

# Cryodur 2312 (Brake Die)

# Technical Datasheet

## Chemistry

Comparable Standard: DIN 1.2312

Typical	C	Mn	Cr	Mo	S
Analysis %	0.4	1.5	1.9	0.2	0.05

## Description

Cryodur® 2312 is a pre-hardened single melt Extra Fine Structure (EFS) plastic mold steel.

Re-sulphurized to improve machinability

Supplied hardness of 280 – 325 HB (29-34 HRC)

## Characteristics

Excellent machinability compared to conventional 4150 press brake die tooling material

## Applications

Brake Dies

## Physical Properties

Density: 0.283 lbs/in<sup>3</sup> (room temperature)

Coefficient of Thermal Expansion	70°F - 200°F 6.8 x 10 <sup>-6</sup> /°F	70°F - 400°F 7.2 x 10 <sup>-6</sup> /°F	70°F - 575°F 7.6 x 10 <sup>-6</sup> /°F
Thermal Conductivity	212°F 276Btu/in/ft <sup>2</sup> /hr/°F	400°F 280Btu/in/ft <sup>2</sup> /hr/°F	575°F 270Btu/in/ft <sup>2</sup> /hr/°F

## Mechanical Properties

Hardness HRc	51	50	48	46	42	36	32	28
Tensile Strength KSI	251	242	228	215	193	165	134	123

## 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.

## Heat Treatment

### Soft Annealing

Temperature	Cooling	Hardness
1310°F – 1365°F	Furnace	235 HB Max.

### Hardening

Temperature	Cooling	Hardness
1544°F – 1598°F	Oil	51 HRc Max.

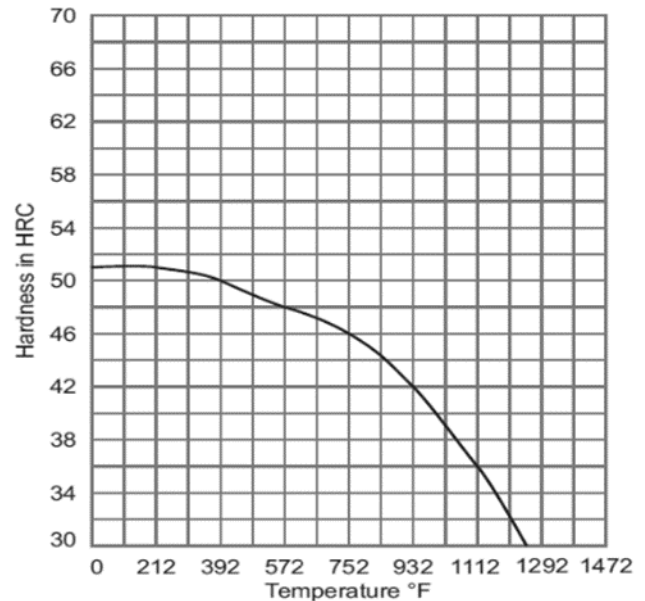
Tempering (see tempering diagram below)

Temperature °F	212	392	572	752	932	1112	1292
Hardness HRc	51	50	48	46	42	36	28

Tempering hardness is approximate and based on two hours at temperature

Please contact your Swiss Steel heat treat representative for more detailed information

## Tempering diagram



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## Welding

Preheat insert to 600°F - 700°F. Maintain temperature above 600°F during welding.

Use TIG with D.C. positive polarity.

Depending on the application, various welding rods can be used. P20 filler which will match the hardness of the base metal after welding and tempering commonly used. Please contact your Swiss Steel heat treatment facility for recommendations.

Slowly cool down to 100°F - 150°F, preferably under an insulating blanket, before post heat.

Post heat at 1000°F one hour per inch of weld depth plus one additional hour – double temper if possible. Exceeding 1050°F could result in the loss of hardness.

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