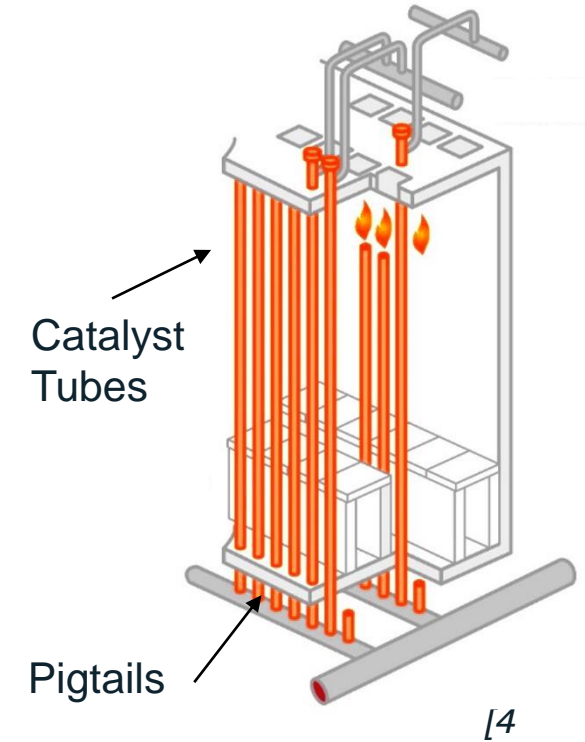
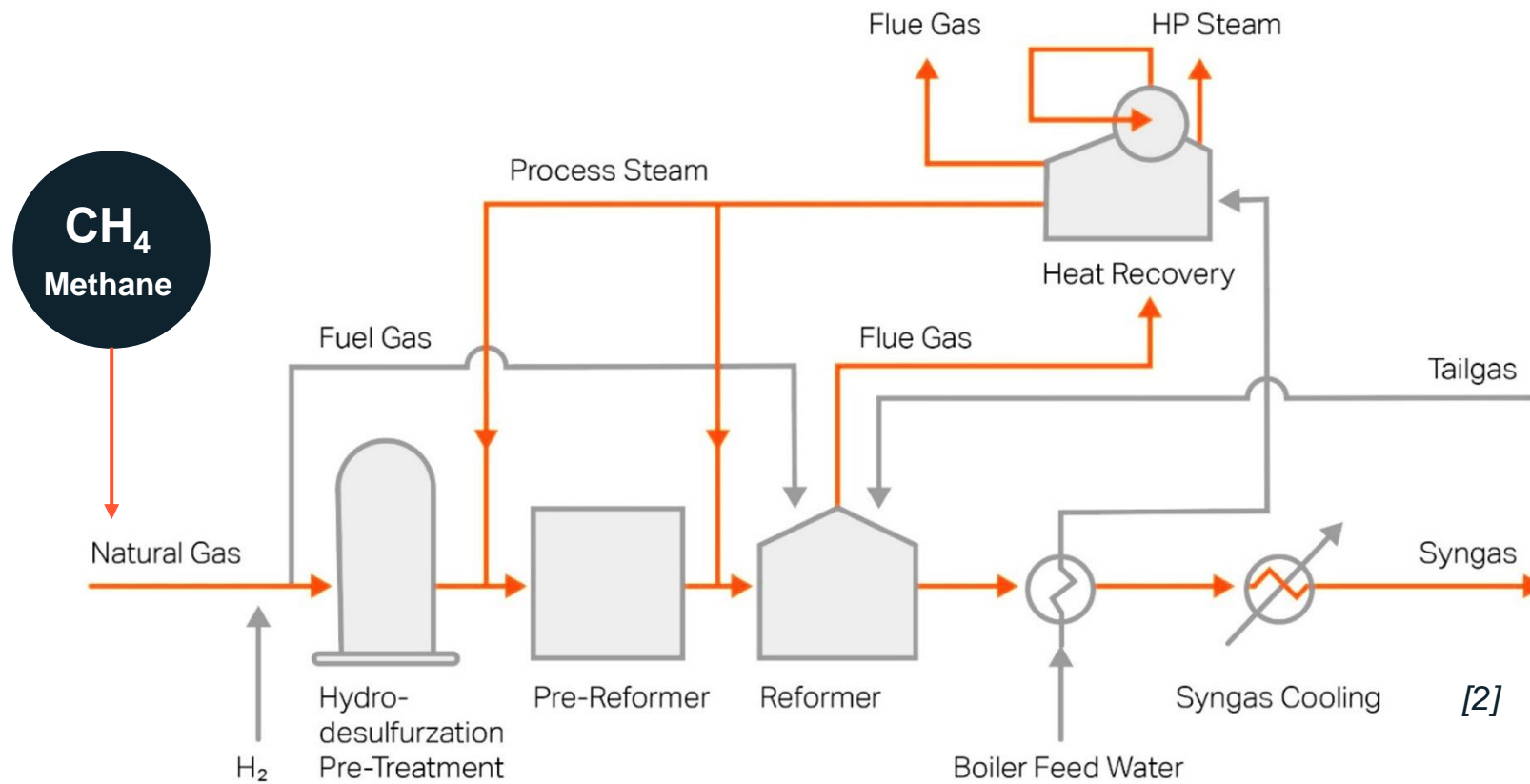




