



VAUTID Wear Resistant Castings

VAUTID Foundries

3 Foundries on 2 Locations



CMW I

Porto Portugal



CMW II

Porto Portugal



MDF

Tramagal Portugal

4 Moulding lines

1 x moulding line	600 x 700 mm	green sand
1 x moulding line	1.100 x 1.200 mm	furan resin sand
1 x moulding line	2.000 x 3.000 mm	furan resin sand
1 x moulding line	2.000 x 4.000 mm	furan resin sand
1 x hand moulding	max. 4.000 x 5.000 mm	furan resin sand

Melting furnaces

500 – 6.000 kg	capacity
300 – 3.500 kg/h	melt capacity

Lot sizes

from single part to 100.000/a

Materials

1. Non-alloyed cast steel for general applications (DIN EN 10293)
2. Low-alloyed cast steel for general applications (DIN EN 10293)
3. Heat resistant cast steel for pressure vessels (DIN EN 10213)
4. Tough and hard cast steel
5. Austenitic manganese steel
6. Heat-resistant cast iron (DIN EN 10295)
7. Stainless cast steel (SEW 410, DIN EN 10213)
8. Chilled iron (DIN EN 12513)
9. VAUTID Chilled iron

Casting weights

2 – 6.000 kg

- Own heat treatment on all locations
- Own lab for melting analysis and material tests on all locations
- Own wear test lab



Lining of turbine pan-type mixer

Moulding process

Individual and series production of castings with the following moulding processes

- Green sand
- CO₂ sand
- Furan sand
- Lost Foam

CAD

Continual use of CAD supported development and production possibilities for the pattern shop

- Design: 3 D, CATIA V 5
- Moulding fill simulation: Flow cast
- Solidification simulation: Solid cast
- Rapid Prototyping: Selective laser sintering (SLS)

Pattern shop

Manufacture of patterns in own pattern shop out of

- Wood
- Plastics
- Polystyrol

Quality control

Testing possibilities

- Chemical Analysis
- Hardness (HB, HRC, HV, Equotip)
- Ultrasonic testing
- Magnetic powder testing method
- Microstructure
- Tensile strength
- Elongation
- Impact bending strength
- Verify of dimensional accuracy
- Corrosion test
- Calcination test
- Wear tests

VAUTID-Material Program

Material Program		Mechanical Properties ^{a)}					
Cur No.	VAUTID Materials	Tensile strength N/mm ²	Yield strength N/mm ² min.	Elongation after fracture (Lo=5d) min.	Hardness acc. HB (HRC)	KV ISO-V Trial J min.	Temperature °C
1. VAUTID Non-alloyed cast steel for general applications (DIN EN 10293)							
1	VAUTID GE200 – 1.0420	300 – 530	200	25	130 – 140	27	RT
2	VAUTID GE240 – 1.0446	450 – 600	240	22	140 – 170	27	RT
3	VAUTID GE300 – 1.0558	520 – 670	300	15	150 – 190	27	RT
2. VAUTID Low-alloyed cast steel for general applications (DIN EN 10293)							
1	VAUTID G17Mn5 – 1.1131	450 – 600	240	24	130 – 190	27 / 70	– 40 / RT
2	VAUTID G28Mn6 – 1.1165	520 – 870	260 – 550	10 – 18	150 – 190	27 – 35	RT
3	VAUTID G26CrMo4 – 1.7221	550 – 850	300 – 550	10 – 16	160 – 250	18 – 40	RT
4	VAUTID G34CrMo 4 – 1.7230	620 – 980	330 – 650	10 – 12	180 – 250	16 – 35	RT
5	VAUTID G42CrMo4 – 1.7231	650 – 1.000	350 – 700	10 – 12	190 – 290	16 – 31	RT
3. VAUTID Heat resistant cast steel for pressure vessel (DIN EN 10213)							
1	VAUTID GP240 GH – 1.0619	420 – 600	240	22	120 – 190	27 – 40	RT
2	VAUTID G17CrMo5-5 – 1.7357	490 – 690	315	20	140 – 200	27	RT
3	VAUTID GXCrNi 13-4 – 1.4317	760 – 960	550	15	220 – 280	27	RT
4. VAUTID Tough and hard cast steel							
1	VAUTID GS55NiCrMoV7 – 1.2714	–	–	–	min. 42 HRC	–	–
2	VAUTID GX37CrMoV5-1 – 1.2343	–	–	–	min. 48 HRC	–	–
5. VAUTID Austenitic manganese steel							
1	VAUTID M12 – 1.3403	–	–	–	–	–	–
2	VAUTID M18-3	–	–	–	–	–	–
3	VAUTID M20-3	–	–	–	–	–	–
6. VAUTID Heat resistant cast iron (DIN EN 10295)							
1	VAUTID H – 1.4729	–	–	–	max. 300	–	–
2	VAUTID H – 1.4743	–	–	–	d	–	–
3	VAUTID H – 1.4776	–	–	–	d	–	–
4	VAUTID H – 1.4777	–	–	–	d	–	–
5	VAUTID H – 1.4823	min. 550	min. 250	3	d	–	–
6	VAUTID H – 1.4825	min. 450	min. 230	15	–	–	–
7	VAUTID H – 1.4826	min. 450	min. 230	8	–	–	–
8	VAUTID H – 1.4837	min. 450	min. 220	6	–	–	–
8	VAUTID H – 1.4848	min. 450	min. 220	8	–	–	–
7. VAUTID Stainless cast steel (SEW 410, DIN EN 10213)							
1	VAUTID K – 1.4086	–	–	–	260 – 330	–	–
2	VAUTID K – 1.4308	440 – 640	200	30	–	60	RT
3	VAUTID K – 1.4312	–	–	–	–	–	–
4	VAUTID K – 1.4313	540 – 800	355 – 500	16 – 18	–	40 – 45	RT
5	VAUTID K – 1.4404	490 – 690	190	40	–	–	RT
6	VAUTID K – 1.4464	–	–	–	230 – 300	–	–
7	VAUTID K – 1.4517	650 – 850	480	22	–	50	RT
8	VAUTID K – 1.4529	440 – 460	180	20	–	60	RT
9	VAUTID K – 1.4552	440 – 460	200	25	–	40	RT
10	VAUTID K – 1.4581	440 – 660	210	25	–	40	RT

