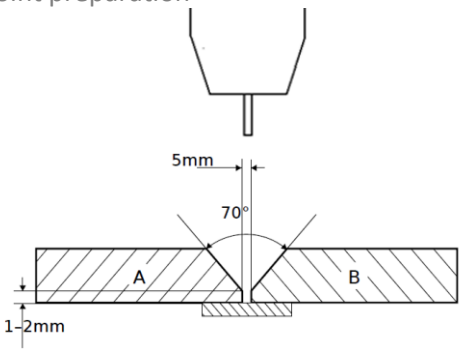
# The test weld, that is closest to the selected simulation, is this *multi pass weld in a V joint in 12 mm plate thickness*

| Base material | Thickness mm | Joint | Joint preparation | Welding process | Filler metal | Shielding gas | Backing gas |
|---|---|---|---|---|---|---|---|
| SDX 2507 EN 1.4410 | 12 | V | Joint angle 70° Face 1-2 mm Gap 5 mm | GMAW (MAG) | 25 9 4 NL Ø1.2 mm Flux cored wire | MISON 18* | Ceramic |

*MISON 18 (Ar+18%$CO_2$+0.03%NO)

Joint preparation

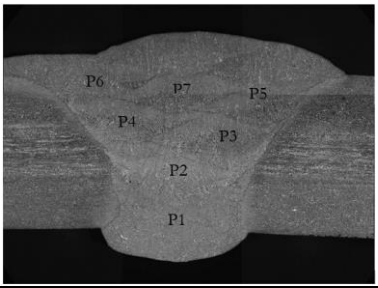



The joint angle was 70° (bevel angles 35°), the root face was 1-2 mm and the root gap 5 mm. Ceramic backing was used. The electrode stick-out 18-22 mm

The test weld was a complete multi pass weld (7 passes). All passes were welded with GMAW (MAG) with Flux Cored Wire. Welding position PA.

| | Welding current A | Voltage V | Heat input kJ/mm | Wire feed speed m/min | Welding speed cm/min | Number of passes |
|---|---|---|---|---|---|---|
| Root | 160 | 27.2 | 1.1 | 10-11 | 19.5 | 1 |
| Fill | 200 | 27.8 | 0.7 | 10-11 | 36 | 2 |
| Fill and cap | 210 | 27.3 | 0.8 | 10-11 | 36 | 4 |

Cross section of the weld



## Measured ferrite fraction in the weld (the rest is assumed to be austenite), and the ferrite fraction more in detail in different regions of the weld, are shown in the table below. The fraction is measured using image analysis.

Ferrite measurements are made in the final weld. All passes but the last cap-pass are reheated by following weld passes. The ferrite fraction is an average value based on several measurements using image analysis in each location and the standard deviation in average values were around 2-6%.

| Pass | Heat input kJ/mm | Average of the pass | Top of the pass | Middle of the pass | Bottom of the pass |
|---|---|---|---|---|---|
| Root before reheated | 1.1 | 51±4% | 52±4% | 48% | 52% |
| Root Reheated | 1.1 | 34±4% | 33±1% | 40% | 29% |
| Fill Reheated | 0.7 | 28±2% | 28±3% | 26% | 28% |
| Fill Reheated | 0.7 | 31±5% | 31±7% | 29% | 34% |
| Fill Reheated | 0.8 | 36±5% | 37±5% | 38% | 31% |
| Fill Reheated | 0.8 | 47±6% | 51±3% | 43% | 38% |
| Cap/Fill Reheated | 0.8 | 42±5% | 41±6% | 43% | 45% |
| Cap As-welded | 0.8 | 44±5% | 42±5% | 43% | 51% |

Nitrides were found mostly in the HAZ and in smaller quantity almost all around in the weld. A nitride free zone was observed on the toe of each pass in the weld extending a little into the HAZ. There are possibly some traces of intermetallic phase in the low temperature HAZ (about 1.5 mm from the fusion line).