



# ASSAB 618 T

	 <small>a voestalpine company</small>	REFERENCE STANDARD		
		AISI	Wnr.	JIS
ASSAB DF-3	ARNE	O1	1.2510	SKS 3
ASSAB XW-10	RIGOR	A2	1.2363	SKD 12
ASSAB XW-42	SVERKER 21	D2	1.2379	(SKD 11)
CALMAX / CARMO	CALMAX / CARMO		1.2358	
VIKING	VIKING / CHIPPER		(1.2631)	
CALDIE	CALDIE			
ASSAB 88	SLEIPNER			
ASSAB PM 23 SUPERCLEAN	VANADIS 23 SUPERCLEAN	(M3:2)	1.3395	(SKH 53)
ASSAB PM 30 SUPERCLEAN	VANADIS 30 SUPERCLEAN	(M3:2 + Co)	1.3294	SKH 40
ASSAB PM 60 SUPERCLEAN	VANADIS 60 SUPERCLEAN		(1.3292)	
VANADIS 4 EXTRA SUPERCLEAN	VANADIS 4 EXTRA SUPERCLEAN			
VANADIS 8 SUPERCLEAN	VANADIS 8 SUPERCLEAN			
VANCRON SUPERCLEAN	VANCRON SUPERCLEAN			
ELMAX SUPERCLEAN	ELMAX SUPERCLEAN			
VANAX SUPERCLEAN	VANAX SUPERCLEAN			
ASSAB 518		P20	1.2311	
ASSAB 618 T		(P20)	(1.2738)	
ASSAB 618 / 618 HH		(P20)	1.2738	
ASSAB 718 SUPREME / 718 HH	IMPAX SUPREME / IMPAX HH	(P20)	1.2738	
NIMAX / NIMAX ESR	NIMAX / NIMAX ESR			
VIDAR 1 ESR	VIDAR 1 ESR	H11	1.2343	SKD 6
UNIMAX	UNIMAX			
CORRAX	CORRAX			
ASSAB 2083		420	1.2083	SUS 420J2
STAVAX ESR	STAVAX ESR	(420)	(1.2083)	(SUS 420J2)
MIRRAX ESR	MIRRAX ESR	(420)		
MIRRAX 40	MIRRAX 40	(420)		
TYRAX ESR	TYRAX ESR			
POLMAX	POLMAX	(420)	(1.2083)	(SUS 420J2)
ROYALLOY	ROYALLOY	(420 F)		
COOLMOULD	COOLMOULD			
ASSAB 2714			1.2714	SKT 4
ASSAB 2344		H13	1.2344	SKD 61
ASSAB 8407 2M	ORVAR 2M	H13	1.2344	SKD 61
ASSAB 8407 SUPREME	ORVAR SUPREME	H13 Premium	1.2344	SKD 61
DIEVAR	DIEVAR			
QRO 90 SUPREME	QRO 90 SUPREME			
FORMVAR	FORMVAR			

( ) - modified grade

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Edition 20210505

## GENERAL

ASSAB 618 T is a prehardened plastic mould steel for moulds and tools with very large dimensions and with strength requirements of up to 1200 MPa.

ASSAB 618 T is characterised by:

- High level of through-hardening
- Good machinability
- Good polishing and texturing properties
- Excellent nitriding characteristics
- Good weldability
- High impact toughness

Note: ASSAB 618 T is 100% ultrasonic tested

Typical analysis %	C 0.26	Mn 1.45	Cr 1.25	Ni 1.05	Mo 0.60	V 0.12	S 0.002
Standard specification	None (Patented)						
Delivery condition	Hardened and tempered to 310 - 355 HB						



A core for moulding of washing machine drum, made of ASSAB 618 T inserted with copper beryllium.

## APPLICATIONS

ASSAB 618 T is suitable for many different types of applications within the plastic processing industry. Its high level of through-hardening even for big dimensions over 1000 mm, coupled with high impact toughness, makes ASSAB 618 T suitable for large moulds, especially for the automotive industry.

