

Value engineering through stainless steel pipework

How does a modern stainless steel pipework system when installed and commissioned compare on price against more traditional BS1387 carbon-steel pipework?

The pressures to come up with cost savings through value engineering on pipework and projects in general have never been higher. The need to innovate has meant that contractors are constantly looking at alternatives to traditional BS 1387 standard-wall carbon-steel pipework systems. One perhaps surprising option in building services for sizes above 5 cm for general water services, heating, plant rooms and risers is stainless-steel Metric Tru-Bore pipework.

This system is widely used in process industries worldwide where a product or media is moved from one place to another under relatively low pressures. It was initially designed for the pulp and paper industry in Scandinavia when they realised traditional products contained far more metal than their processes required. It is now the leading system in many other processes and sectors and the default choice within the water and water-treatment industry.

Metric Tru-Bore is based on a smooth-bore thin-wall stainless-steel welded pipework concept. As a corrosion-free pipework material, it is designed to utilise the inherent property advantages of stainless steel. It therefore does not require any additional coatings nor to be produced in heavy wall thicknesses, but it is thick enough to resist distortion and impact damage.

At first glance when looking at the product as an option the positives are obvious. This stainless-steel pipework is up to 70% lighter than carbon steel, leading to significantly quicker installation. Further, as the thicknesses are more tailored to requirements, fabrication times are often 40% of carbon steel. The smooth surface of stainless steel dramatically improves cleaning and commissioning times, the life cycle of the pipework is longer and virtually maintenance free.

How does stainless steel stand up when compared more thoroughly on the upfront input price of the base materials? As

there is so much less material involved with the stainless-steel system, Metric Tru-Bore is competitive or cheaper than traditional carbon steel even on a purely direct material comparison.

Now that stainless-steel Metric Tru-Bore can be proven to be a competitive material even when compared to carbon steel, what other value added savings can be achieved in fabrications, installation and commissioning?

Initially the weight factor. Traditional carbon-steel pipe with a nominal bore of 8 in has a wall thickness of 8.18mm and weighs 43 kg/m.

A comparable Metric Tru-Bore stainless-steel pipe weighs 10 kg/m. The thinner wall of stainless steel in both pipe and fittings leads to significantly quicker TIG welding times — up to three times quicker than MIG welding of carbon steel, which requires three weld passes compared to one for stainless steel.

Also stainless steel can have complex headers with multi-sized and angled branches extruded from a single length of pipe.

The combination of the savings

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for welding and fittings can be a significant part of the cost of the pipework. The thinner wall also reduces consumable usage.

Once on site, it is generally acknowledged that installation times will seriously reduced by up to three times. The lighter nature of Metric Tru-Bore means that it is less likely to need heavy lifting equipment on site. It is easier to manoeuvre in situ and often can be carried or manhandled in to position.

The lighter weight also leads to further cost savings in reduced pipe support structure and fixings.

Almost any connection for

carbon steel can be used to connect the pipes. In general Metric Tru-Bore it is connected by stainless-steel collars which are welded to the end of the pipe spools and fitted in combination with a mild-steel composite-coated loose backing flange. This makes it easier to connect on site than with fixed flanges. The flanges can be coated in a variety of ways to suit each industry requirement (e.g. 3M Scotchkote or zinc plated) to suit the environment and operating conditions. The actual thickness of the backing flange can be varied also to save money according to the pressure requirement.

Roll-type groove connection couplings can also be used if stipulated by the client. In all connections no site hot works are necessary as the system is generally pre fabricated off site.

Cleaning and commissioning are also much quicker. The smooth and hygienic surfaces and welds require minimal flushing, unlike the extended flushing regime for carbon-steel piping. There are no residual coating materials, excess welding slag or carbon steel after product and dirt.

Stainless steel has a cleaned pickled surface and can be flushed significantly more quickly and to a higher consistent standard. There is also no surface breakdown or disintegration of the stainless steel over its working life.

All the competitive benchmarking and other savings in fabrication, installation and commission have led to Metric Tru-Bore being the quickest-growing product in the piping and building-services industry. The recycled content of stainless steel is about 80%, and it can be recycled again at the end of the project. The general carbon footprint of stainless steel, with less consumables, less energy during welding, lighter support structure and lifting equipment very well fits the needs of modern building services and their customer desires.

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The practised eye will appreciate how the light weight of stainless-steel pipework in this chilled-water rooftop plant room can reduce installation time compared with carbon steel — perhaps making it three times quicker — by virtue of features such as it being much lighter in weight and quicker to weld.