



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

Appendix A1

Scope of work and technical specification for

Utheim Main transformers



Technical specification – Transformers
Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

1	INFORMATION ON THE WORKPLACE	3
1.1	General	3
1.2	The Deliverables	3
1.3	The Contract Object	3
1.4	Accommodation	4
1.5	Hours of work	4
1.6	Transport of personnel	4
2	SUPPLEMENTARY REQUIREMENTS TO APPENDIX A0 – TECHNICAL SPECIFICATION	4
2.1	Standards	4
2.2	Technical data	4
2.3	Operating conditions	5
2.4	Execution of the work	6
2.5	Information when tendering/guarantees and tolerances	9
2.6	Factory testing/acceptance testing	9
2.7	Transport, assembly at the station, testing and commissioning	9
2.8	Documentation	9
2.9	Tender schedule	10



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

1 INFORMATION ON THE WORKPLACE

1.1 General

Utheim transformer station is located at Trøndelag county in Ørland municipality. There are normally good access and public roads to the property of the transformer station.

Address: Lerbern, 7130 Brekstad

<https://goo.gl/maps/wF4GHCKVvhmfNY9>

The transformer is to be placed at foundation indoors. Drawing showing foundation and other dimensions are given in appendix.

1.2 The Deliverables

The contractor shall deliver:

- 1 pc. 40 MVA, 65/22kV oil immersed power transformers, DDP at Utheim Transformer station.
- Testing
- Assembly at the station

Preferred time of delivery is:

- According to Appendix C.

1.3 The Contract Object

The transformers shall be 3-phase with oil insulation and shall be constructed for outdoor operation at any normal weather conditions.

The transformers shall be two winding transformers equipped with an On-Load Tap-changer on the high voltage side. Rated voltages 65/22kV.

The transformer connection shall be YNyn0/d.

Due to using of Peterson coils of the 22kV side, the transformers shall also have a third winding delta-connected. This third winding must be dimensioned so the transformers 0-point on the 22kV side can be charged to a third of the nominal power. The winding must be designed to withstand all the current forces (short circuit etc). Due to have the possibility to disconnect the delta winding, this third winding must have two bushings of the top. The two bushings must be connected to each other with a detachable connection.



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

1.4 Accommodation

The Company has no opportunity to arrange overnight accommodations, but can assist by providing information.

1.5 Hours of work

The Company’s ordinary hours of work are Monday-Friday, 08:00 – 15:00.

The use of overtime or shift work must be agreed on with the Company. All use of our companys personell shall be organised and paid by the Contractor.

1.6 Transport of personnel

All transport of the Contractor’s and Subcontractors’ personnel shall be administered and paid for by the Contractor.

2 SUPPLEMENTARY REQUIREMENTS TO APPENDIX A0 – TECHNICAL SPECIFICATION

2.1 Standards

No supplementary requirements to Appendix A0.

2.2 Technical data

Data for the Contract Object(s) included in the invitation to tender.

Type	Three phase, two winding oil-immersed transformer equipped with On Load Tap-Changer make: Reinhausen. Other types can be offered as option.
Rated power	40MVA
Frequency	50 Hz
Nominal temperature rise oil	60 K
Nominal temperature rise winding	65 K
Cooling	ONAN
Voltage ratio	65/22 kV
Regulating	65kV±8x1,5%, position 1 shall indicate highest level
Insulation level:	72.5kV side: LI 325 AC 140 24kV side: LI 125 AC 50
Connection symbol	YNyn0/d
Short circuit impedance	10%
Auxiliary voltage	Control: 110V DC Motor: 3x230V AC IT



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.3 Operating conditions

2.3.1 Erection

The transformer shall satisfy outdoor erection, approximately 500 meters above the sea level. Ambient temperature -40 °C to +40 °C.

2.3.2 Operating voltage

Highest operating voltage at the aerial network is 72,5kV at primary side and 24kV at secondary sides.

2.3.3 Insulation level at neutral

The 24kV side shall be able to be connected to earth by use of a coil.

2.3.4 Load capacity

No supplementary requirements to Appendix A0.

2.3.5 Short-circuit strength

The transformer shall withstand an infinity high short circuit current from the networks 72,5kV side.

2.3.6 Noise

Maximum 59 dB according to IEC 600551 with ONAN.

If fans are proposed as an option, the noise level with fans shall be given.

2.3.7 Losses

The Contractor shall pay a penalty for the share of losses that exceed the guaranteed values. The guaranteed values shall be calculated according to Ecodesign Tier 2. The following capitalisation values will be used for calculation of loss:

Load loss:	NOK 22,400/kW (at 75 °C winding temperature).
No-load loss:	NOK 97,600/kW

Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.4 Execution of the work

2.4.1 In general

No supplementary requirements to Appendix A0.