Steam methane reformers



[4]

1. Reforming Reaction

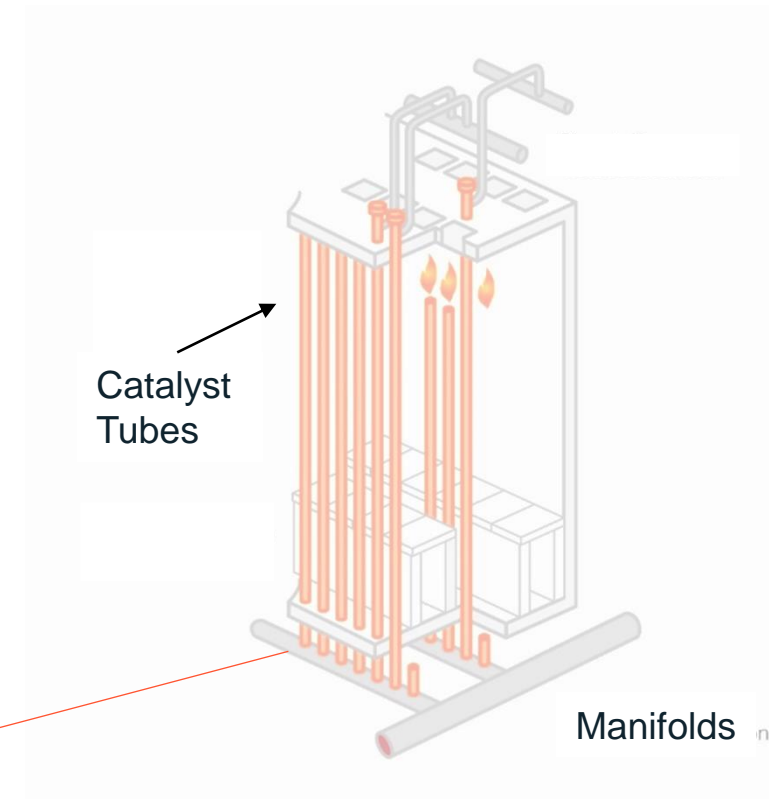
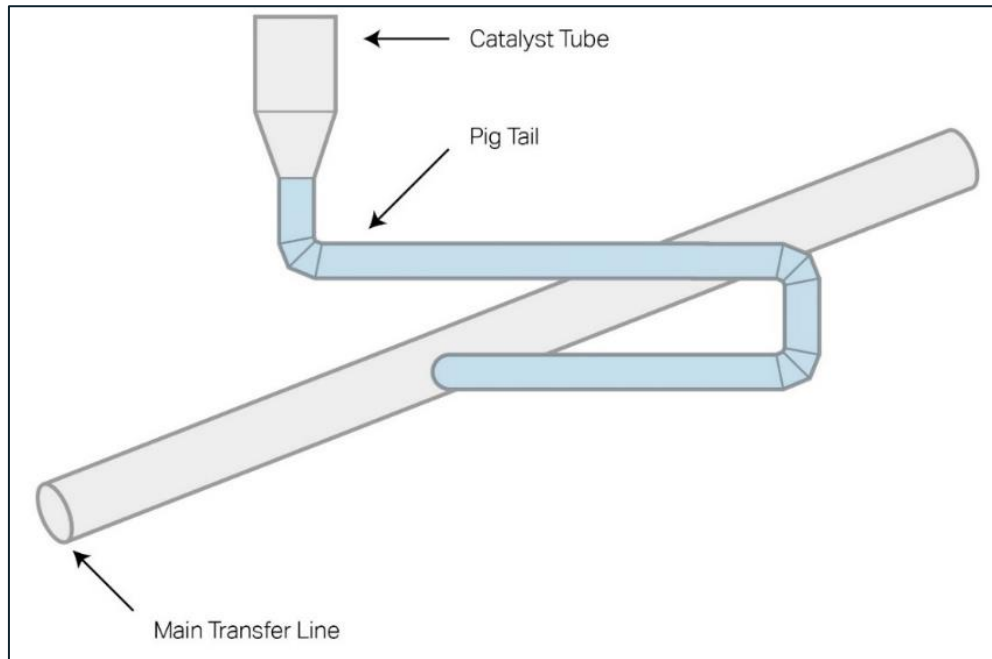


