

CASE STUDY

PE100 BORSAFE™ HE3490-LS

LARGE DIAMETER DIFFUSERS FOR OUTFALL PIPELINE OF DAHEJ DESALINATION PLANT, GUJARAT, INDIA



BACKGROUND

Gujarat has a large coastline of 1,600km, and to meet the growing need for water resources, the state has increasingly adopted desalination technology in recent years, accounting for over 40% of the desalination plants in India.

Dahej desalination plant off the coast of Gujarat is dedicated to industrial purposes. It supplies water to the Dahej Petroleum, Chemicals and Petrochemical Investment Region (PCPIR), one of the fastest developing investment regions nationwide.

Built by Gujarat Industrial Development Corporation (GIDC), the Dahej plant will draw water from the Arabian Sea, desalinate and purify it to make it potable and suitable for industrial consumption.

With a capacity of 100 million litres per day, the plant aims to ease the strain on the current water supply coming from Narmada River and a canal. This will enable the PCPIR to be more self-sufficient in water consumption in the long term in order to develop sustainably.

CHALLENGES

Desalination processes produce large quantities of brine and chemicals as by-products, which need to be diluted before being discharged back into the sea, in order to limit environmental impact.

One such method is to mix it via a diffuser in a mixing zone at the end of an outfall pipeline. For example, once a pipeline containing the brine reaches the sea floor, it can split into many branches, each releasing brine gradually through duck-billed valves.

However, diffusers made of conventional materials such as steel are extremely costly, heavy and prone to corrosion, while other materials such as glass reinforced plastic (GRP) may pose issues to the integrity of the diffuser assembly.

Additionally, the outfall diffuser required for Dahej desalination plant was a massive size of 1,200mm in diameter and 44m in length, making it technically demanding to produce without sacrificing structural integrity and strength.

SOLUTION

Sangir Plastics Pvt Ltd, which was selected to produce the diffuser for the outfall pipeline for Dahej desalination plant, chose BorSafe™ HE3490-LS PE100 material from Borouge to accomplish the rigorous task.

To meet the challenges of operating in aquatic environments, HDPE is an environmentally sustainable and cost-effective choice because of its many advantages:

- Lightweight and flexible for ease of installation
- High resistance to corrosion and abrasion for long-term protection of environments
- Leak-proof welded joints that withstand ground movements and rough terrains
- Versatility in design, e.g. pressure rating of up to 16 bars and pipe diameter of up to 2,500mm

Additionally, BorSafe™ HE3490-LS pre-compounded PE100 material has excellent carbon black dispersion and better mechanical properties compared to natural resins and masterbatch, enabling pipes to have better quality consistency.

In traditionally fabricated HDPE diffusers, reducer tees are used and there is extensive welding required. For this project, the use of electro-fusion saddles to install the 10 sections of 630mm diameter branches for duck-billed valves ensured that there was no pressure de-rating of the 1,200mm diameter pipe nor compromise of its structural integrity.

Sangir Plastics' excellent workmanship, together with the innovative fabrication techniques using PE pipes and fittings, delivered a brine discharge diffuser that sets a nationwide record of being the largest in its class, with its impressive size.

The superior product performance of BorSafe™ HE3490-LS as well as the expertise and quality assurance offered by Borouge are the reasons Sangir Plastics Pvt Ltd counts on Borouge as a trusted partner to succeed in such demanding projects.

SUMMARY

Project name	Dahej desalination plant by Gujarat Industrial Development Corporation
Project location	Dahej, off the coast of Gujarat, India
Project completion date	2021
Producer	Sangir Plastics Pvt Ltd
Application	Large diameter diffusers for a desalination outfall pipeline
Project requirements	HDPE diffuser of diameter 1,200mm and length 44m (when fully assembled)
Solution	PE100 BorSafe™ HE3490-LS
Solution benefits	Overall strengthened integrity and service life of diffuser assembly <ul style="list-style-type: none"> ▪ Excellent resistance to corrosion and abrasion ▪ Lightweight and flexible for ease of installation ▪ Uniform pipe wall thickness due to good low sagging performance ▪ Strong slow crack growth resistance ▪ High quality control and excellent pipe quality consistency ▪ High extrusion output

About Borouge A joint venture between ADNOC and Borealis. Borouge is a leading petrochemicals company that provides innovative plastics solutions for the energy, infrastructure, mobility, packaging, healthcare and agriculture industries. With 4.5 million tonnes of annual capacity, Borouge has the world's largest integrated polyolefin complex, with the ambition to double its current capacity by 2030.

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