### TYPICAL APPLICATION

Large compression and injection moulds:

- Car bumpers
- Dashboards
- Intake manifolds
- Car bonnets
- Large display panel casings (e.g., TV, computers)
- Home appliances and white goods
- Bottle crates
- Containers
- Chairs
- Dumpsters



Washing machine's plastic drum. The large and intricately-shaped plastic drum places great demands on the mould steel for high toughness and through hardening characteristics.

# PROPERTIES

## PHYSICAL DATA

Delivery condition

Temperature	20 °C	250 °C	500 °C
Density kg/m <sup>3</sup>	7 800	-	-
Modulus of elasticity N/mm <sup>2</sup>	204 000	188 000	160 000
Coefficient of thermal expansion /°C from 20°C	-	12.2 × 10 <sup>-6</sup>	13.9 × 10 <sup>-6</sup>
Thermal conductivity* W/m °C	37	41	40
Specific heat J/kg °C	470	-	-

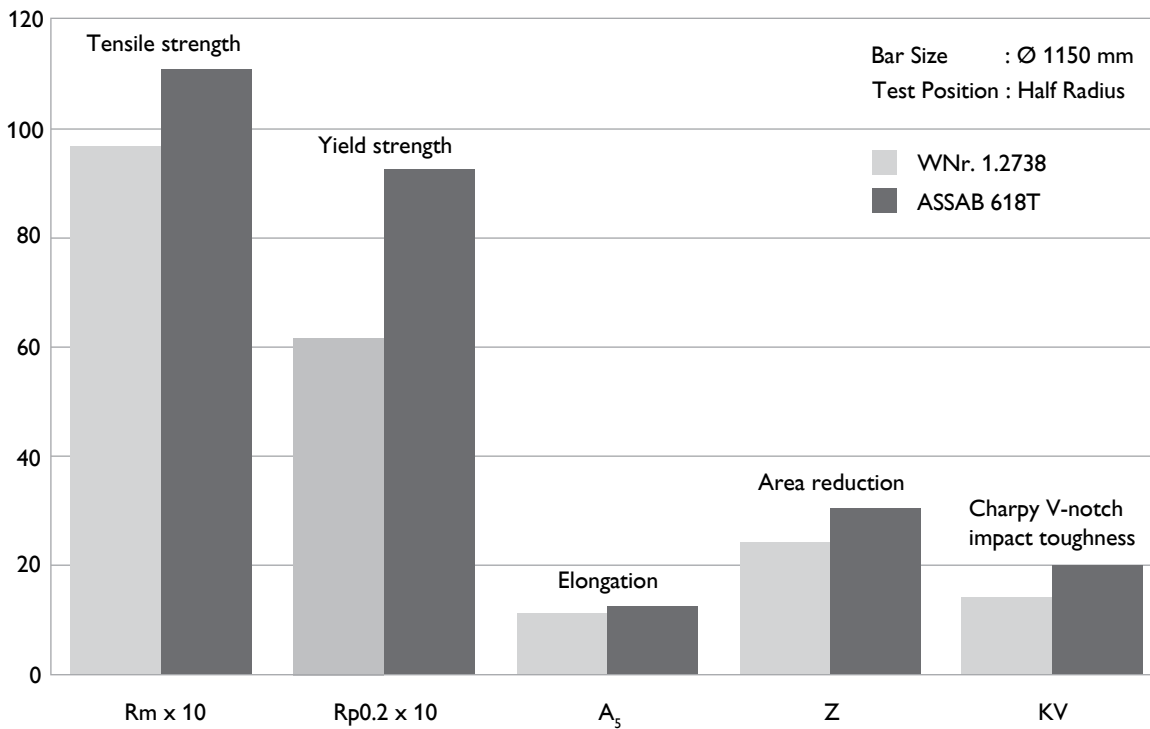
## MECHANICAL PROPERTIES

The properties are representative of samples taken from half radius of a forging diameter of 1150 mm. Values of different mechanical properties depend on the dimensions of original material, position and direction of samples, as well as hardness and test temperature.

