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全球钢号百科！

Global Steel Grade Encyclopedia

涵盖的行业或国家与地区类别

ASTM INTERNATIONAL 国材料与试验协会
GJB 国家军用标准
SAE INTERNATIONAL 动力机械工程师协会
EU 前欧洲标准化
AISI 美国钢铁学会
DIN 德国工业标准
AMS [空航天材料规范
ISO 国际标准
JASO 日本汽车标准组织
EN 欧洲标准
JB [国机械行业标准
UNS 统一编号系统
UNI 意大利标准
ASME 美国机械工程师协会
SS 瑞典标准
GB 国家标准
JIS 日本工业标准

ASP®2012

Powder metallurgy HSS

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo	W	V
0.60	1.0	0.3	4.0	2.0	2.1	1.5

STANDARDS

- Europe: HS 2-2-2
- Germany: 1.3397

DELIVERY HARDNESS

- Typical soft annealed hardness is 230 HB

DESCRIPTION

ASP®2012 is the best in class for high toughness up to 58 HRC in cold-, warm- and hot applications.

APPLICATIONS

- Cold work tools: Powder compacting tools, cold extrusion tools, cold-heading dies, fine blanking tools.
- Plastic injection moulders, broaches and injector pins.
- Machine components and rolls.
- Warm- and hot-work applications: extrusion dies, forging dies and punches, hot forming dies.

FORM SUPPLIED

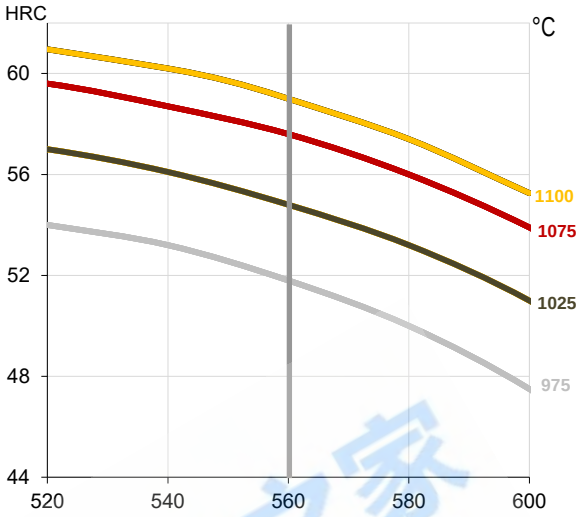
- Round bars
- Flat bars

Available surface conditions: drawn, peeled, rough machined.

HEAT TREATMENT

- Soft annealing in a protective atmosphere at 850-900°C for 3 hours, followed by slow cooling at 10°C/h down to 700°C, then air cooling.
- Stress-relieving at 600-700°C for approximately 2 hours, slow cooling down to 500°C.
- Hardening in a protective atmosphere with pre-heating in 2 steps at 450-500°C and 850-900°C and austenitising at a temperature suitable for chosen working hardness. Cooling down to 40-50°C.
- Tempering at 560°C three times for at least 1 hour each time. Cooling to room temperature (25°C) between temperings.

GUIDELINES FOR HARDENING



Hardness after hardening, quenching and tempering 3x1 hour

ASP®2012 has a good flexibility in heat treatment with hardening temperatures commonly used for cold work tool steel applications.
To achieve the optimal hardness and toughness combination we recommend tempering at 560°C.
For a hardness above 58 HRC, do not hesitate to contact our technical support to define the best heat treatment process for the application.

PROCESSING

ASP®2012 can be worked as follows:

- machining (grinding, turning, milling)
- polishing
- hot forming
- electrical discharge machining
- welding (special procedure including preheating and filler materials of base material composition).

GRINDING

During grinding, local heating of the surface, which may alter the temper, must be avoided. Grinding wheel manufacturers can provide advice on the choice of grinding wheels.

SURFACE TREATMENT

The steel grade is a perfect substrate material for PVD coating. If nitriding is requested, a small diffusion zone is recommended but avoid compound and oxidized layers.