^{a)} Mechanical properties are reference values; exact values according to the condition of delivery and thickness can be taken from the appropriate standard.

Condition of delivery	Weldability	Applications	Forms of stress
N	good	for mechanical engineering and steel structural work	
N	good	for mechanical engineering and steel structural work	
N	good	for mechanical engineering	
QT	good	for pressure vessel	
N, QT1, QT2	good	for mechanical and plant engineering	
QT1, QT2	preheating + after heat treatment	for mechanical and plant engineering	
QT1, QT2	preheating + after heat treatment	for mechanical and plant engineering	
QT1, QT2	preheating + after heat treatment	for mechanical and plant engineering	
N, QT	good	for pressure vessel	
QT	preheating + after heat treatment	for turbines, pressure vessel, steam boiler	
QT	preheating + after heat treatment	for pressure vessel	
QT	limited	for hammer in the size reduction technics	
QT	limited	for hammer in the size reduction technics	
AT	good	for crusher jaw, crushing cone	<p>from to</p>
AT	good	for crusher jaw, crushing cone	
AT	good	for crusher jaw, crushing cone	
Wb4 / 800 – 850	preheating + stress relieve heat treatment	for industrial furnace engineering up to 850 °C on air	<p>from to</p>
G	preheating + stress relieve heat treatment	for industrial furnace engineering up to 900 °C on air	
G	preheating + coolant in furnace	for industrial furnace engineering up to 1.150 °C on air	
G	preheating + coolant in furnace	for stirring teeth up to 1.100 °C on air	
G	good	for industrial furnace engineering up to 1.100 °C on air	
G	good	for industrial furnace engineering up to 900 °C on air	
G	good	for industrial furnace engineering up to 950 °C on air	
G	good	for industrial furnace engineering up to 1.150 °C on air	
G	good	for industrial furnace engineering, petroleum and natural gas plants up to 1.100 °C on air	
G	preheating + coolant in furnace	for food technique, chemical industry	
AT	good	for accessories, mechanical engineering	
AT	good	for pump construction	
AT	good	for pressure vessel	
AT	good	for pressure vessel	
G	preheating + heat treatment	for chemical industry, flue gas desulfurization	
AT	good	for pressure vessel, chemical industry	
AT	good	for pressure vessel	
AT	good	for pressure vessel, chemical industry	
AT	good	for pressure vessel, chemical industry	

d = Castings can be delivered also in an annealed condition: In this case a maximum value of the hardness can be arranged.