## COMPARISON OF MECHANICAL PROPERTIES

WNr. 1.2738 versus ASSAB 618 T

Mechanical properties in MPa, %, J



# MACHINING RECOMMENDATIONS

The cutting data below are to be considered as guiding values which must be adapted to existing local conditions.

Condition: Pre-hardened condition 310 - 355 HB

## TURNING <sup>1)</sup>

Cutting data parameters	Turning with carbide		Turning with High Speed Steel
	Rough turning	Fine turning	Fine turning
Cutting speed ( $v_c$ ), m/min	150 - 220	195 - 295	10 - 15
Feed (f) mm/rev	0.2 - 0.4	0.05 - 0.2	0.05 - 0.2
Depth of cut ( $a_p$ ) mm	2 - 4	0.5 - 2	0.5 - 2
Carbide designation ISO	P20-P30 Coated carbide	P20-P30 Coated carbide	-

<sup>1)</sup> Parameters based on SECO CVD coated grades TP1000/2000/2500/3000

## DRILLING

### HIGH SPEED STEEL TWIST DRILL

Drill diameter mm	Cutting speed ( $v_c$ ) m/min	Feed (f) mm/r
≤ 5	12 - 14 *	0.05 - 0.15
5 - 10	12 - 14 *	0.15 - 0.25
10 - 15	12 - 14 *	0.25 - 0.30
15 - 20	12 - 14 *	0.30 - 0.35

\* For coated HSS drill,  $V_c \sim 18-20$  m/min

### CARBIDE DRILL

Cutting data parameters <sup>2)</sup>	Type of drill		
	Indexable insert	Solid carbide	Carbide tip <sup>1)</sup>
Cutting speed ( $v_c$ ), m/min	70 - 180	60 - 120	50 - 70
Feed (f) mm/r	0.05 - 0.25 <sup>3)</sup>	0.08 - 0.34 <sup>3)</sup>	0.12 - 0.20 <sup>3)</sup>

<sup>1)</sup> Parameters based on SECO drilling systems

<sup>2)</sup> Parameters for 3XD drilling depth with internal coolant supply

<sup>3)</sup> Depending on drill diameter

## MILLING

### FACE AND SQUARE SHOULDER MILLING

Cutting data parameters	Milling with carbide	
	Rough milling <sup>1)</sup>	Fine milling <sup>2)</sup>
Cutting speed ( $v_c$ ) m/min	130 - 140	150 - 200
Feed ( $f_z$ ) mm/tooth	0.5 - 3.0	0.06 - 0.1
Depth of cut ( $a_p$ ) mm	≤ 2	0.5 - 2
Carbide designation ISO	P20 - P40 Coated carbide	P20 - P40 Coated carbide

<sup>1)</sup> Parameters based on SECO R217/220.21 high feed cutters with SCET120630T coated inserts

<sup>2)</sup> Parameters based on SECO QuattroMill R217/220.53-09 cutters with SEMX/SEEX09T3AFTN coated inserts

### END MILLING

Cutting data parameters	Type of end mill		
	Solid carbide <sup>1)</sup>	Carbide indexable insert <sup>2)</sup>	High speed steel
Cutting speed ( $v_c$ ), m/min	90 - 140	100 - 165	10 - 15 <sup>3)</sup>
Feed ( $f_z$ ) mm/tooth	0.01 - 0.20 <sup>4)</sup>	0.08 - 0.15 <sup>4)</sup>	0.02 - 0.35 <sup>4)</sup>
Carbide designation ISO	K10 - P40	P20 - P30	-

<sup>1)</sup> Based on SECO Jabro end mills

<sup>2)</sup> Based on SECO Turbo type square shoulder indexable insert end mills

<sup>3)</sup> For coated HSS end mill,  $V_c \sim 25 - 30$  m/min

<sup>4)</sup> Depending on radial depth of cut and cutter diameter

## GRINDING

### Wheel recommendation

Type of grinding	Wheel recommendation
Face grinding straight wheel	A 46 HV
Face grinding segments	A 36 GV
Cylindrical grinding	A 60 KV
Internal grinding	A 60 IV
Profile grinding	A 120 JV

# SURFACE TREATMENT

## NITRIDING AND NITROCARBURISING

Nitriding gives a hard surface, which is very resistant to wear and erosion. A nitrided surface also increases the corrosion resistance.

