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Process of normalizing and annealing of iron and steel

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently JIS B 6911:1987 is replaced with JIS B 6911:1999.

Definitions, classification and symbol of processing, material to be processed, processing equipment, processing method, quality of processed product, etc. are altered in this revision.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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Process of normalizing and annealing of iron and steel

1 Scope This Japanese Industrial Standard specifies the process of normalizing and annealing of iron and steel (hereafter referred to as "processing").

Remarks: Partial heat treatment is not included in the processing.

2 Normative references The standards listed in the **Attached Table 1** contain provisions which, through references in this Standard, constitute provisions of this Standard. The most recent editions of the standards listed shall be applied.

3 Definitions For the purposes of this Standard, the definitions given in **JIS B 6905** apply for the major terms used in this Standard, and the following definitions apply for the rest of the terms used.

- a) **material to be processed** The parts and materials to be subjected to the processing. The parts are finished or almost finished iron and steel products, including machine tools, jigs, equipment or their parts, and the materials are iron and steel and their semi-finished products made by rolling, forging, casting and the like.
- b) **processed product** The parts or materials which have undergone the processing as defined in this Standard.
- c) **single body** A piece or set of processed products.
- d) **heating equipment** In heating equipment for metals heat treatment use, the device to heat materials to be processed for the purpose of heat treatment.
- e) **air furnace** The furnace to heat materials to be processed in the air or in the combustion atmosphere of fuel.
- f) **hot bath vessel** The equipment to heat or cool materials to be processed in a hot bath containing molten salt, molten metal and the like.
- g) **atmospheric furnace** The heating furnace capable of controlling the atmosphere in which materials to be processed are heated to suit the purpose of intended processing, by making the atmosphere reductive, inert, decarburizing or the like as required.
- h) **vacuum furnace** The equipment to heat or cool materials to be processed in the air or in inert or other gases under reduced pressure, thus capable of adjusting the pressure to suit the purpose of processing.
- i) **fluidized-bed furnace** The equipment to heat or cool materials to be processed using ceramics or other fluidized particles as heating media.

4 Classification and symbol of processing The classification and symbol of processing shall be as shown in **Table 1**, depending on the method of processing used:

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Table 1 Classification and symbol of processing

Classification of processing	Symbol ⁽¹⁾
Normalizing	HNR
Full annealing	HAF
Isothermal annealing	HAI
Softening	HASF
Low-temperature annealing	HAL
Stress relieving	HAR
Spheroidizing	HAS

Note ⁽¹⁾ In accordance with JIS B 0122.

5 Material to be processed

5.1 Classification of materials to be processed The classification of materials to be processed shall be as defined in Table 2 or the quality of processed product shall comply with 8.

Table 2 Classification of materials to be processed

Standard number	Applicable classification symbol
a) Steel bars, sections, plates and strip	
JIS G 3115	SPV235, SPV315, SPV355, SPV410, SPV450, SPV490
JIS G 3118	SGV410, SGV450, SGV480
JIS G 3119	SBV1A, SBV1B, SBV2, SBV3
JIS G 3124	SEV245, SEV295, SEV345
JIS G 3126	SLA235A, SLA235B, SLA325A
JIS G 3127	SL2N255, SL3N255, SL3N275, SL9N520
JIS G 4109	SCMV1, SCMV2, SCMV3, SCMV4, SCMV5, SCMV6
b) Steel pipes	
JIS G 3441	SCr420TK SCM415TK, SCM418TK, SCM420TK, SCM430TK, SCM435TK, SCM440TK
JIS G 3445	STKM11A, STKM12A, STKM13A, STKM14A, STKM15A, STKM16A, STKM17A, STKM18A, STKM19A, STKM20A
JIS G 3446	SUS430TKA, SUS410TKA, SUS420J1TKA, SUS420J2TKA
JIS G 3455	STS370, STS410, STS480
JIS G 3456	STPT370, STPT410, STPT480
JIS G 3458	STPA12, STPA20, STPA22, STPA23, STPA24, STPA25, STPA26
JIS G 3459	SUS405TP, SUS409LTP, SUS430TP, SUS430LXTP, SUS430J1LTP, SUS436LTP, SUS444TP
JIS G 3460	STPL380, STPL450, STPL690
JIS G 3461	STB340, STB410, STB510
JIS G 3462	STBA12, STBA13, STBA20, STBA22, STBA23, STBA24, STBA25, STBA26
JIS G 3463	SUS405TB, SUS409TB, SUS409LTB, SUS410TB, SUS410TiTB, SUS430TB, SUS430LXTB, SUS430J1LTB, SUS436LTB, SUS444TB, SUSXM8TB, SUSXM27TB
JIS G 3464	STBL380, STBL450, STBL690
JIS G 3467	STF410 STFA12, STFA22, STFA23, STFA24, STFA25, STFA26
JIS G 4903	NCF600TP, NCF625TP, NCF690TP, NCF800TP, NCF825TP
JIS G 4904	NCF600TB, NCF625TB, NCF690TB, NCF800TB, NCF825TB

Table 2 Classification of materials to be processed (continued)

