

Think thin

Hyper-duplex Sandvik SAF 3207 HD®.
An extreme material for extreme umbilicals.



From super strength to hyper strength

When Sandvik created the first super-duplex stainless steel, Sandvik SAF 2507®, it also created the steel tube for deep-water umbilicals.

Since then, 60 million meters (or 200 million feet) of super-duplex control lines, chemical injection lines and umbilical center tubes have been delivered by Sandvik. That's more than 80 percent of steel umbilical tubing produced worldwide.

But today, as umbilicals need to reach deeper and further, not even super strength is strong enough. So, after years of development and testing, Sandvik presents the solution:

The Sandvik SAF 3207 HD®. A hyper-duplex stainless steel designed to cope with the most adverse conditions that any umbilical is likely to confront.

Hyper strength means greater yield strength, greater corrosion resistance and superior fatigue properties – compared to super-duplex.

What this means for your umbilical is thinner tube walls and lower weight. At those nearly infinite depths, where heat, pressure and corrosion are brutal, that's exactly what you need.

| Grade | UNS | Cr | Ni | Mo | N |
|---------------------|------------|-----------|-----------|-----------|----------|
| Sandvik SAF 2507 | S32750 | 25 | 7 | 4 | 0.3 |
| Sandvik SAF 3207 HD | S33207 | 32 | 7 | 3.5 | 0.5 |

The increased Cr and N content in Sandvik SAF 3207 HD contributes to its superior strength and corrosion resistance in seawater.

The hyper-duplex umbilical

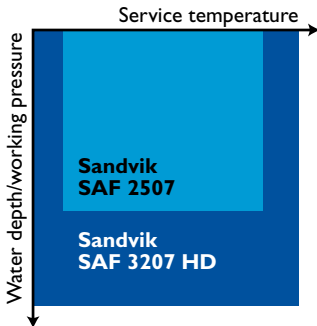
Sandvik SAF 3207 HD is a major technological leap. It's a special-purpose material developed for the most extreme conditions in terms of depth, temperature and pressure.

Its yield strength is 20 percent greater than that of Sandvik SAF 2507 – reaching a minimum of 700-770 MPa (100-110 ksi). With a minimum PRE value of 50, the crevice corrosion resistance is significantly improved – even at service temperatures of up to 90°C (194°F).

The benefits when it comes to building umbilicals are considerable.

Thinner walls and lighter installations make it possible to reach and operate ultra-deep wells that were previously too costly or too complex to exploit. At the same time, the temperature and pressure window widens – with the benefits of thinner walls.

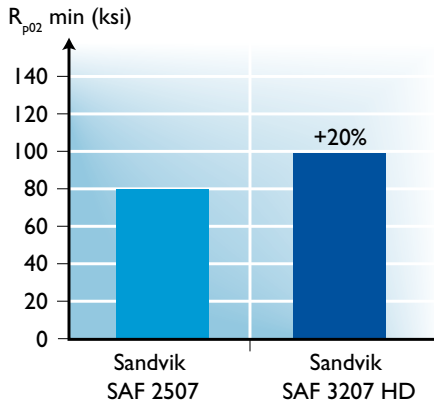
Simply put, umbilicals made with the new hyper-duplex Sandvik SAF 3207 HD can operate in environments where other metals can't survive.



This graph shows that Sandvik SAF 3207 HD can be used at a higher temperature range than Sandvik SAF 2507. Its increased strength also makes it possible to work at greater depths and higher pressures.