For best results, the following steps should be followed:

1. Rough machining
2. Stress tempering at 560°C
3. Grinding
4. Nitriding

The following surface hardness and nitriding depths will be achieved after nitriding:

Process	Time h	Surface hardness <sup>1)</sup> HV <sub>1</sub>	Depth <sup>3)</sup> mm
Gas nitriding at 510°C	36	790 <sup>2)</sup>	0.40
Plasma nitriding at 500°C	10	780	0.33
	20	800	0.30
Gas nitrocarburising at 570°C	3	740	0.22

- <sup>1)</sup> Unless otherwise specified, nitriding hardness is measured at approximately 20 microns below the surface using micro-Vickers at 0.2 kgf load
- <sup>2)</sup> Nitriding hardness is measured using macro-Vickers at 5 kgf load
- <sup>3)</sup> Nitriding depth is the distance from the surface where hardness is 50 HV higher than the matrix hardness

## HARD CHROME PLATING

After plating, the tool should be tempered at 180°C for 4 hours, within 4 hours of plating, to avoid the risk of hydrogen embrittlement.

## ELECTRICAL DISCHARGE MACHINING — EDM

If spark-erosion, EDM, is performed in the as-delivered condition, the tool should then be given an additional temper at approx. 560°C.

# WELDING

Good results when welding tool steel can be achieved if proper precautions are taken during welding (elevated working temperature, joint preparation, choice of consumables and welding procedure).

Welding method	TIG	MMA
Preheating temperature	350 - 400 °C	350 - 400 °C
Filler material	ASSAB 718 TIG-WELD	ASSAB 718 WELD
Maximum interpass temperature	375°C	375°C
Post weld cooling	20 - 40°C/h for the first 2 hours and then freely in air	
Hardness after welding	300 - 330 HB	300 - 330 HB
Heat treatment after welding:		
Tool that need to be polished	Temper at 600°C for 2 h	

## POLISHING

ASSAB 618 T has excellent polishability in its delivery condition. After grinding, polishing can be carried out using aluminium oxide or diamond paste.

### TYPICAL PROCEDURE

1. Grind to 0.05 mm from the finished size.
2. Polish with diamond paste grade 45 to obtain a dull and even surface.
3. Polish with diamond paste grade 15.
4. Polish with diamond paste grade 3, or grade 1 for particularly high demands on surface finish size.

Note: Each steel grade has an optimum polishing time, which largely depends on hardness and polishing technique. Overpolishing can lead to a poor surface finish (e.g., an “orange peel” effect).

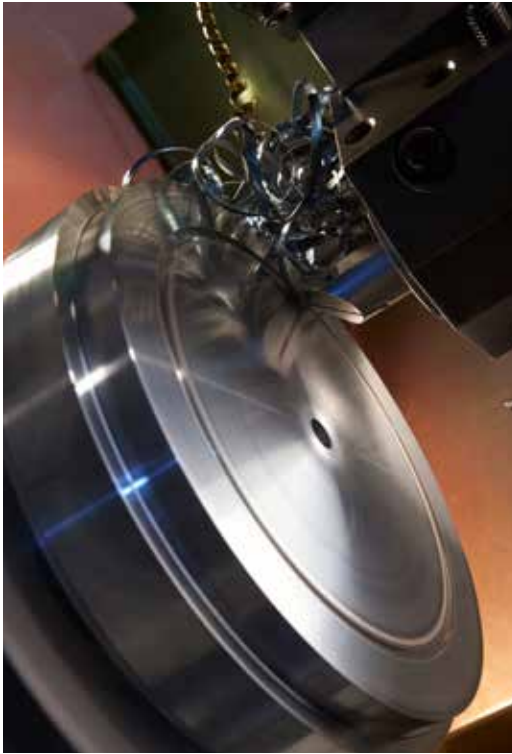
## FURTHER INFORMATION

Please contact your local ASSAB office for further information on the selection, heat treatment, application and availability of ASSAB tool steel.