2. Water gas shift reaction





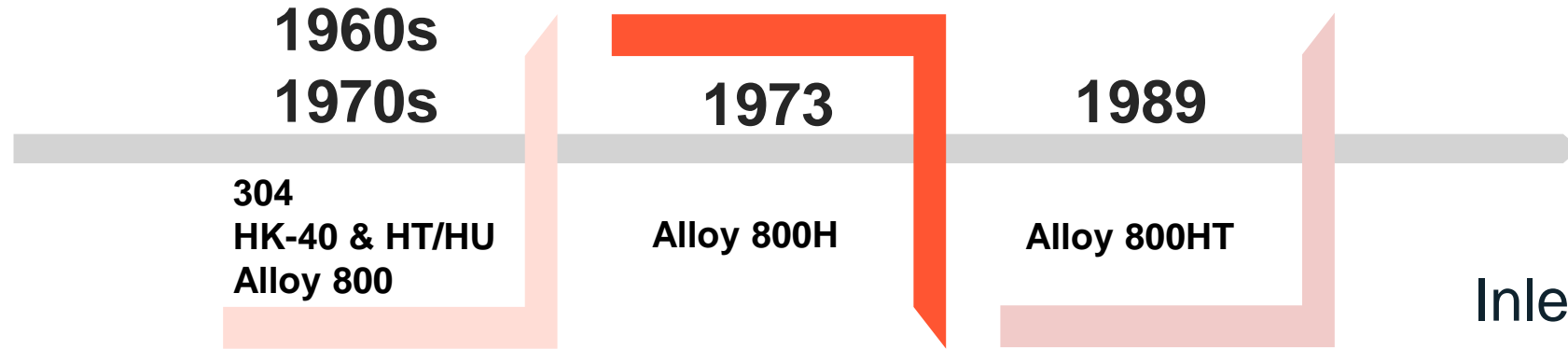
Pigtails overview



- Conduct outlet gas to the collecting system
- Accommodate thermal expansion
- 1.25 and 1.5 inch (31.75 and 38.1 mm)
- Creep rupture



Material selection, outlet pigtails Sanicro 31HT (N08810/N08811)



Inlet pigtails

Operating temperature: 550-600°C

5R10 (TP304H)

6R35 (TP321H)

6R44 (TP347H)

