

תשתיות אנרגיה בע"מ

G1, G2 שנאים לגנרטורים

**Standard Specification for
Two Oil Immersed Power Transformers
0.4/6.6KV – 2500KVA**

V0	30/01/2024	FOR APPROVAL	A.NAHARI	
Rev.	Date		BY	ORL
		Description	Approved	



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1. **SCOPE**

1.1 **General**

This specification covers the design, manufacture, painting, test, and the supply of two sealed oil immersed power transformers 6.6/0.4KV - 2500KVA

In addition Data Sheet and Bill of materials (BOM) will be issued.

1.2 **Quote Conditions**

Purchaser and Final Owner: **Energy Infrastructures ltd.**

Installation Site Ashkelon, Israel.

1.3 **Transport and Erection**

The vendor shall be responsible for the transportation of the transformers to the final installation location at **Ashkelon site** (Israel), this includes all loading, unloading, coordinating local law authorities during land transportation (if needed).

2. APPLICABLE CODES AND STANDARDS

The following documents form part of this specification, according to their latest published issue.

All aspects, tests etc., not covered by the IEC publications shall be executed according to the latest published issue of the official or otherwise approved standards of the manufacturer's country.

No.	Title
IEC 60050	International Electro technical vocabulary
IEC 60076-1 (2004-04)	Power transformers General
IEC 60076-1 (am1)	Power transformers General
IEC 60076-2 (1993-04)	Power transformers Temperature rise
IEC 60076-3 (2000-03)	Power transformers Insulation levels dielectric tests and external clearances in air
IEC 60076-4 (2002-06)	Power transformers Lightning impulse and switching-impulse testing
IEC 60076-5 (2006-02)	Power transformers ability to withstand short circuits
IEC 60076-7 (2005-12)	Power transformers Loading guide for oil immersed transformers
IEC 60076-8 (1997-11)	Power transformers application guide
IEC 60076-10	Power transformers Determination of sound levels
IEC 60076-10-1	Power transformers Determination of sound levels
IS 50464	Distribution transformer Requirements for energy efficiency and labeling

3. ENVIRONMENTAL AND GRID CONDITIONS**Environmental conditions**

Temperature 0°C to 45°C the ambient temperature shall be considered for design as 45°C.

Humidity max 95%

Altitude less than 10 m.

Location: Outdoor, corrosive, with heavy industrial pollution, such as H₂S and SO₂ gases, 450m from the sea.

4 **TECHNICAL SPECIFICATION**

The terminology used in this section is, in general, according to IEC Publications 60076. The term “guaranteed” used in this Specification in connection with specified quantities means that the magnitude of the quantity to which it is applied shall be subjected to the tolerances given in IEC Publication 60076.

4.1 **Transformer Data**

- | | | |
|--------|--|--|
| 4.1.1 | Rated Power (ONAN) | See Data Sheet |
| 4.1.2 | Number of phases..... | 3 |
| 4.1.3 | Rated frequency | 50Hz |
| 4.1.4 | Rated primary voltage | 6.6KV |
| 4.1.5 | Impulse withstand voltage | 60KV respective. |
| 4.1.6 | One-minute power frequency test | 20KV R.M.S. |
| 4.1.7 | Rated secondary voltage between
any two phases and neutral
(when transformer is not loaded)..... | 400V |
| 4.1.8 | No. of L.V. bushings | 4 |
| 4.1.9 | Rated current of phase bushing..... | according to transf. size |
| 4.1.10 | Rated current of neutral bushing..... | according to transf. size |
| 4.1.11 | Cooling | ONAN |
| 4.1.12 | Connection vector group..... | YnD-11 |
| 4.1.13 | Guaranteed impedance voltage
(short circuit impedance) | 6% |
| 4.1.14 | H.V. and L.V. winding material | Copper |
| 4.1.15 | Maximum top oil temperature rise | 55°K |
| 4.1.16 | Maximum winding temperature rise | 60°K
(measured by resistance) |
| 4.1.17 | Nameplate | as per IEC standard
60076 and IS 5484 |
| 4.1.18 | Off load tap changer on | H.V. side |
| | • No. of Taps | 5 |
| | • Voltage range . | ±2x2.5% |
| 4.1.19 | Losses: Tolerance | 5% |
| | • Maximum No load losses (PO)..... | 1750W |
| | • Maximum load losses (Pe)..... | 18500W |

4.1.20 Ability to withstand short circuit.

The transformer shall be designed and constructed to withstand the thermal and dynamic effects of external short circuits according to IEC Publication.

4.1.21 Max noise level 60 db (A)

4.1.22 Oil EDHELL DIALA Ax or NYNAS Nitro
10GBx, or equivalent approved by
Israel Electric Corporation.

4.2 Construction

4.2.1 The transformer shall be an oil immersed natural air cooled (ONAN), suitable for outdoor installation.

The tank shall be fabricated from cold rolled steel (CRS) sheets folded and welded complete. The top cover shall be sealed and bolted.

The transformer shall be a hermetic sealed type transformer without conservator.

