

# GENERAL HEAT TREATMENT OF UDDEHOLM STEEL GRADES IN STANDARD CODES

EDITED ENGLISH VERSION NO. 24 - 2021.11.09

Codes → (only DK) ↓	Steel grades	1		2		3		4		5		Remarks
		Stress relieving	Austinit.-temp. / Holding time	Tempering 2x	Tempering 2x	Tempering 2x	tempering 3x					
		°C	°C / min.	°C / HRC*	°C / HRC*	°C / HRC*	°C / HRC*					
ARN	Arne	650	820	200 / 60							Solids >30 mm should be avoided	
BUR	Bure	650	1030 / 30							560 / 52		
CAL	Caldie	650	1030 / 30			540 / 60				540 / 60		
CAM	Calmax	650	960 / 30	250 / 57								
COR	Corrax	-	-	-		575 / 46					To be tempered 1 x 4 hours	
DIE	Dievar	650	1030 / 30			580 / 52				600 / 48		
ELM	Elmax	650	1080 / 30	250 / 58								
FOR	Formvar	650	1030 / 30			580 / 52				600 / 48		
IMP-G	Impax Sup.	550		Gas nitr. <sup>2)</sup>							<sup>2)</sup> 525°C - hardness 700 HV	
M2	M2	650	1180 / 15							560 / 64	To be tempered 3 x 1 hour	
MIR	Mirrax ESR	650	1030 / 30	250 / 50							Contact us by cross sections >100 mm	
NIM	Nimax	500		Plasma nitr. <sup>3)</sup>							<sup>3)</sup> 480°C – 10 h – hardness 950 HV	
ORS-A	Orvar Sup./2 M	650	1030 / 30			600 / 48	620 / 44			620 / 44		
ORS-B	Orvar Sup./2 M	650	1030 / 30			580 / 52				580 / 52		
ORS-C	Orvar Sup./2 M	650	1030 / 30			610 / 46				610 / 46		
ORS-D	Orvar Sup./2 M	650	1030 / 30							600 / 48		
Q9S	QRO 90 Sup.	650	1030 / 30			610 / 46				610 / 46		
RIG	Rigor	650	960 / 30	250 / 59								
SLE-A	Sleipner	650	1030 / 30			540 / 61				540 / 61		
SLE-B	Sleipner	650	1060 / 30							540 / 63		
STA	Stavax ESR	650	1030 / 30	250 / 52								
SV3	Sverker 3	650	960 / 30	250 / 62								
SV21-A	Sverker 21	650	1030 / 30	180 / 61								
SV21-B	Sverker 21	650	1060 / 30			525 / 60						
TYR-A	Tyrax ESR	650	1060 / 30	200 / 57							<sup>5)</sup>	
TYR-B	Tyrax ESR	650	1060 / 30	250 / 55							<sup>5)</sup> <sup>6)</sup>	
UNI	Unimax	650	1030 / 30			525 / 57				525 / 57		
VA4E-A	Vanadis 4 E	650	1030 / 30			525 / 61				525 / 61	Is replaced by VA4E-D	
VA4E-B	Vanadis 4 E	650	1100 / 30							540 / 63		
VA4E-C	Vanadis 4 E	650	1150 / 15							540 / 64		
VA4E-D	Vanadis 4 E	650	1060 / 30							540 / 62		
VA8-A	Vanadis 8	650	1060 / 30							540 / 61	To be tempered 3 x 1 hour	
VA8-B	Vanadis 8	650	1100 / 30							540 / 63	To be tempered 3 x 1 hour	
VA8-C	Vanadis 8	650	1180 / 15							540 / 64	To be tempered 3 x 1 hour	
VA10-A	Vanadis 10	650	1150 / 15							540 / 64		
VA23-A	Vanadis 23	650	1100 / 30							560 / 63	To be tempered 3 x 1 hour	
VA30-B	Vanadis 30	650	1100 / 30							560 / 65	To be tempered 3 x 1 hour	
VA60	Vanadis 60	650	1180 / 10							560 / 68	To be tempered 3 x 1 hour	
VANA	Vanax	650	1080 / 30	200 / 60							To be tempered 2 x 2 hours <sup>4)</sup> <sup>5)</sup>	
VANC	Vancron	650	1060 / 30							540 / 62	To be tempered 3 x 1 hour <sup>4)</sup>	

\*Hardness stated with a tolerance +/- 2 HRC

<sup>4)</sup> Margin for finishing to exact dimensions min. 0,3 mm

<sup>5)</sup> Sub-zero treatment -100°C

<sup>6)</sup> In connection with subsequent low temperature PVD-coating

## Guide:

Select the material and process in the matrix. Example: Sleipner is tempered 2 times at 540°C to 61 HRC. The code will end up as **SLE-A-3**.

## Remarks:

Where nothing else is mentioned, the process is done by vacuum heat treatment at 3-6 bar. Step quenching is used by big dimensions (thickness >80 mm) and by difficult geometries.

Tempering: Holding time when fully heated through, 2 hours, unless otherwise stated.

Stress relieving minimum 25°C below the last tempering temperature from the hardening process. Holding time when fully heated through, 2 hours.

Please contact voestalpine HPM Denmark A/S if there are questions regarding the above, or if the task requires a special heat treatment.