Thermodur® 2343 EFS

Technical Datasheet

Chemistry
Comparable Standard: AISI H-11

Typical	C	Si	Cr	Mo	V
Analysis %	0.38	1.0	5.3	1.3	0.4

Description
Thermodur® 2343 EFS is a single melt Extra Fine Structure (EFS) hot work die steel. Supplied in the annealed form.

Characteristics
Good toughness
Moderate high-temperature strength
Moderate heat-check resistance

Applications

Hot extrusion tooling	Shot Sleeves
Die inserts	Forging Dies

Physical Properties
Density: 0.280 lbs/in³ (room temperature)

Coefficient of Thermal Expansion	70°F - 200°F 6.6 x 10^{-6} /°F	70°F - 400°F 6.9 x 10^{-6} /°F	70°F - 750°F 7.1 x 10^{-6} /°F
Thermal Conductivity	70°F 185Btu/in/ft²/hr/°F	650°F 189Btu/in/ft²/hr/°F	1300°F 210Btu/in/ft²/hr/°F

Mechanical Properties
Toughness (CVN):
Approximately 10-12 ft/lbs (room temp at 44 HRc)

Tensile Properties: (room temperature)
Modulus of Elasticity = 30x10^6 PSI

Hardness HRc	Tensile Strength KSI
52	259
48	227
31	174

Polishing
When determining the hardness, please contact your Swiss Steel representative for recommendations.

Heat Treatment
Soft Annealing

Temperature	Cooling	Hardness
1382°F – 1470°F	Furnace 20°F/hour to 1200°F. Then air cool.	230 HB Max.

Stress Relieving

Temperature	Cooling	Hardness
1200°F for 2 hours	Cool slowly to 930°F in air	230 HB Max.

Hardening (refer to TTT diagram on page 2)

Temperature	Cooling	Hardness
1850°F – 1880°F Hold at temperature for 30 minutes	Vacuum quench to 1000°F then cool to below 150°F	54 HRc Max quenched

Tempering (See tempering diagram on page 2)

Temperature °F	752	932	1022	1112	1202	1292
Hardness HRc	52	54	52	48	38	31

Tempering hardness is approximate and based on two hours at temperature.
Optimal heat treatment parameters should be followed to achieve maximum potential die life.
Please contact your Swiss Steel heat treat representative for more detailed information.

General Note
All statements regarding the properties or utilization of the materials or products mentioned are for the purpose of description only. Guarantees regarding the existence of certain properties or a certain utilization are only valid if agreed upon in writing.

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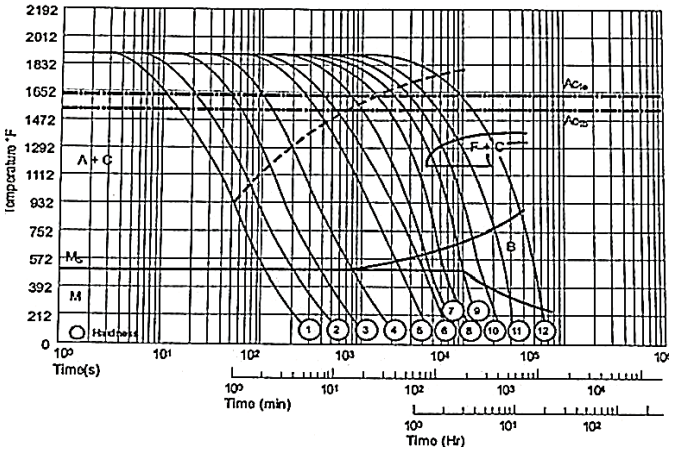
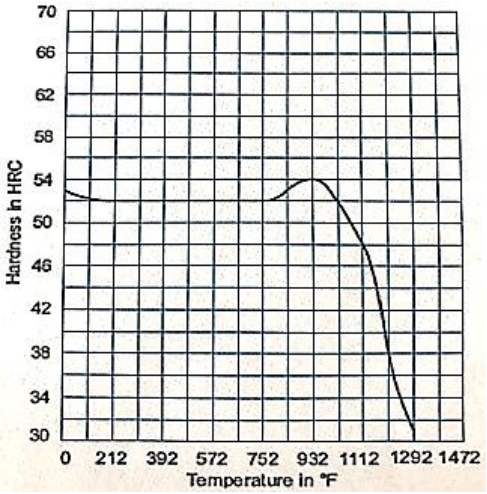
Time-Temperature-Transformation
Austenitizing temperature 1865°F



Tempering Diagram



Welding
Thermodur® 2343 EFS can be welded in an annealed and hardened condition if machining errors, design changes or minor cracking have occurred. TIG (Tungsten Inert Gas) should preferably be used.

Welding Guidelines

Process	Tig/MMA
Current	D.C.
Amperage (A)	100-150
Electrode	Tungsten Thorium
Electrode Diameter	0.10 – 0.17
Protective Gas	Argon Helium
Flow (L/mm)	10
Filler Rod	AISI H-11 or H-13

Welding Temperatures

Preheat Temp.	Maintained Temperature during welding	Cool down to:	Stress Relieve
700°F - 800°F	Above 600°F	150°F	1050°F for 2 hours

Cooling Curve Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hardness (HV 10)	**707**	**698**	**690**	**681**	**649**	**665**	**665**	**642**	**813**	**483**	**446**	**276**
Hardness (HRc approx.)	**60.5**	**60**	**59.5**	**59**	**58**	**58.5**	**58.5**	**57.5**	**64**	**48**	**45**	**34**

Swiss Steel International

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