



Tougher than any challenge

Special transformers for industrial applications

Answers for energy.

SIEMENS

SIEMENS
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Familiar with the most demanding tasks

The comprehensive Siemens range of robust, reliable, and highly cost-effective transformers for industrial applications

Transformers play an eminently important role in several industries, especially in metallurgical plants and processes. Enormous currents need to be supplied for AC and DC electric arc furnaces and ladle furnaces in the primary aluminum, copper, zinc, chlorine, and carbon industries, or for large industrial drives. And while production capacities are growing on a grand scale in order to satisfy worldwide demand, higher voltages and currents need to be supplied by more and more powerful transformers.

The working conditions for transformers that supply the energy for such processes are usually extraordinarily severe. The transformers, exposed to cyclic load and high thermal stress, must withstand frequent overcurrents and overvoltages caused by short circuits in the furnace or the tripping of high-voltage circuit breakers. On the other hand, any outage can cause a total loss of production due to the “freezing” of pots or furnaces.

That is why off-the-shelf solutions will never do for heavy-duty industrial processes. Each single transformer needs to be precisely tailored to meet individual demands.

Siemens transformers for industrial applications have led this field for more than five decades – thanks to over 100 years of experience in transformer technology and Siemens’ unique expertise throughout the entire energy conversion chain.

Siemens transformers for industrial applications are widely renowned for superior design and innovative engineering, low fault rates, and outstanding durability. And Siemens’ close global network of experts and production facilities, as well as the company’s strong commitment to problem solving, make sure that all requirements are met with technical excellence, even within tight time frames. That is why Siemens transformers come with a unique five-year warranty.

Siemens also supplies the special medium-voltage transformers required for the renowned Perfect Harmony drives – versatile performers that help significantly increase productivity and provide the highest levels of reliability, precision, and longevity in demanding industrial applications.

Be it in metallurgy, mining, water supply and distribution, pulp and paper, cement production, or marine applications – even for oil and gas production 2,000 meters under the sea: Siemens transformers for industrial applications come into play whenever extraordinarily tough challenges are to be successfully met.

Discover the comprehensive range of Siemens oil-immersed and dry-type transformers for industrial applications. See for yourself the benefits Siemens transformers have to offer when it comes to the reliable supply of power for industrial core processes.