RT = room temperature, N = normalising, G = as cast, QT, QT1, QT2 = quenched and tempered, AT = solution annealing

VAUTID-Material Program

Cur No.	VAUTID Materials	Tensile strength N/mm ²	Crushing strength N/mm ²	E-Modul [kN/mm ²]	Hardness (HRC)	Fracture toughness K _{Ic} [kN/mm ²]	Machinability
8. VAUTID Chilled iron (DIN EN 12513)							
1	GJN-HV520 – 0.9620 (similar Ni-Hard 1)				min. 52		
2	GJN-HV600(XCr18) – 0.9645 (similar Ni-Hard 4)				min. 55		

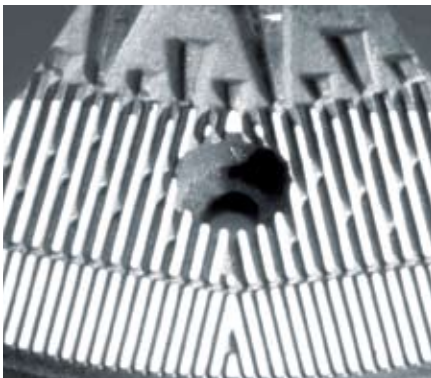
9. VAUTID chilled iron (own developments)

1	VAUTID W3	450 – 800	620 – 750	165 – 180	min. 58	–	no
3	VAUTID W4	450 – 800	620 – 750	165 – 180	min. 52	–	no
5	VAUTID W7	600 – 1.000	2.800 – 3.200	158 – 190	min. 59	25 – 31	yes
6	VAUTID W72	600 – 1.000	2.800 – 3200	158 – 190	min. 59	25 – 31	yes
7	VAUTID W72H	600 – 1.000	2.800 – 3.200	158 – 190	min. 59	25 – 31	yes
8	VAUTID W73	600 – 1.000	2.800 – 3.200	158 – 190	min. 59	25 – 31	no
12	VAUTID W78A	600 – 1.000	2.800 – 3.200	158 – 190	min. 62	–	no
16	VAUTID W100	450 – 800	1.800 – 2.800	150 – 170	min. 59	25 – 31	no

further material developments according to customer requirements

Applications

Crushing

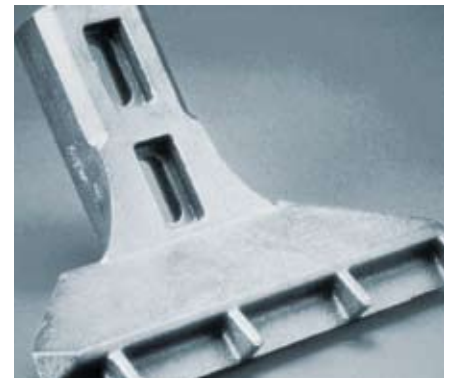


Refiner disk for cellulose industry



Hammer for rock crushing

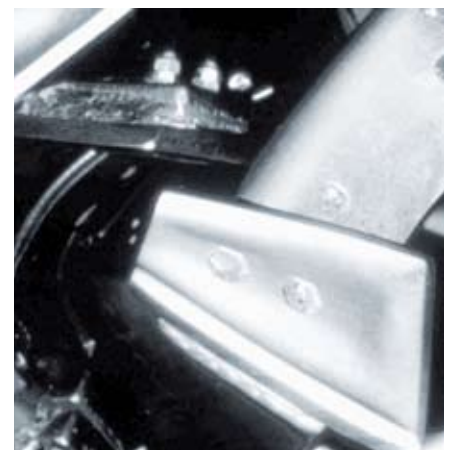
Mixing















Mixer blade for planet mixer



Impact bars for crushers



Mixing tools for double-shaft mixer

Condition of delivery	Weldability	Applications	Forms of stress
G		abrasion stressed castings	from   to      
G/hardened		abrasion and impact stressed castings	
G	bad	for linings, mixer tools	   
G	bad	for linings, mixer tools	
hardened	bad	for pump elements, hammer	
hardened	bad	for pump elements, hammer	
hardened	bad	for impact bars, hammer	
hardened	bad	for impact bars, hammer	
hardened	bad	for impact bars, linings	
G	bad	for brick industry	

G = as cast

Conveying



Special mechanical engineering



Crawler elements on excavator for open pit mining

Recycling



Grate bars in waste incineration



Waste utilization; infeed grate bars



Glass recycling; impact crusher for crushing of ceramics