The facts speak loud and clear

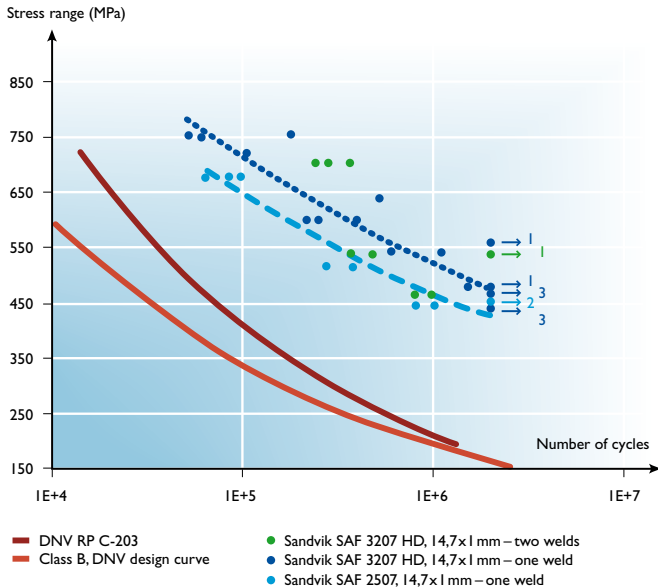
No matter how you compare the performance of Sandvik SAF 2507 and Sandvik SAF 3207 HD – yield strength, weight, corrosion resistance or fatigue properties – the hyper-duplex comes out on top.



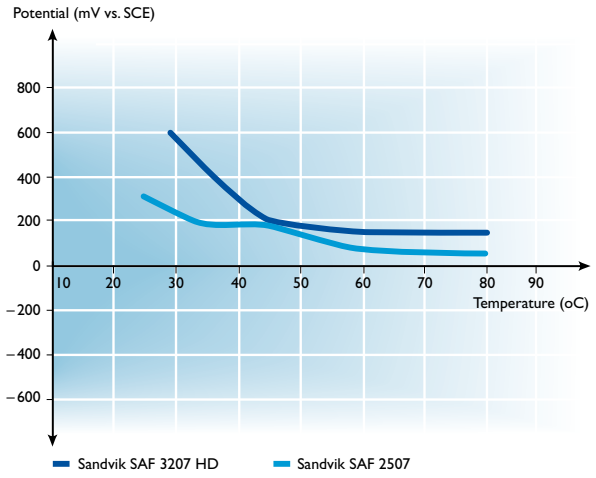
The higher yield strength and thinner walls make it possible to coil the tubes onto smaller reels holding longer umbilical lengths. This means more efficient use of the installation vessel and fewer terminations for long tiebacks.

| Grade | ID mm | Nominal wall thickness mm | Wall thickness reduction % | Weight saving % |
|---------------------|----------|---------------------------------|----------------------------------|-----------------------|
| Sandvik SAF 2507 | 12.70 | 2.50 | - | - |
| Sandvik SAF 3207 HD | 12.70 | 1.66 | 21 | 22 |

An example of the wall thickness reduction and corresponding weight savings enabled by the greater strength of Sandvik SAF 3207 HD. Calculations are based on BS8010 and a 15 ksi system.



S-N curves for Sandvik SAF 3207 HD, Sandvik SAF 2507 and DNV design curves.



Design curve for butt-welded Sandvik SAF 3207 HD and Sandvik SAF 2507 showing initiation of crevice corrosion versus potential and temperature.

Your hyper-duplex expert team

When you choose Sandvik SAF 3207 HD, you're not only getting a material with the best yield strength, corrosion, temperature and fatigue properties available. You also get access to your own team of hyper-duplex specialists.

Sandvik's sales engineers – assisted by metallurgists and researchers from our R&D center – are always on call to advise and support you in materials-related matters. With the advent of a new exciting material like Sandvik SAF 3207 HD, their know-how is naturally upgraded accordingly.

Our fully integrated production facilities ensure the highest consistency and quality of every material we make – Sandvik SAF 3207 HD being no exception.

And Sandvik's world-class R&D program – in which Sandvik SAF 3207 HD was born – is committed to developing new products in response to customer needs and in close cooperation with the customer's own specialists.





Sandvik Materials Technology
SE-811 81 Sandviken, Sweden, Phone +46 26-26 30 00, Fax +46 26-26 02 20
www.smt.sandvik.com/oilgas