4.3 Transformer Auxiliaries, Accessories and Components

4.3.1 Bushings

	0.4 KV	6.6KV
Number	4	3
Insulation class (KV)	1	12
Impulse withstand voltage positive and negative (kV peak)		75
One-minute power frequency test (kV r.m.s.)	2.5	28

- L.V. Terminals shall permit connection to copper busbars or cables.
- The high voltage terminals' connection shall be EUROMOLD-ELASTIMOLD or approved equivalent, 400A, screw type, totally insulated elbow connectors.

The Supplier will provide without extra costs, both male and female plug connectors, suitable for a cable cross section as given in the Data Sheet.

4.3.2 Transformer Base

Transformers shall be supplied with castor wheels.

4.3.3 Oil Filling Cap

Transformer shall be provided with oil filling cap.

4.3.4 Drainage of the Transformer Tank

There shall be an opening at the bottom of the tank for removing oil, by means of a ¾" spherical high-quality tap.

4.3.5 Pressure Relief Device

The transformer shall be equipped with a pressure relief device. The pressure relief device shall be for 0.3 Atm. with a diameter opening in the transformer's lid of 68 mm. The device shall meet the relevant IEC requirements.

4.3.6 Protection

The transformer shall be equipped with a DGPT protection relay.

The relay shall include the following functions:

- Gas emission in oil.
- Oil low level.
- Pressure increase.
- High oil temperature (with two separate levels, one for alarm and one for protection).
- Oil temperature measurement.

4.3.7 The transformer shall be equipped with a stainless-steel nameplate showing the wiring diagram and giving all data according to IEC standard 60076.

4.3.8 Transformer shall be provided with lifting lugs.

4.3.9 Two earthing screws with M12 Thread shall be welded to the Transformer, one on the base and one on the cover.

4.4 Painting

The painting of the transformer tank and other steel parts will be in accordance with Manufacturer's standard procedures for tropical corrosive atmosphere, as approved by Purchaser.

Painting will be in a paint system resistant to very severe marine corrosion environment C5, for a very long durability VH over 25 years, (i.e. requirement: C5-VH), according to the ISO 12944-5: 2018 standard.

The paint system specification according to the table in this standard is in Table C.5, System C5.08, which means 4 layers for a total paint thickness of over 320 microns at least, (Recommended at least 340 microns), and consisting of a zinc-rich epoxy primer, an epoxy intermediate paint in two separate layers, and polyurethane-polyester top coat

Surface preparation will be Sa 3, and profile roughness 50-85 microns. (Instead of a zinc-rich epoxy primer such as SSPC, you can use an inorganic zinc silicate primer IOZ , which is sometimes better if the

application is professional but requires a very professional contractor with proven experience in applying an inorganic zinc silicate primer on steel).

Paint inspection is always recommended. Before grit abrasive blasting wash the steel with soap and high-pressure clean fresh water and remove white developer paint from magnetic welding tests. After washing with soap/detergent and water pressure, dry, and perform Sa3 abrasive grit blasting to obtain a profile roughness of 50-85 microns. Salt level will be below maximum 50 mg/m² NaCl tested by Bresle Kit. Contractor will supply detailed paint inspection report (paint inspection certificate) according to EN 10204,

Type 3.1.

The color of the topcoat shall be medium grey.

5. DOCUMENTATION

- 5.1 Vendor shall provide with the bid the following documents and information in three copies + reproducible.
 - 5.1.1 Customer's Data Sheet.
 - 5.1.2 Detailed dimension drawings specifying also weights.
 - 5.1.3 Technical catalogue.
 - 5.1.4 Type test report (see paragraph 7).
 - 5.1.5 No load, full load and the total losses corrected to 75°C.
 - 5.1.6 Noise level according to the latest IEC recommended methods of measurement.
 - 5.1.7 Information about manufacturer's experience and list of similar transformers installed in Israel.
 - 5.1.8 Summary of data.
 - 5.1.9 Best delivery time.

- 5.2 Three weeks after award of order the contractor shall supply the following:
 - 5.2.1 Final dimension drawings and weights.
 - 5.2.2 Certified data sheet.
 - 5.2.3 Civil guide
 - 5.2.4 Sub-vendor list
 - 5.2.5 Catalogues and instruction books.

- 5.3 Vendor shall supply copies of routine test when accomplished and before shipping.

6. WARRANTY

Three years warranty of satisfactory performance under normal utilization conditions from date of first operation or two years from date of delivery to site shall be included in the price of each transformer.

During the warranty period any request of assistance shall be dealt with within 24 hours.

Repairs shall be made as far as possible on the spot with any other repair being carried out in the Manufacturer's repair station in Israel in reasonable time and to full Purchaser's satisfaction.

Transport of the transformer to and from the repair station shall be at the Manufacturer's expense.

7. TESTS

7.1 The transformer shall be subjected to routine tests as per IEC 60076 at the Manufacturer's works.

7.2 The Manufacturer shall submit with the bid a copy of the type test performed on an identical transformer as per I.E.C 60076 by an internationally recognized laboratory.

Has the type test report not been submitted with the bid, one of the transformers shall be subject to a full type test on manufacturer's expense.