Common or Proprietary names	Alloy 800
UNS designation	N08800
Carbon, %	0.10 max.
Aluminium, %	0.15-0.6
Titanium, %	0.15-0.60
Al + Ti, %	0.30-1.20
ASTM Grain Size	Not specified

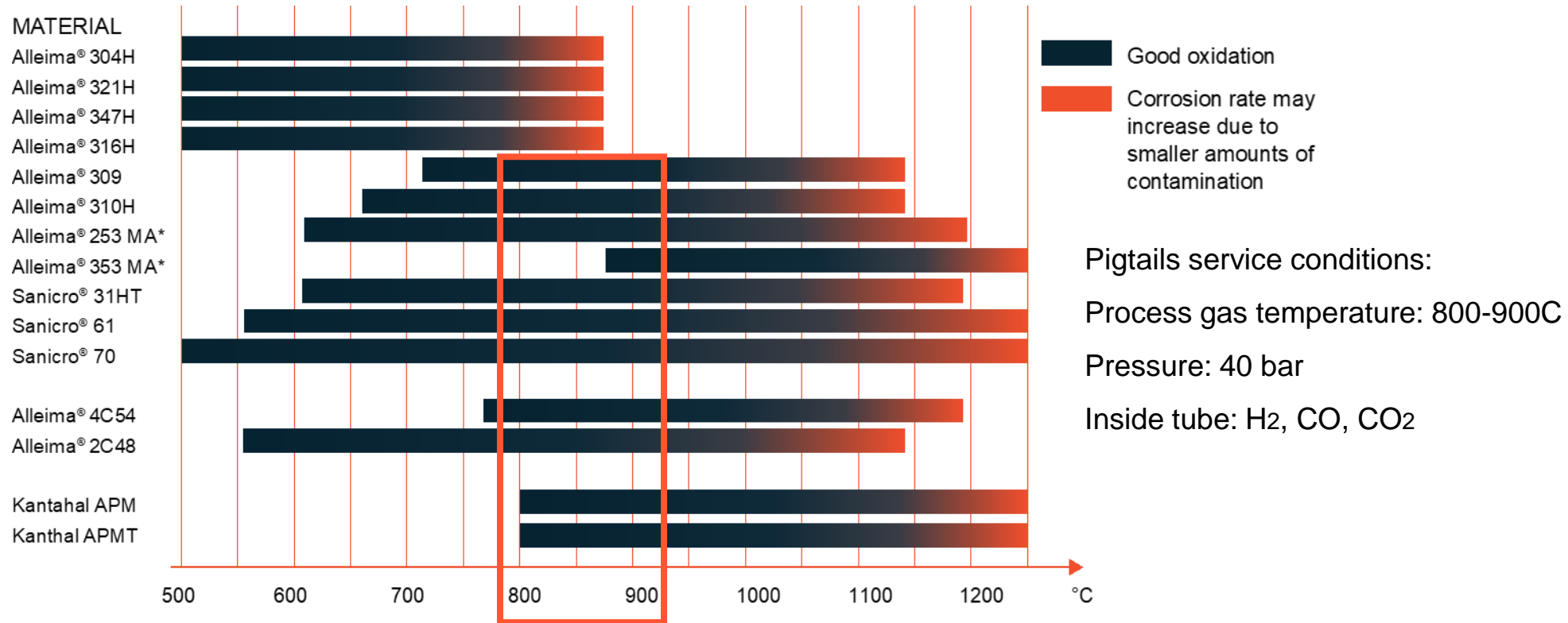
Alloy 800H
N08810
0.05-0.10
0.15-0.6
0.15-0.6
0.30-1.20
5 or coarser

Alloy 800HT	Sanicro 31HT
N08811	N08810/N08811
0.06-0.10	0.07
0.25-0.6	0.5
0.25-0.6	0.5
0.85-1.20 0.7 max.	0.85-1.20 (N08811)
5 or coarser	Customer Specified (2-4, 3-5)



