



3-layer polypropylene pipeline coatings and field joints

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Pipeline coatings are critical to the long term performance of a pipeline and have evolved over the years to match construction and operating conditions. As the 'easy to get' oil and gas becomes depleted, the operators look further afield for major finds. These energy fields have therefore become more remote and the reservoirs are often much deeper. This means that the conditions to construct a pipeline are more challenging than before and the oil or gas is flowing at much higher temperatures and pressures.

To meet the demands of these conditions, the engineering behind pipelines has become more sophisticated, higher strength steels are being used and higher performance pipeline coatings are required. One of these coatings includes 3-layer polypropylene (3LPP), which consists of a fusion bonded epoxy (FBE) primer, a polypropylene adhesive and a polypropylene top coat. The coating type is similar to 3-layer polyethylene except that polypropylene is more temperature resistant than high density polyethylene, which becomes a major factor on pipelines operating at temperatures greater than 80°C. These types of pipelines may be typical of flow or gathering lines in an oilfield where the resource is drawn from deep reservoirs and flows at very high temperatures (100°C-140°C).

Another reason for specifying polypropylene is its superior hardness and abrasion resistance. This can be important for use in remote oilfields, where pipe handling will traverse rocky terrain,

for directional drilling applications or for offshore pipelines where a damage-free coating will save time and money during pipeline construction.

The available options for field joint systems compatible with 3LPP and economical to install had been limited in the past. This became a factor in whether or not a specifier would choose the coating type. Over the past five years, however, several field-friendly systems have been developed, but how does a specifier choose which one to use?

As a basic design principle, it is preferable to have a field joint that closely mirrors the mainline coating and provides an equal level of specified performance. However, field joints have different requirements than mainline coatings. One of the requirements of a mainline coating is to withstand the rigours of transportation to the right-of-way or lay barge, whereas the field joint is applied just before the pipeline is laid. Conversely, the field joint is applied under variable field conditions, whereas a mainline coating is applied in the controlled conditions of a manufacturing plant. Therefore, product selection becomes a function of economics, the true pipeline in-service operating conditions and the challenges of field application.

Canusa-CPS has been a pioneer in the development of cross-linked polyethylene heat-shrinkable field joint systems and was able to develop a heat-shrinkable sleeve based on polypropylene rather than the traditional polyethylene. To that end,

Canusa's GTS-PP polypropylene heat-shrinkable sleeve has quickly become an industry standard for use on 3LPP coated pipelines and for onshore and offshore applications.

As a case history, Canusa recently completed the In Amenas pipeline in Algeria.

The qualification and installation steps for Canusa's GTS-PP product used on the In Amenas project included the following steps, some of which were done in parallel:

- salt contamination test;
- surface preparation by abrasive blasting;
- surface profile measurement;
- surface cleanliness check;
- positional markings for heat-shrinkable sleeve;
- mixing of liquid epoxy primer;
- initial joint pre-heat (prior to epoxy application);
- liquid epoxy primer application;
- wet film thickness measurement;
- pre-heat to force cure epoxy;
- sleeve positioning and heat shield placement;
- sleeve installation and recovery with propane torches;
- inspection;
- adhesion tests after cooling.

Key elements in the successful completion of a field joint coating project include:

Product selection Consult with the field joint coating manufacturer or a consultant who is knowledgeable about available grades of products on the market.

Product pre-qualification Once specified, the manufacturer of the field joint products should pre-qualify the products and provide third party test reports that the product will meet its stated performance level.

Contractor qualification and training Ensure that the contractor is fully trained in the installation of the product. Credible manufacturers will have the resources to send field service people to a job site to train the crew and qualify the equipment to be used.