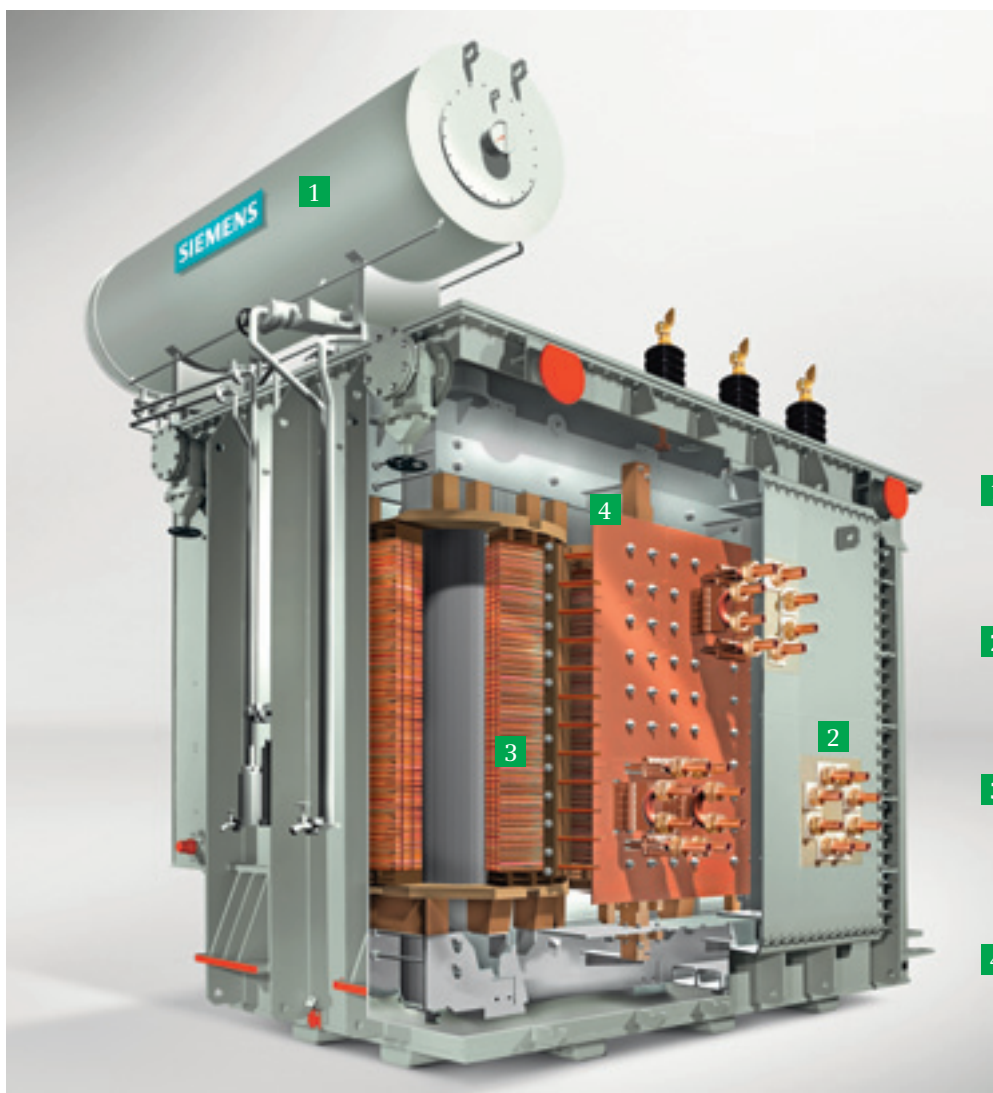
Engineered for performance

Siemens special transformers for industrial applications are the product of choice for a wide range of applications:

- Electric arc furnace transformers
- Electric arc furnace series reactor
- DC electric arc furnace transformers
- Rectifier transformers
- Converter transformers for large drive applications

Your benefits at a glance:

- Tailor-made industry transformers for every kind of application
- Comprehensive rating range
- Superior technical design including cost-saving delta connection
- Low fault rate
- Outstanding reactivity
- Exceptionally long service life
- Market-unique five-year warranty
- Tightly knit global production, delivery, and service network



1 Oil expansion tank with Buchholz relays and dehydrating breathers

2 Water-cooled copper tubes at LV-side in triangulated arrangement

3 LV-winding with giant CTC's (continuously transposed conductors)

4 CTC's are brazed on copper bus bars for high current up to 120 kA.

Heavy-duty transformers for every demand



EAF transformer

Electric arc furnace (EAF) transformers

Siemens EAF transformers are specially designed to withstand the exceedingly severe conditions of the metallurgical steel melt processes in foundries, in secondary steelmaking, or in ferroalloy production. A regulation transformer, which is required for bigger units, can be placed directly adjacent to the transformer or even inside the transformer tank.

Design options:

- Direct or indirect regulation
- On-load or off-circuit tap changer
- Built-in reactor for long arc stability
- Air or water-cooled secondary bushing arrangements and designs
- Internal secondary phase closure (internal delta)

Technical features:

- Ratings up to 250 MVA
- Secondary voltage up to 1,500 V (LF down to 80 V)
- Electrode current for steel up to 120 kA
- Electrode current for ferroalloy up to 180 kA