Structural stability

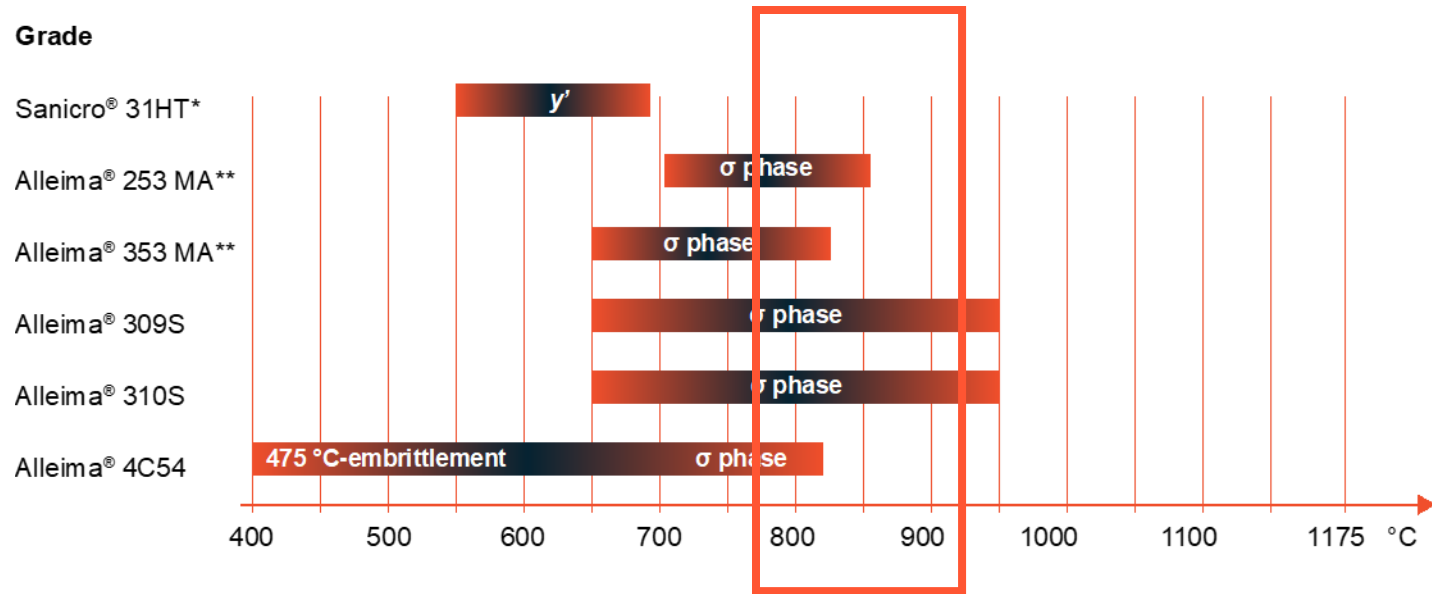
Recommended operating temperatures in air



* 253 MA, 353 MA are trademarks owned by Outokumpu.



Structural stability



Within the precipitation ranges for the different phases the dark blue colour indicates the highest degree of precipitation. 1% sigma phase is precipitated at 800°C for 353 MA after 7000h, for 253 MA after 2000h, and for 310 and 309 after <200h. 4C54 precipitates 1% sigma phase at 650°C after <200h.