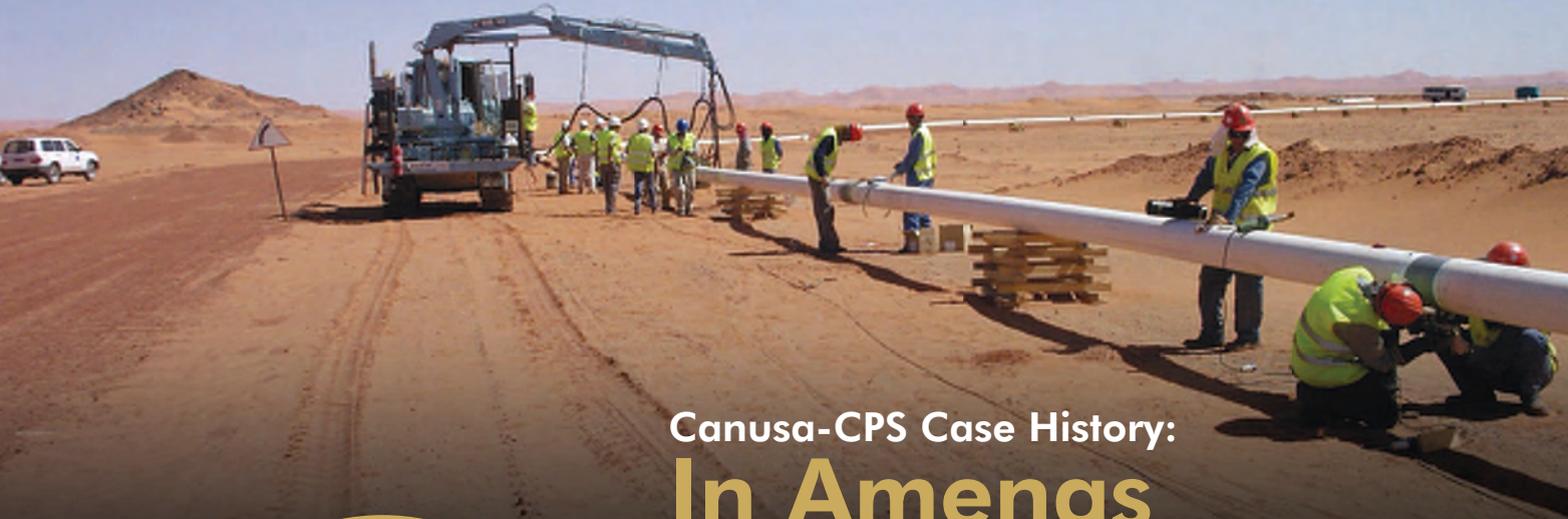
Ongoing inspection Confirmation that the proper level of surface preparation is being done plus a simple field adhesion test will tell if the product has been installed properly.

As with any field-installed construction product, field-joint protection systems are reliant on proper selection and installation quality to attain optimum performance. For heat-shrinkable sleeves, ensure that a proven system is specified, manufacturer installation recommendations are followed and ongoing inspection is done to ensure quality of installation. ●



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Canusa-CPS Case History: In Amenas



Project Success Story

Located in the southeastern part of Algeria, the pipeline constructed as part of the In Amenas oilfield development used a polypropylene anti-corrosion coating due to a very high operating temperature. After extensive project qualification trials, Canusa-CPS' GTS-PP polypropylene sleeve was selected as the optimal polypropylene coating for the field joints on the project. GTS-PP was chosen for its excellent performance as a high temperature polypropylene corrosion coating, as well as its simple installation, when compared to other polypropylene field joint coating systems.

Uniqueness

With its polypropylene materials, the patented GTS-PP system offers excellent high temperature corrosion and mechanical protection, meeting the highest industry standards for high temperature polypropylene coatings. GTS-PP is applied at lower temperatures and requires less complex equipment and specialised labour than other systems that provide comparable polypropylene protection, increasing productivity and lowering project costs. The product is also shipped pre-cut to site, reducing handling, positioning and installation time, making it ideal for installation in challenging field conditions.

Hurdles to Secure the Project

The design engineers for the In Amenas project had very strict requirements for the 3LPP field joint coating to be used on the project. Extensive qualification trials were required for approval of the coating system to ensure equivalent performance to the factory applied 3LPP coating. To demonstrate compliance with these stringent requirements, Canusa-CPS mobilized its strong field service team and held qualification trials at its facility in the United Kingdom and at the project site in Algeria. After full qualification of the GTS-PP system, comprehensive operator training and project start-up assistance was provided by Canusa-CPS in Algeria to ensure a successful project execution.

Highlights

Project: In Amenas

Market: Oil & Gas

Country: Algeria

Product: GTS-PP

Length: 10,000 joints

Pipe Diameter: 10" – 24"

Pipe Coating: 3LPP

Year: 2006

Proven Performance • Global Experience



Canusa-CPS is registered to ISO 9001:2000.

For more information contact your local Canusa-CPS representative.

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