EAF series reactors

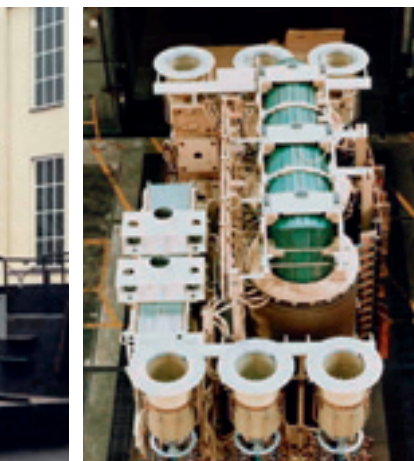
Stable and linear reactance is a prerequisite for the optimal operation of a long-arc steel furnace. Siemens EAF series reactors are therefore built as three-phase types with an iron core. They come with or without magnetic return circuits and can be designed as a stand-alone unit or incorporated into the tank of the EAF transformer itself.

Design options:

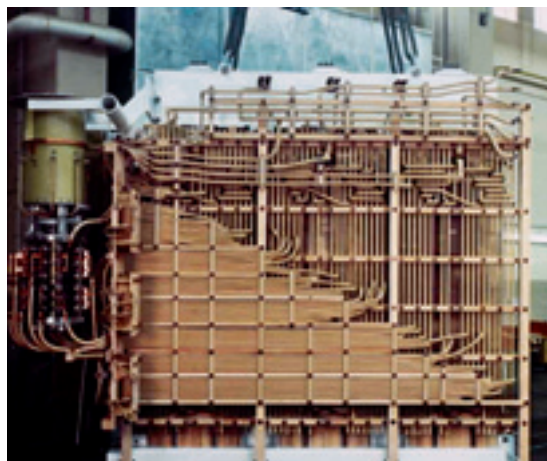
- Use or nonuse of tap changer for operational flexibility
- Under oil or air
- On-load or off-circuit tap changer
- Secondary bushing arrangements and designs

Technical features:

- Ratings up to 60 MVA



Furnace transformer and reactor



Leads to the tap changer



Line feeder transformer

Direct current EAF transformers

Siemens DC EAF transformers, used for steel furnaces with a thyristor rectifier, are usually designed with a double-stacked coil structure with one LV winding in the delta connection and one in wye connection. Just like the AC EAF transformers, they are extra-rigid to cope with even the most severe working conditions.

Design options:

- 6- or 12-pulse system
- Intermediate yoke for double tier
- On-load or off-circuit tap changer
- Secondary bushing arrangements and designs on one or opposite side of the tank
- Air or water-cooled
- Optional filter winding

Technical features:

- Ratings up to 130 MVA
- Secondary voltage up to 1,300 V
- Electrode current up to 120 kA

Rectifier transformers

Siemens rectifier transformers, designed with a built-in or a separate voltage regulation unit, are in use for a multitude of applications from very large aluminum electrolyses to various medium-size operations. According to the wide field of application, there are many design options for such transformers, including a combination of voltage regulation, rectifier transformers in double-stack configuration, phase-shifting, interphase reactors, transducers, and filter-winding. An auto-connected regulating transformer can also be incorporated in the same tank if transport and site requirements allow.

Design options:

- Tailored for thyristor or diode rectifier
- Voltage range and step voltage
- Double or triple tier design or keel line arrangement
- On-load or off-circuit tap changer and filter winding
- Additional phase-shifting windings for 12-pulse or higher systems
- Interphase reactor, transducers
- Air-cooled secondary bushing arrangements and designs
- Numerous different vector groups and phase shifts

Technical features:

- Ratings up to 120 MVA
- Secondary voltage 0–1,500 V, depending on the application

Converter transformers

Large-scale industrial drives, pump stations, rolling stock in mining applications, wind tunnels, or blast furnaces, to mention just a few, are the strong suit of Siemens converter transformers. Combined with a frequency converter they supply the input for variable-speed drives. Mostly built as double-tier models with two secondary windings they allow 12-pulse rectifier operation. An additional winding serves as a filter for harmonics.

