



# ERCC guidelines for energy offers

What you need to know

What documents to submit when making an offer

*ERCC 30/01/2023*

# Purpose / background

- UA Ministry of energy (MOE) is responsible of accepting offers of autotransformers, transformers, high voltage equipment, power generators, etc.
- UA MOE designated (by Govt decree) as unique consignee for all such items a state – private energy company “JSC Khmelnytskoblenergo”
- JSC at its turn is centralizing needs and sending offers for acceptance to all stakeholder companies in UA – transmission and distribution, e.g. Ukrenergo.
- This process takes time given the complexity of technical specifications and availability of energy experts to conduct the evaluation of offers. All these hampered by war effects, blackouts, etc.
- ERCC agreed with MOE and JSC a list of minimum documents to accompany the offers, notably for power transformers – which are most complex.
- Therefore, ERCC produced these slides to serve as guidance for MS/PS.

# Examples of incomplete offers

- Autotransformer 250 MVA 400/160 kV +- 15%
- Power Transformer 33/11.5 kV 15 MVA
- Oil Capacitive Voltage Transformer Trench TCVT 170 kV - 150000: $\sqrt{3}$ /100: $\sqrt{3}$  - 50/0,2 – 75/0,5 100/3P
- Voltage transformer 10 kV - No details available
- Currents transformers 10kV - Details not available

**All these examples lack technical description and specifications.**

**We should not accept such offers without supplementary details. This will save time and energy (exchanges) with UA authorities.**

# Checklist for power transformers and autotransformers – WHAT YOU MUST HAVE

1. Photo of the technical plaque – welded on the trafo body
2. Table of characteristics – voltage, current, rated power, etc
3. Technical drawings
4. Pictures from real setting or warehouse

# 1. Example: photo of the technical plaquette

Three Phase Auto-Transformer to I.E.C. 76:1967

M.V.A. (OFAF)	H.V. 250	L.V. 250	Tertiary 25
k.V. (no load)	H.V. 225	L.V. 110	Tertiary 10.5
Amperes.	H.V. 641.5	L.V. 1312.2	Tertiary 1375

Vector symbols Yn, yno, d5  
 Impedance volts on position 5  
 H.V./L.V. 16.2 % H.V./tertiary.  
 Type of cooling and rating 39.5 % L.V./tertiary 19.4 %

Type of oil :- Shell Diala B.

ONAN	150	M.V.A.
OFAN	187.5	M.V.A.
ONAF	220	M.V.A.
OFAF	250	M.V.A.

Insulation level (kVp)  
 H.V. 1050 L.V. 550 Tertiary 75

Oil quantities :-  
 Transformer 42021 litres. 36.54 tonnes  
 Cooling plant 11500 litres. 10.00 tonnes  
 Selector switch 12903 litres. 11.22 tonnes  
 Diverter switch 570 litres. 0.50 tonnes  
 Core and windings 80.00 tonnes  
 Complete transformer including oil 198.21 tonnes  
 Cooling plant including oil 40.60 tonnes  
 Transport excluding oil 106.00 tonnes

Mass :-

Manufacturer : Hawker Siddeley Power Transformers Limited.  
 Manufacturers Serial No. 761046  
 Year of Manufacture. 1978

**AEG**

3-Phasen-Transformator  
 Hergestellt im Transformatorwerk Saporoskije (Ukraine)  
 1995 modernisiert durch AEG TRO Berlin

Typ	1021N-160000/220-01	Nennfrequenz	50 Hz	Isolationspegel	OS	W	MS	2N	US
F.Nr.	140303	Schaltgruppe	YNyn0/5	Um	245	123	153	123	12
Bezeichnung	1989	Überspannung	OFAF	AC	kv	260	230	230	30
Norm	IEC 76	Obertemperatur max. K	60	LI	v28/Spesche	kv	900/900	550/-	550/550

Bem. Leistung kVA	Bem. Spannung V	Bem. Strom A	Kurzschlussleistung in K		
OS 160 000	231 000	409	Schaltgruppe	Stiefg. 1	Stiefg. 10M
MS 160 000	110 500	800	OS - MS	YNyn0	14.6
US 42 000	10 500	2309	OS - US	Ynd5	11.6
			MS - US	ynd5	7.3

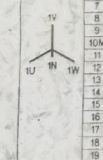
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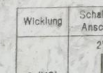
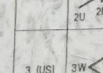
Kurzschlussdrosselspule in Wicklung 3 (US)	Stromwandler	Übersetzung, A	Leistung, VA	Klasse
Fabrikat TRO Typ Kapez. 1335/543	8/1V, 1W	Kern 1	600/1	15
Bem. Leistung 725 kVA Strangspannung 543 V Schaltung II		Kern 2, 3	600/1	30
Bem. Strom 1335 A Netzspannung 10 500 V Frequenz 50 Hz	3U, 3V, 3W	Kern 1, 2	300/1	30