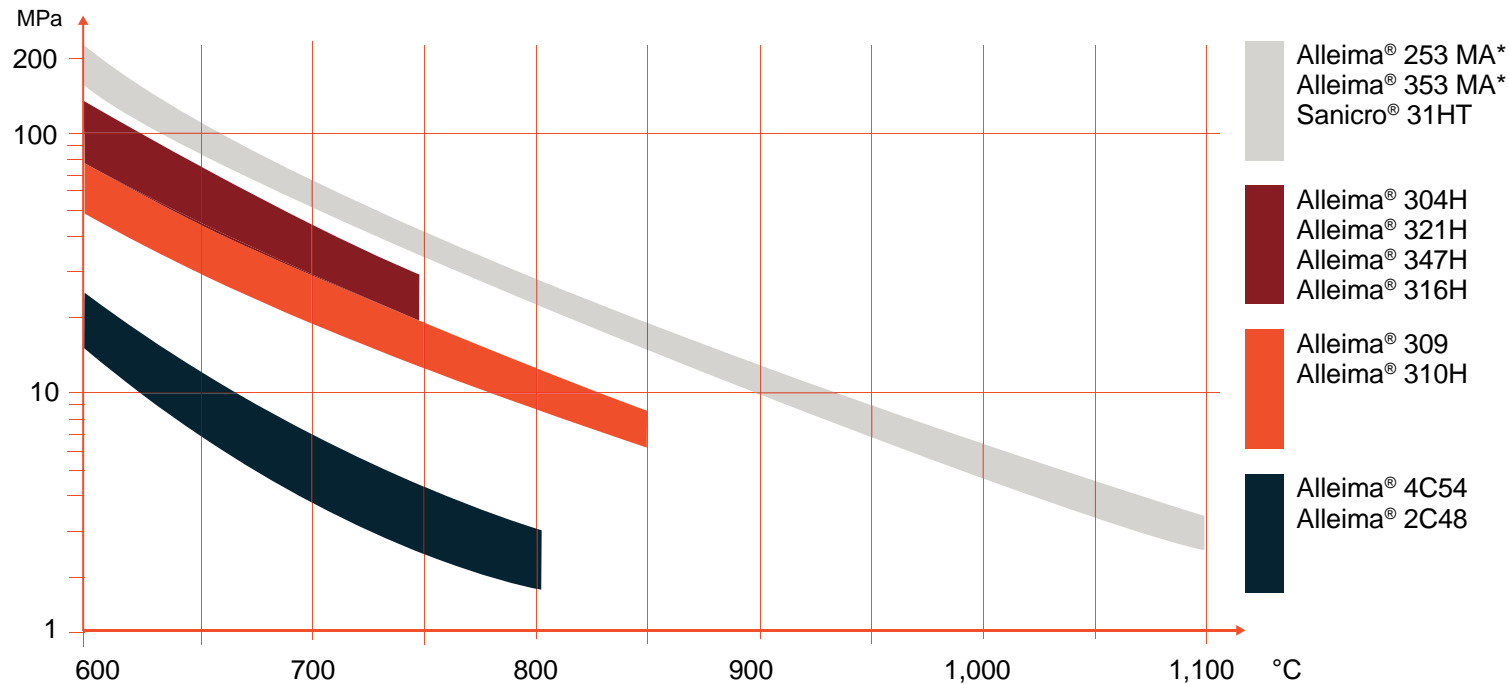
*A modified Sanicro® 31HT is used at 550-700°C to eliminate the risk of precipitating sigma-phase.

** 253 MA, 353 MA are trademarks owned by Outokumpo.



Creep rupture strength

$R_{KM}/100,000 H$, FOR SOME ALLEIMA STAINLESS STEELS AND HIGH NICKEL ALLOYS



- Time dependent strain
- Deformation or distortion of part under steady load
- Function of grain size

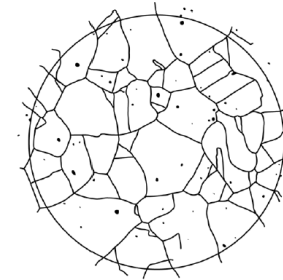


FIG. 2 Example of Twin Grains (Flat Etch) from Plate II, Grain Size No. 3 at 100X

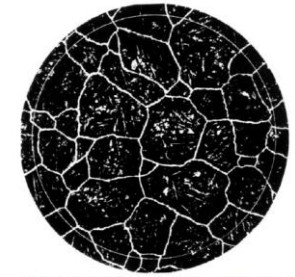


FIG. 4 Example of Austenite Grains in Steel from Plate IV, Grain Size No. 3 at 100X

Grain size range:

No. 00 - 14.0
 \varnothing 0.5080 mm - 0.0028 mm
 according to ASTM E112

* 253 MA, 353 MA are trademarks owned by Outokumpu.