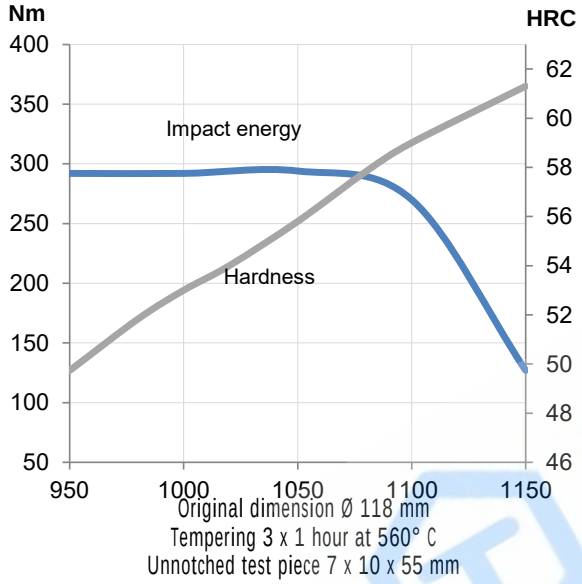
PROPERTIES

PHYSICAL PROPERTIES

Temperature	20°C	400°C	600°C
Density g /cm³ *(1)*	7.8	7.7	7.6
Modulus of elasticity kN/mm² *(2)*	220	195	175
Coefficient of thermal expansion from 20°C, per °C *(2)*	-	$12.1x10^{-6}$	$12.7x10^{-6}$
Thermal conductivity W/m°C *(2)*	26	30	30
Specific heat J/kg °C *(2)*	420	510	600

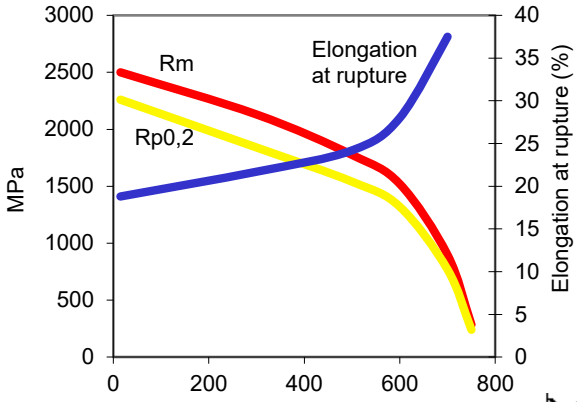
(1)=Soft annealed
(2)=Hardened 1100°C and tempered 560°C, 3x1 hour

IMPACT TOUGHNESS



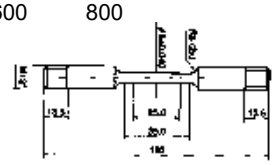
Original dimension Ø 118 mm
Tempering 3 x 1 hour at 560° C
Unnotched test piece 7 x 10 x 55 mm

TENSILE STRENGTH

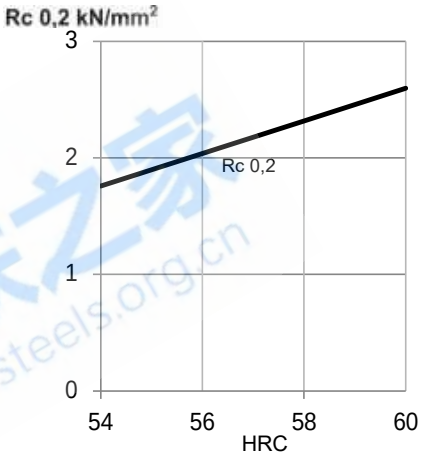


Test temperature in °C

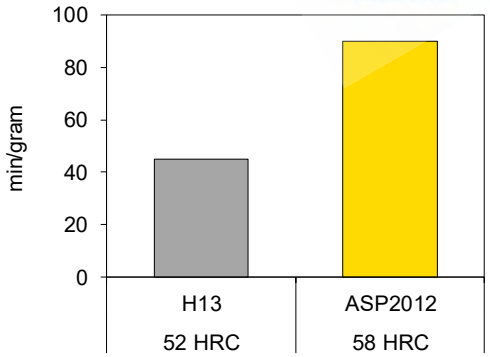
Size of blank Ø15mm
Test piece dimensions are given below.
Hardness 58 HRC



COMPRESSION YIELD STRESS

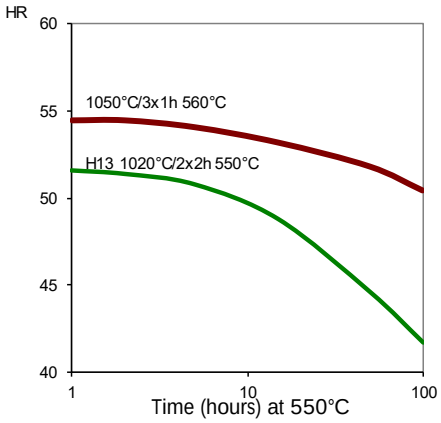


WEAR RESISTANCE



Wear resistance is measured as the time needed for removal of one-gram material from a test piece.
Technique: Pin-on-cylinder, dry SiO2-paper of grade 00, sliding rate 0,3m/s, load 9N and size of specimen 2 x 5 x 30mm.

TEMPERING RESISTANCE



SAFETY DATA SHEET SDS: A

COMPARATIVE PROPERTIES