

3" BY-PASS MANDREL 9CR



DAYE SPECIAL STEEL CO., LTD.

NO. 316 HUANGSHI AVENUE, HUANGSHI, HUBEI, CHINA PC:435000

## QUALITY CERTIFICATE

ACC TO EN10204 3.1



APPROVED

By John at 11:17 am, Jul 06, 2017

INVOICE NO: GBUSA1780406FEAC

DESCRIPTION OF GOODS: HOT ROLLED QUENCHING AND TEMPERING STEEL BAR

1, EA PO:1092790 0P, SPEC:EAGL-600 REV.6

Grade	Batch No.	Heat No.	Size	Pieces	Bundles	Weight (MT)	Total Length(FT)	Manufacture Process	Delivery Condition
9Cr-1Mo	H617080890	7050285M	2.75"	37	4	6.368	694.26	EAF+LF+VD+IC	quenched and tempered

Chemical Composition (Wt %)																			
	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	W	Al	V	Nb	Ti	Ca	B	As	Sn	Pb
Min	0.09	0.30	0.25	0	0	8.00	0	0.90	0										
Max	0.15	0.50	0.60	0.020	0.010	10.00	0.50	1.10	0.25										
Ladle	0.12	0.44	0.36	0.009	0.004	8.74	0.22	0.95	0.04										
Product1																			
Product2																			

Macrostructure Examination(Level)			Non-metallic inclusion (Level)								K4 Method Oxides	Ds	Microstructure		Jominy Test (ASTM A255 HRC-1/16 inch)					Hydrostatic Pressure Test			Drift result	Dimensional inspection	Visual examination
S	R	C	A	H	T	H	T	H	T	H			Grain Size	Decarburizing Layer						time	pressure	conclusion			
													ASTM E112	pcs	mm									good	good
													9-8												

Mechanical Properties(ASTM E8)					Quadrant hardness				Hardness(ASTM E10)				Charpy Impact Test(ASTM E23)											
Yield Strength	Tensile Strength	YS/TS	Elongation	Reduction Area	Mid WALL	ID	OD	max. deviation	1/2 R from surface	1/2 R from surface	Surface	Longitudinal 10*10(mm)												
(KSI)	(KSI)		A(%)	Z(%)	(HRC)	(HRC)	(HRC)		HBW	HRC	(HBW)	14.00(°F)	Shear	Lateral Expansion	(°F)	Shear	Lateral Expansion	(°F)	Shear	Lateral Expansion	(°F)	Shear	Lateral Expansion	
86.710	Rp0.2	107.300	24.0	72					235	21.5		(ft-lbs)	(%)	(mm)	(ft-lbs)	(%)	(mm)	(ft-lbs)	(%)	(mm)	(ft-lbs)	(%)	(mm)	
												109	100	1.525										
90.625	Rp0.5											121	100	1.725										
												133	100	1.925										

Mechanical Properties Inspection			Depth of specimens	Gauge Length	Tensile Diameter	Reduction Ratio	customer's specification	QTC Size	Radio-activity	Residual magnetic-field	NDT(Non-destructive Test)											
Standard	Location	Direction									Ultrasonic Test				Eddy Current Test			Magnetic Particle Test				
											standard	testing level	external imperfection	internal imperfection	conclusion	standard	testing level	conclusion	standard	testing level	conclusion	
ASTM A370	1/2 R from surface	Longitudinal		4D	0.5"	67.4					ASTMA388	API6A PSL 3			good							

Normalizing			Quenching			Temperature of Quench Media		Tempering			Furnace hearth survey & calibration		Stress Relieve		Quality System	
Temperature(°C)	Time(min)	Cooling Method	Temperature(°C)	Time(min)	Cooling Method	Starting(°C)	Finishing(°C)	Temperature(°C)	Time(min)	Cooling Method	Time	Standard	Temp(°C)	Time(min)	Process	ISO9001:2008, ISO/TS 16949
			920	100	water cooling	10	14	735	200	air cooling	2017-02-09	AMS-2750	705	200		

Note: (1) No impermissible macro-structural defects, such as flakes, subsurface bubbles and pipes are available. This material is free from mercury and radioactivity. No welding repair.

(2) When there is any complaint, you are kindly requested to mark the Steel Grade, Heat No., Size, Delivery Date, Causes and reserve the material in the condition of delivery

(3) Our company's quality management system has been certified by TÜV SÜD for fulfilling all requirements of ISO9001:2008, ISO/TS 16949.

(4) Straightening: cold rotary straightening

Signature of quality assurance manager: ZhangZhiCheng

Date: 2017-05-27