Cigré 2016, August 21 to 26, Paris, France

Siemens uses vacuum interrupters for the first time in high voltage switch gear up to 145 kV

While millions of vacuum interrupter units are used in medium voltage switchgear worldwide, until now they have come up against their limits in the high voltage sector above 72.5 kilovolts (kV). Following intensive research and development in this area, Siemens exhibited high voltage interrupters and gas-insulated switchgear using vacuum technology and so-called clean-air technology up to a voltage of 145 kV for the first time ever at this year’s Cigré in Paris. With this technology, a vacuum interrupter unit performs the switching and arc extinguishing activities. Technically processed and purified air with a mixing ratio of 80 percent nitrogen to 20 percent oxygen – so-called clean air – provides the insulation for the current-carrying conductors inside the housing of the metal-encapsulated, gas-insulated switchgear (GIS). The new outdoor circuit-breaker 3AV1 and new switchgear 8VN1 Blue GIS, with vacuum switching technology and clean-air insulation are scheduled to be launched on the market in 2018. They are further developments of the circuit-breakers and switchgear that use sulfur hexafluoride (SF$_6$) as insulating, switching and arc extinguishing gas and which continue to be still part of the product range.

With the combination of vacuum switching technology for switching and arc extinction and clean air as high voltage insulating medium, Siemens has further developed existing insulation and arc extinction technology to meet climate neutrality requirements. “With this technology, we are expanding our high voltage portfolio and offering our customers an alternative solution without SF$_6$ for higher voltage levels as well. The use of technical switching and insulating gases with high global warming potential can be reduced or even avoided completely in many application areas with the help of vacuum switching technology,” said Karlheinz Kronen, CEO of the Business Unit High Voltage Products within the Siemens Energy Management Division.
With vacuum switching technology, when the contacts are opened the switching arc burns in a metal-vapor plasma between the contacts inside the vacuum extinction chamber. The metal vapor condenses back onto the contacts after the arc is extinguished. No decomposition products occur and the arc does not affect the surrounding insulation. This means that natural insulating gases such as dry air, nitrogen or carbon dioxide that only have poor arc extinction properties, if any at all, can be used for high-voltage insulation of current-carrying conductors. The use of technical insulating gases that have to be able to insulate live parts as well as extinguish arcs effectively can be reduced or even completely avoided by means of vacuum switching technology. The combination of vacuum interrupter units up to 145 kV for arc extinction and dry air (clean air) as high voltage insulating medium offers an additional alternative to sulfur hexafluoride (SF\textsubscript{6}) to supplement the existing insulating and arc extinction technology.

Siemens has used vacuum switching technology for more than 40 years in its medium voltage switchgear as well as in high-voltage circuit-breakers up to 72.5 kV. With the new circuit-breakers and switchgear, Siemens is extending the use of vacuum switching technology up to a rated voltage of 145 kV, a rated short-circuit breaking current up to 40 kiloamperes (kA), a rated current of up to 3150 A and operating temperatures from -55°C up to +55°C. This wide service spectrum makes the new circuit-breakers and encapsulated switchgear suitable for many applications in both outdoor as well as indoor installations. The lower insulating capability of natural gases results in slightly larger dimensions compared with gas-insulated switchgear with SF\textsubscript{6}. However, power transmission efficiency in practice remains equally as high as before. Vacuum switching technology provides advantages for the operator including, for example, easier handling during transport and installation and in operation as well as during maintenance and when recycling. There is also no obligation to report the volumes of gas used.

High voltage circuit-breakers and gas-insulated switchgear are part of the Siemens Division Energy Management’s product portfolio. As a product supplier, system integrator, and solution and service provider, the Division offers power supply companies and industry cost-efficient, reliable, and intelligent solutions for the transmission and distribution of electrical power. The portfolio ranges from products and systems for low-voltage and distribution networks and smart grid and energy automation solutions to high voltage transmission systems. With a presence in more
than 100 countries, the Siemens Division earned approximately €11.9 billion in sales and €570 million in profit and employed just fewer than 53,000 employees worldwide last fiscal year, which ended on September 30, 2015.

This press release and a press picture is available at www.siemens.com/press/PR2016080369EMEN

For further information on Division Energy Management, please see www.siemens.com/energy-management

For further information on gas insulated high voltage switchgear, please see www.siemens.com/hv-gis/8vn1

For further press documents on Cigré 2016, please visit www.siemens.com/press/cigre2016

Contact for journalists
Dietrich Biester
Phone: +49 9131 7-33559; E-mail: dietrich.biester@siemens.com

Heiko Jahr
Phone: +49 9131 7-29575; E-mail: heiko.jahr@siemens.com

Follow us on Twitter at: www.twitter.com/siemens_press

Siemens AG (Berlin and Munich) is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization. One of the world’s largest producers of energy-efficient, resource-saving technologies, Siemens is No. 1 in offshore wind turbine construction, a leading supplier of gas and steam turbines for power generation, a major provider of power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry. The company is also a leading provider of medical imaging equipment – such as computed tomography and magnetic resonance imaging systems – and a leader in laboratory diagnostics as well as clinical IT. In fiscal 2015, which ended on September 30, 2015, Siemens generated revenue of €75.6 billion and net income of €7.4 billion. At the end of September 2015, the company had around 348,000 employees worldwide. Further information is available on the Internet at www.siemens.com.