Design options:

- Double tier design or multiple tier
- On-load or off-circuit tap changer
- Filter winding and/or earth screen
- Air or water-cooled secondary bushing arrangements and designs
- Numerous different vector groups and phase shifts
- Variable-speed drive design

Technical features:

- Ratings up to 120 MVA
- Secondary voltage between 800 V and 14 kV, depending on the drive

Project references



EAF transformers

- Baosteel, China:
25 MVA, 33 kV/220 V
- Benteler Lingen, Germany:
105 MVA, 33 kV/600 V
- DEW Siegen, Germany:
25 MVA, 10 kV/377 V
- Saarstahl, Germany:
80 MVA, 30 kV/450 V
- Azovmash, Ukraine:
12 MVA, 10 kV/300 V
- Charter Steel, USA:
71 MVA, 34.5 kV/1,050 V
- Claymount, USA:
72 MVA, 25 kV/700 V

EAF transformers with reactor and/or regulating transformer in one tank

- DEW Siegen, Germany:
105 MVA/18.4 MVAr,
30 kV/600 V
- DEW Witten, Germany:
100 MVA/14.3 MVAr,
110 kv/33.3 kV/950 V
- Nucor Jewett, USA:
110 MVA/3.2 MVAr,
34.5 kV/1,201 V
- Nucor Steel Berkeley, USA:
80 MVA, 34.5 kV DC furnace



Rectifier transformers

- Alcoa, Brazil:
19.3 MVA, 33 kV
- Bayer Uerdingen, Germany:
35.74 MVA, 30 kV
- FEAG, Germany:
19.364 MVA with double interphase reactor
- Muehlheim, Germany:
5.81 MVA, 110 kV/822 V
- SGL Carbon, Germany:
9.2 MVA, 11.5 kV/220 V
- PDO, Oman:
20 MVA, 33 kV
- Alro Slatina, Romania:
66.8 MVA, 30 kV

Heavy-duty rectifiers with multiple active parts

- PSW EW Reutte, Austria:
4 MVA, 30.75/25/2x0.69 kV
(Midel 7131)
- Cumerio, Bulgaria:
13.3/2x6, 634/4x4.691 MVA
with double interphase reactor
- Intertrust, Bulgaria:
2x16, 78/4x11.865 MVA
with double interphase reactor
- Hydro Aluminum, Neuss, Germany:
° 40/20/20 MVA with transductors
31.5 kV/21 kV/625 V
- RWE KW WES/EEM, Germany:
Saugzuggebläse Kohlekraftwerk
3.7 MVA, 10/1/4x0.72 kV
- Asturiana NAVE, Spain:
46.78/4x16.54/20 MVA
with transductors and double
interphase reactor
- Richmond, USA:
25 Hz, 4x6.6 MVA, 4x18,
7 kV/3.75 kV

Converter transformers for large drive applications

- Gasco Ruwais, Abu Dhabi:
28/2x14/10 MVA, 33/2x4.7/11 kV
- Alcoa, Brazil:
95 MVA, 138 kV
- Shann Jing, China:
26.4/2x13.2 MVA, 10/2x5.4 kV
- Deutsche Bahn, Aschaffenburg,
Germany:
50 Hz, 36/2x18/4 MVA,
110 kV/3 kV/3 kV/6 kV
- Deutsche Bahn, Lehrte, Germany:
16.7 Hz, 20/4x5.25/1 MVA,
110 kV/3 kV/12 kV
- Tata Steel, India:
30/2x15 MVA, 132/2x5 kV
- Jemen, LNG:
10 MVA, 33 kV
- Peru LNG, Peru:
22/2x11/7 MVA, 13.8/2x4.6/6 kV

Published by and copyright © 2010:
Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

For more information, please contact
our Customer Support Center.
Phone: +49 180 524 70 00
Fax: +49 180 524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

Order No. E50001-G640-A145-X-4A00
Printed in Germany
Dispo 19200, c4bs No. 7486
fb 2385 470868 WS 02103.0

Printed on elementary chlorine-free
bleached paper.

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