# ASSAB

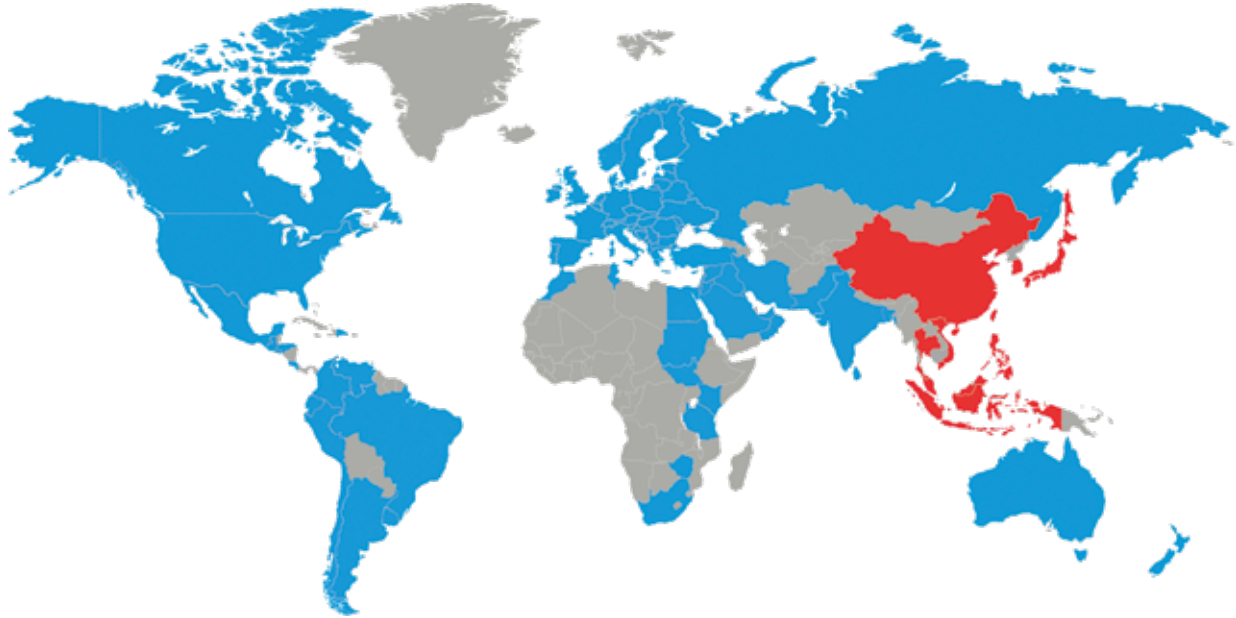
## SUPERIOR TOOLING SOLUTIONS

# A ONE-STOP SHOP



ASSAB is unmatched as a one-stop product and service provider that offers superior tooling solutions. In addition to the supply of tool steel and other special steel, our range of comprehensive value-added services, such as machining, heat treatment and coating services, span the entire supply chain to ensure convenience, accountability and optimal usage of steel for customers. We are committed to achieving solutions for our customers, with a constant eye on time-to-market and total tooling economy.





Choosing the right steel is of vital importance. ASSAB engineers and metallurgists are always ready to assist you in your choice of the optimum steel grade and the best treatment for each application. ASSAB not only supplies steel products with superior quality, we offer state-of-the-art machining, heat treatment and surface treatment services to enhance steel properties to meet your requirement in the shortest lead time. Using a holistic approach as a one-stop solution provider, we are more than just another tool steel supplier.

ASSAB and Uddeholm are present on every continent. This ensures you that high quality tool steel and local support are available wherever you are. Together we secure our position as the world's leading supplier of tooling materials.

For more information, please visit  
[www.assab.com](http://www.assab.com)