Stützenschalter Fabrikat TRO  
 Typ SCV3-630-170/245-W19 Bem. Strom 630 A Um 110 kV

Gesamtgewicht 230 t Ölgewicht 57 t  
 Transportgewicht 216 t Heraushebbarer Teil 132 t

Transformatorbuckel und Ausdehnungsgefäß sind vakuumfest

Schaltung Anschluss	St	Wicklung T (DS)		Wieder-erfindel je Phase	Wieder-erfindel je Phase
		Spannung V	Strom/A bei 160 MVA		
	1	265 620	344	1	11 - 10
	2	264 440	349	2	
	3	260 260	355	3	
	4	256 080	361	4	
	5	251 900	367	5	
	6	247 720	373	6	
	7	243 540	379	7	
	8	239 360	386	8	
	9	235 180	393	9	
	10M	231 000	400	10	
	11	226 820	407	11	
	12	222 640	415	12	
	13	218 460	423	13	
	14	214 280	431	14	
	15	210 100	440	15	
	16	205 920	449	16	
	17	201 740	458	17	
	18	197 560	466	18	
	19	193 380	476	19	

Wicklung	Schaltung Anschluss	Spannung V	Strom A
2 (MS)		110 500	800 bei 160 MVA
3 (US)		10 500	2309 bei 42 MVA

1V  
 1U 1N 1W

1W 1V 1U 1N  
 2W 2V 2U 2N 2W  
 3W 3V 3U 3N

Schaltgruppe

Kurzschlussdrosselspule

AEG TRO Transformatoren und Schaltgeräte GmbH  
 Made in Germany  
 S 33964

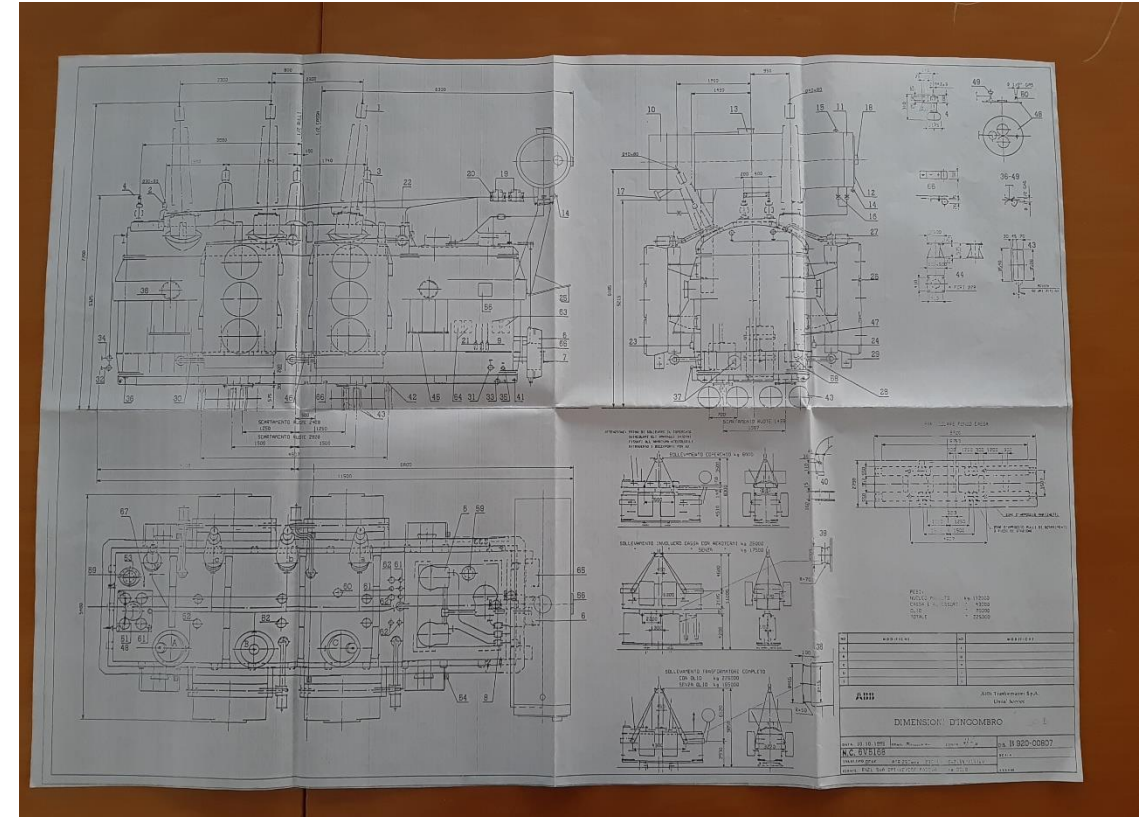
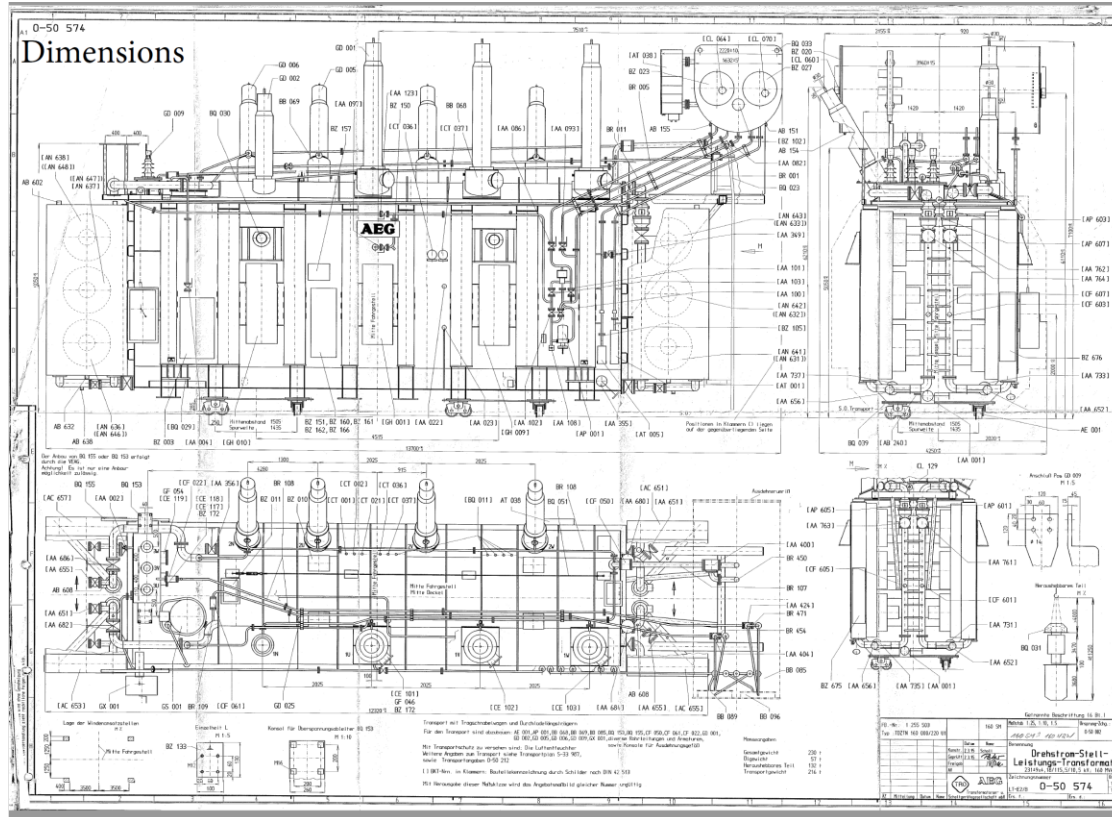
Transformer 1

