

Tailor made Conductor

“La Spezia – Vignole”
Overhead Line



SIMPLY PERFECT

High Temperature All Aluminium Alloy Conductor

Design / Research and Develop Department

Davide Peroni

Copyright © 2014 De Angeli Prodotti S.r.l.

Intellectual Property of De Angeli Prodotti S.r.l., it is forbidden reproduction and diffusion of this document.

ABSTRACT

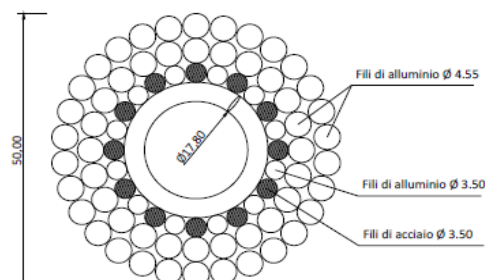
De Angeli Prodotti won the tender for the upgrading of the 400kV line La Spezia-Vignole, one of the most important Italian transmission lines in an area subject to extreme ice loading conditions. Thanks to its design and technical ability De Angeli Prodotti has developed a simple but innovative conductor that allows **significant ampacity increase and reduced line losses** with minimal effect on the tower.

INTRODUCTION

La Spezia-Vignole is an old but critical transmission line that connect the North-West region with the center and South of Italy. This 113km long 400kV line is split in 65km twin bundle and 48km single bundle. The single bundle conductor is used on the region with extreme ice loading (up to 16kg/m) however this caused a bottle neck on the line reducing the power transmission capacity. For this reason in 2011 Terna published a tender for design, test, supply and installation of a new single bundle conductor with ampacity more than 2300 A.

ENGINEERING

The current single bundle conductor was an Hollow type ACSR conductor $\varnothing 50\text{mm}$.



De Angeli Prodotti developed a tailor made solution using an innovative $\varnothing 49\text{mm}$ High

Temperature All Aluminium Alloy Conductor.

The solution combines the simplicity and reliability of a standard design with the high performance of AT2 special aluminium alloy, giving a conductor with a similar diameter (important for the *corona*) higher mechanical strength (+5%), lower weight (-2%), lower electrical resistance (-22%) and allowing an ampacity increase up to 2700 A (+52%) in Winter condition and 2440 A (+72%) in Summer condition.

Furthermore the conductor thanks to its very low electrical resistance enables **more than 26% line losses reduction**.

The conductor properties have been widely tested (tensile strength, stress-strain, thermal resistance, creep, fatigue and self-damping) with excellent results and a final on field installation test proved the feasibility and the ease of use. Thanks to the positive result the installation has been approved and the line will be renewed with the new conductor during 2014 and 2015, in partnership with the installer company RODA spa.



Figure 1. Picture of real Ice loading condition on TERN A 400kV La Spezia-Vignole overhead line

CONCLUSIONS

The conductor $\varnothing 49\text{mm}$ AAAC AT2 developed by De Angeli Prodotti successfully replaced the Hollow type ACSR on 400kV single bundle electrical 400kV line giving an ampacity increase of more than 50%. This helped to solve the problem of congestion of the Italian power grid.