❖ Unpacking and lifting procedure	
	❖ Checking of received goods and loose parts according to packing list/shipping documents	
	❖ Setting and adjusting of CB-pole frame	
	❖ Alignment of the CB at determined “X” and “Y” axes	
5	<b>Installation of Assembly – Units</b>	Classroom & Training field
	❖ Basic steps for cleaning and installing the unit	
	❖ Flange treatment (indoor and outdoor), connection	
	❖ Install of all three CT's (with regarding of CT polarity)	
	❖ Transversal/lateral dismantling modules installation	
	❖ Install of all three cable outgoing units, which contain a combined disconnector/earthing switch and fast acting earthing switch	
	❖ Align the units and assembling, Incl. adjusting of the steel support	
<b>Week Review</b>		Classroom & Training field
<b>Q and A session</b>		

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6	Product exercise(s)		Training field
	❖	Cable termination installation (if available)	
	❖	Steel support mounting	
	❖	VT installation	
7	SF <sub>6</sub> -gas		Classroom Training field
	❖	General Information about SF <sub>6</sub> -gas	
	❖	Instruments/Tools	
	❖	SF <sub>6</sub> -gas reporting	
	❖	Content of decomposition product	
	❖	Handling of contaminated SF <sub>6</sub> -gas	
	❖	SF <sub>6</sub> -gas handling with reclaiming	
	❖	Maximum differential pressures on barrier insulators	
	❖	Filling with gas refilling trolley	
8	CB operation mechanism		Classroom Training field
	❖	Operation mechanism basics and working principle	
	❖	Handling for 1st charging	
	❖	Interlocking device	
	❖	Carbon brushes	
	❖	Venting of the low-pressure tank	
	❖	Manual charging device with PSC Movie	
	❖	Troubleshooting	
9	Product exercise(s)		Classroom Training field
	❖	Cabling and earthing/grounding part	
	❖	Cable “first” connection	
	❖	Cable trays arrangement	
	❖	Studying of Earthing layout	
	❖	Installation of the earthing and system grounding	
10	Week Review		Classroom Training field
	Q and A session		
	Installation exam		
	End of Installation part		

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11	General Introduction to Commissioning	Classroom Training field
	Personal Skills of the Commissioning Engineer	
12	General Introduction to Commissioning	Classroom Training field
	continuation	
13	Circuit breaker drives MSD Theory	Classroom Training field
	❖ Introduction to MSD drive	
	❖ MSD Functionalities	
14	Circuit breaker drives MSD Practical	Classroom Training field
	❖ MSD Drive Testing & Test Protocol	
	CB Time-stroke testing Theory	
14	❖ Introduction to time-stroke testing	Classroom Training field
	❖ Testing equipment	
	❖ Introduction to ACTAS software	
	❖ Dual ground timing test	
	CB Time-stroke testing Practical	
	❖ Setting up the testing area	
	❖ Connecting the equipment	
	❖ Installation of the software	
	❖ Evaluating the results	
	❖ Adjusting the breaker	
15	❖ Time-Stroke Test Protocol	Classroom Training field
	Isolators and Earth Switches Theory	
	❖ Overview	
15	❖ Electronic board	Classroom Training field
	❖ Interlocking board	
	Isolators and Earth Switches Practical	
15	❖ On-Site Testing & Test Protocol	Classroom Training field
	Week Review	
	Q and A session	

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16	Instrument Transformers Theory		Classroom Training field
	❖ VT & CT introduction		
	❖ Applicable Regulations		
	Instrument Transformers Practical		
	❖ VT Testing		
	❖ VT Test Protocol		
	❖ CT Testing		
	❖ CT Test Protocol		
17	Secondary systems Theory		Classroom Training field
	❖ Density monitors (TRAFAG)		
	❖ PWC600		
	❖ MSM		
18	Drawings and Interlocking Theory		Classroom Training field
	❖ Introduction to Hitachi ABB Drawings		
	❖ Explanation of the interlocking		
	❖ Interlocking matrix		
	❖ Exercises		
19	Practical On-Site training day		Classroom Training field
	❖ Drawings		
	❖ Interlocking		
	❖ BCU		
	❖ Practical exercises		
20	Documentation Theory		Classroom
	❖ Test Reports		
	❖ Red Marks		
	❖ Field Report		
	❖ NCRs		
Final Examination			
Final Q and A session			

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