## 2. Example: Summary table of characteristics

Type	Oil immersed three phase autotransformer
Manufacturing year	1971
Rated Power $S_r$ [MVA]	250
Rated Voltage HV $U_{r1}$ [kV]	230
LI [kV]; AV [kV] (IEC 60076)	900;140
Rated Voltage LV $U_{r2}$ [kV]	135
LI [kV]; AV [kV] (IEC 60076)	650;140
Tapping Range	$\pm 6 \times 2,5\%$ (on LV)
Ratio (rated/max/min)	1,7/2/1,5
Cooling System	OFAF
Short Circuit Impedance (rated/max/min) [%]	9,61/11,87/10,30
Auxiliary Winding [kV]	15
Total Weight [kg]	225.000



# 3. Example: Technical drawings



# 4. Example: Pictures





# Voltage and current transformers

- These are measurement devices for substations
- Less strict specs
- Important to mention:
  - Rated voltage, e.g. 10 kV
  - Rated current, e.g. 1A or 5A
- Good examples:
  - Current transformer 30 kV / 300-600 A + (7,2-22-60kV ) 2000/5 A
  - 150 kV current transformer with secondary 5 A



# High voltage equipment

- Comprises: insulators, circuit breakers, disconnectors, surge arresters, relays, etc.
- Try to get as many details
- Good example: Circuit breaker SF6 170 kV,  
HITACHI-ABB type LTB-170 D1/B,  $I_n=2000A$ ,  $I_{disconnect}=31,5$  kA
- Bad examples:
  - MV Switch with fuse
  - Differential Relay SEB IDT 660B
  - 170 kV orizontal disconnector - Details not known

# For protection relays, circuit breakers

- Most important: ORDERING CODE from manufacturer
- This is a long string of numbers like:

<https://library.e.abb.com> › public ▼

## Order code - ABB

Order code: **HAFAAAAxxAE1BNNxXC** or **HAFAAAAxxBE1BNNxXC** or.  
HAFAAAAxx3E1BNNxXC ... Order code: **HAFAAAAxxFE1BNNxXC** or...





# Thank you



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