News Release

住友電工
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Sumitomo Electric Industries, Ltd.

First Supply of Newly Developed High Conductivity Overhead Conductor to Suppress Carbon Dioxide Emission

Sumitomo Electric Industries, Ltd. will supply newly developed 61%IACS Conductivity Thermal Resistant Aluminum Alloy Conductor High Corrosion Resistant Aluminum-Clad Steel Reinforced (hereinafter, 61TACSR/HRAC) from December, 2021 to Japanese transmission network. With improved manufacturing processes of aluminum alloy, we achieved not only to maintain its thermal resistant properties but also to improve its conductivity. Lower electrical resistance compared with the conventional material realizes improvement of electrical power losses on the transmission network. Sumitomo Electric will contribute to suppress carbon dioxide emissions by reducing generating amount at power stations with this new conductor.

To realize decarbonized society, lots of efforts are ongoing all over the world. In the power transmission field, needs for the conductor which can supply electric power efficiently is rising. In this context, Sumitomo Electric firstly developed "61TACSR/HRAC" which consists of thermal resistant aluminum alloy (hereinafter, TAL) with 61%IACS conductivity and we are pleased to announce that this conductor will be adopted to Japanese practical transmission line for the first time in the world.

Generally, Aluminum Conductor Aluminum-clad Steel Reinforced (hereinafter, ACSR/AC) which consists of hard-drawn aluminum withstands up to 90°C as the allowable continuous operating temperature is widely adopted in overhead transmission lines. Meanwhile, in trunk transmission lines which connect between major power stations and substations, thermal resistant aluminum alloy aluminum-clad steel reinforced (hereinafter, TACSR/AC) which consists of TAL withstand up to 150°C is often adopted. Due to higher operating temperature, TACSR/AC can bear larger current capacity.

TAL has higher thermal resistance but conductivity is lower than that of hard-drawn aluminum. As the capacity and the constructed length of transmission lines are getting larger and longer, improvement of transmission losses by high conductive material is recognized as one of common concerns. However, since it was difficult to improve both thermal resistant and conductivity simultaneously, TAL with 60%IACS conductivity developed in 1970 is still utilized up to today. At

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this time, Sumitomo Electric established manufacturing process to increase the solid-soluted Fe amount into a matrix of aluminum alloy, which is known to be difficult so far. With this new manufacturing process, Sumitomo Electric succeeded to improve conductivity of TAL to be 61%IACS which is the same conductivity of hard-drawn aluminum while keeping the thermal resistance of conventional TAL and this conductor will be adopted to Japanese practical transmission lines for the first time.

Since this new conductor has the same construction and design philosophy as the conventional conductor, no changes nor modifications are required on the tower, hardware fittings and installation procedures. Therefore, it is easy to adopt this new conductor to the practical transmission lines. With the 1% increment of conductivity, transmission losses will be improved by approximately 2%. If 2000 MWh capacity generating power station is assumed, approximately 1.75 GWh of power generation and approximately 8000 tons of CO_2 emission would be saved per year with this new conductor.
Sumitomo Electric will supply high conductivity overhead conductor stably and continuously make contribution to realize decarbonized society by promoting this conductor not only in Japanese market where the demands of introducing recyclable energy is rising but also in the overseas market, especially in the developing countries market where the large demands for the construction of infrastructures.

Information of this project

Supplying product	61TACSR/HRAC810mm^2 Approximately 530 km
Delivery period	From December 2021 to December 2022
Manufacturing factory	Toyoura Works in the city of Hitachi, Ibaraki Prefecture, Japan.

*1 Percentage value of conductivity when annealed copper conductivity is defined as 100%
*2 State of the additives are solved into a matrix material uniformly in atomic level
*3 If transmission losses are supposed to be 5%, the 2% losses improvement will save 0.1% of total generating amount.
Amount of CO_2 emissions are calculated following formula with incorporating the coefficient of CO_2 emission, 0.000445 t·CO_2/kWh.
2×10^6(kWh) × 24(h) × 365(day) × 0.001 × 0.000445(t·CO_2/kWh) = 7,796 (t·CO_2)