Designing a new Inline Insulated Piercing Trough Connector for conductor cross-sections 1.5 to 25 mm2.

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ABSTRACT

Regarding to practical and safety requirements Enexis experienced a lack of availability of the correct/needed through connectors on the world market. Because manufacturers didn't self-start new developments after several requests of Enexis, Enexis came up with the idea of tendering in a "Design Contest" for an Insulated Piercing Connector to give manufacturers in the world market of connectors this development push.

This paper covers the reasons for, the process during, and the results of this design-contest-tender that was mainly carried out for and by mechanics of Enexis, in collaboration with Asset Management, Innovation and Purchasing.

KEYWORDS

Low voltage, Accessories, Insulated Piercing Connector, Working under live conditions, Safety regulations, European tendering regulations, Design contest, Product development, Collaboration, Procurement.

INTRODUCTION

Enexis is one of the three largest Distribution System Operators in the Netherlands, having a LV-network of about 90.000 km cable length. Working under conditions where low voltage cables are de-energized at installation of trough- and branch joints nowadays in some occasions is less tolerated by customers than in the previous era. Working under live conditions is only tolerated by the safety regulator as long as strict safety requirements are met. Regarding to these requirements, Enexis experienced a lack with respect to the availability of the right insulation piercing connectors for conductor cross-sections 1.5mm^2 to 25 mm^2.

Currently available insulated piercing connectors e.g. require an overlap of the conductors for installation which, according to Enexis' mechanics, is unsuitable at e.g. the reconnection of disconnected defaulters. According to mechanics of Enexis, due to the large conductor range, also a lot of the currently available insulation piercing connectors have too large dimensions compared to the conductor they are installed upon.

Fig. 1: Connector with and without a necessary overlap of conductors.

Because manufacturers didn't self-start new developments after several requests of Enexis, Enexis came up with the idea of tendering in a "Design Contest" for an Insulated Piercing Connector to give manufacturers in the world market of connectors this development push. This method of tendering within the European tendering regulations was not applied before for product development within the energy sector. However in construction it is well known for tendering architecture and buildings. After subscribing and presenting a concept-design, three manufacturers were given the opportunity to develop a connector within the tender. In the end the best manufacturer won a contract for supply of the winning connectors to Enexis. The runners up, having a finished product, received a contribution towards the development costs.

COLLABORATION AS THE BASIS

Those who think it is enough to just develop a high-quality connector based on connector standards and cable types, is forgetting gaining acceptance of the product from the mechanics. For this reason Enexis' mechanics participated in the tender at the specification phase, the design and prototype phase and in the phase of judging the final connectors. Their direct contact with the Enexis Asset Management, Innovation and Purchasing departments and with Designers and Product managers of the participating manufacturers lead to mutual comprehension and optimization of the designs.

On the other hand Enexis recognized that there are significant risks for manufacturers in the development of specialized network products. So though the intellectual property rights of the design contest and all its contents vested in Enexis, the intellectual property rights of the final designs/connectors fully stay with the tenderers. Neither Enexis nor the tenderer is restricted, now or in the future, by any Intellectual Property rights regarding the final connectors. This means e.g. that the tenderer is allowed to sell the final connector as well to other customers in the same market and/or other markets.

SPECIFICATION PHASE

Cable and conductor types

At the specification phase Asset Management and the mechanics first inventoried together which cable types and conductor types are in use, leading to the requirement that the desired connector should be suitable for 0.6/1kV mass impregnated paper, PVC and XLPE insulation. For conductor cross-sections 1.5 to 10 mm^2 it was concluded that only solid copper conductors are in