2.4.2 Core

No supplementary requirements to Appendix A0.

2.4.3 Windings

No supplementary requirements to Appendix A0.

2.4.4 Transformer tank

No supplementary requirements to Appendix A0.

2.4.5 Cover

No supplementary requirements to Appendix A0.

2.4.6 Conservator

The total volume of the conservator shall be minimum 10 % of the total transformer oil volume.

2.4.7 Underbody

The transformer shall be fitted with wheels track width 1789 mm (length direction) / 1435 mm (transverse direction).

The transformer shall have the possibility to be placed directly on the foundation or placed on the wheels. The transformer shall therefore be delivered with wheels and anti-vibration pads.

The transformer shall be able to be moved to another transformer cell with other foundation details, therefore the transformer underbody has to be reinforced and strong enough for use of jacking devices at any single spot on the whole underbody surface.

2.4.8 Surface treatment, corrosion protection

Colour grey but optional colours can be offered.



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.4.9 Bushings

Resin Impregnated Paper (RIP) with composite insulator.

2.4.10 Tap changer

On-Load Tap-changer shall be type make Reinhausen.

Tap changer shall be with vacuum technology.

2.4.11 Dryer

No supplementary requirements to Appendix A0.

2.4.12 Cooling system

ONAN

2.4.13 Equipment for monitoring and protection

According to Appendix A0, with additions:

There has to be two individual cabinets, one for the operation of the tap changer and one for monitoring and protection. Both cabinets shall be equipped with 230V heating elements.

The tap changer shall be equipped with devices that are necessary for protection, control and getting oil samples. It shall also be fitted with a protection relay of the type RS2001 or similar.

Blocking shall be terminated using push buttons with light located on the front of the control cabinet of the transformer.

2.4.14 Other equipment

- Removable rack for installation of arresters on HV side.
- Four pcs. Anti-vibration pads



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.4.15 Spare parts



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.5 Information when tendering/guarantees and tolerances

The bidder shall state guaranteed values for the sizes and components stated in Appendix A0.

2.6 Factory testing/acceptance testing

1	Routine tests	Remarks
1.1	Routine tests according with IEC 60076	
1.2	Dimension tests	
1.3	Check of auxiliary equipment	
2	Type tests	
2.1	Sound level measurement	
2.2	Temperature rise test	
3	Special tests	
3.1	Measurement of the windings insulation resistance	
3.2	Measurement of no-load currents at 230V / 400V, 50Hz	
3.3	Measurement of zero sequence impedance	

2.7 Transport, assembly at the station, testing and commissioning

The transformer shall be delivered on the service spot. The Contractor must cover all the costs for the transportation, included insurance costs and calculating load capability to bridges if necessary.

Assembly at site has to be done by time of agreement, and shall include all costs for the Contractor. Necessary dismantle and re-assembly at site because of moving the transformers shall be included in the offer.

2.8 Documentation

No supplementary requirements to Appendix A0.



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

2.9 Tender schedule

The following technical schedule shall be given with the tender. Failure to give the information could be ground for disqualification.



Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

Technical Data

Description	Unit	T1 Data*	NA
Manufacturer			
Place of manufacture			
Type / designation			
General design description			
Connection symbol			
Voltage ratio	kV		
Insulation level, LIWL / ACWL			
High voltage	kV		
Low voltage	kV		
Neutral	kV		
Winding 3	kV		
Rated power	MVA		
No-load current at rated voltage	A		
Per cent impedance voltage at rated current (nominal tapping)	%		
Sound pressure level	dB(A)		
LOSSES (guaranteed)			
No-load losses	kW		
Load losses at 75°C,	kW		
Auxiliary power at full load	kW		
Efficiency at nominal conditions, including auxiliary power	%		
MOTORS			
Rated power - oil pump	kW		
Rated voltage	V		

* Or Supplier information sheet reference No.

Technical Data (Continued)

Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

Description	Unit	T1 Data*	NA
DIMENSIONS AND WEIGHTS			
Overall dimensions of transformer in service (l x w x h) (Dimension sketch to be provided)	mm		
Total weight of complete transformer in service	t		
Overall shipping dimensions of largest part (l x w x h)	mm		
Maximum shipping weight of the heaviest piece	t		
Plate thickness transformer tank (side, bottom, top)	mm		
MISCELLANEOUS			
Manufacturer and type designation of accessories and protection devices			
Oil type			
Bushings			
Oil-to-water coolers			
Oil pumps			
Oil temperature indication			
Winding temperature indication			
Bucholz relay			
Oil level gauge			
Oil flow indicators			
Current transformers			
Painting system characteristics			

* Or Supplier information sheet reference No. Fig.

Drawing – dimentions transformer cell.

Technical specification – Transformers

Appendix A1 – Scope of work and technical specification for Utheim 66_22kV 40MVA