Standard number	Applicable classification symbol
c) Wire rods and wire products JIS G 3539	SWCH6A, SWCH8A, SWCH10A, SWCH12A, SWCH15A, SWCH16A, SWCH18A, SWCH19A, SWCH20A, SWCH22A, SWCH10K, SWCH12K, SWCH15K, SWCH16K, SWCH17K, SWCH18K, SWCH20K, SWCH22K, SWCH24K, SWCH25K, SWCH27K, SWCH30K, SWCH33K, SWCH35K, SWCH38K, SWCH40K, SWCH41K, SWCH43K, SWCH45K, SWCH48K, SWCH50K
JIS G 3545	SWCHB220, SWCHB223, SWCHB226, SWCHB231, SWCHB234, SWCHB237, SWCHB320, SWCHB323, SWCHB331, SWCHB334, SWCHB420, SWCHB423, SWCHB437, SWCHB526, SWCHB531, SWCHB620, SWCHB623, SWCHB634, SWCHB637, SWCHB726, SWCHB731, SWCHB734, SWCHB737, SWCHB823
d) Carbon steel and alloy steel for machine structural use JIS G 4051	S10C, S12C, S15C, S17C, S20C, S22C, S25C, S28C, S30C, S33C, S35C, S38C, S40C, S43C, S45C, S48C, S50C, S53C, S55C, S58C, S09CK, S15CK, S20CK
JIS G 4052	SMn420H, SMn433H, SMn438H, SMn443H SMnC420H, SMnC443H SCr415H, SCr420H, SCr430H, SCr435H, SCr440H SCM415H, SCM418H, SCM420H, SCM435H, SCM440H, SCM445H, SCM822H SNC415H, SNC631H, SNC815H SNCM220H, SNCM420H
JIS G 4102	SNC236, SNC415, SNC631, SNC815, SNC836
JIS G 4103	SNCM220, SNCM240, SNCM415, SNCM420, SNCM431, SNCM439, SNCM447, SNCM616, SNCM625, SNCM630, SNCM815
JIS G 4104	SCr415, SCr420, SCr430, SCr435, SCr440, SCr445
JIS G 4105	SCM415, SCM418, SCM420, SCM421, SCM430, SCM432, SCM435, SCM440, SCM445, SCM822
JIS G 4106	SMn420, SMn433, SMn438, SMn443 SMnC420, SMnC443
JIS G 4107	SNB5, SNB7, SNB16
JIS G 4108	SNB21-1 to 5, SNB22-1 to 5, SNB23-1 to 5, SNB24-1 to 5
JIS G 4202	SACM645
e) Steel for special use JIS G 4303	SUS405, SUS410L, SUS430, SUS430F, SUS434, SUS447J1, SUSXM27, SUS403, SUS410, SUS410J1, SUS410F2, SUS416, SUS420J1, SUS420J2, SUS420F, SUS420F2, SUS431, SUS440A, SUS440B, SUS440C, SUS440F
JIS G 4304	SUS405, SUS410L, SUS429, SUS430, SUS430LX, SUS430J1L, SUS434, SUS436L, SUS436J1L, SUS444, SUS447J1, SUSXM27, SUS403, SUS410, SUS410S, SUS420J1, SUS420J2, SUS429J1, SUS440A
JIS G 4305	SUS405, SUS410L, SUS429, SUS430, SUS430LX, SUS430J1L, SUS434, SUS436L, SUS436J1L, SUS444, SUS447J1, SUSXM27, SUS403, SUS410, SUS410S, SUS420J1, SUS420J2, SUS429J1, SUS440A

Table 2 Classification of materials to be processed (continued)

Standard number	Applicable classification symbol
JIS G 4309	SUS405, SUS430, SUS430F, SUS446, SUS403, SUS410, SUS410F2, SUS416, SUS420J1, SUS420J2, SUS420F, SUS420F2, SUS440C
JIS G 4311	SUH446, SUH1, SUH3, SUH4, SUH11, SUH600, SUH616 SUS405, SUS410L, SUS430, SUS403, SUS410, SUS410J1, SUS431
JIS G 4312	SUH21, SUH409, SUH409L, SUH446 SUS405, SUS410L, SUS430, SUS430J1L, SUS436J1L, SUS403, SUS410
JIS G 4313	SUS420J2-CSP
JIS G 4315	SUS430-WSB, SUS434-WSB, SUS403-WSB, SUS410-WSB
JIS G 4316	SUSY430, SUSY410
JIS G 4317	SUS430
JIS G 4401	SK1, SK2, SK3, SK4, SK5, SK6, SK7
JIS G 4403	SKH2, SKH3, SKH4, SKH10, SKH51, SKH52, SKH53, SKH54, SKH55, SKH56, SKH57, SKH58, SKH59
JIS G 4404	SKS11, SKS2, SKS21, SKS5, SKS51, SKS7, SKS8, SKS4, SKS41, SKS43, SKS44, SKS3, SKS31, SKS93, SKS94, SKS95 SKD1, SKD11, SKD12, SKD4, SKD5, SKD6, SKD61, SKD62, SKD7, SKD8 SKT3, SKT4
JIS G 4410	SKC3, SKC11, SKC24, SKC31
JIS G 4801	SUP3, SUP6, SUP7, SUP9, SUP9A, SUP10, SUP11A, SUP12, SUP13
JIS G 4802	S50C-CSP, S55C-CSP, S60C-CSP, S65C-CSP, S70C-CSP SK5-CSP, SK4-CSP SUP10-CSP
JIS G 4804	SUM11, SUM12, SUM21, SUM22, SUM22L, SUM23, SUM23L, SUM24L, SUM25, SUM31, SUM31L, SUM32, SUM41, SUM42, SUM43
JIS G 4805	SUJ1, SUJ2, SUJ3, SUJ4, SUJ5
JIS G 4901	NCF600, NCF601, NCF625, NCF690, NCF800, NCF825
JIS G 4902	NCF600, NCF601, NCF625, NCF690, NCF800, NCF825
f) Casting and forging	
JIS G 3201	SF340A, SF390A, SF440A, SF490A, SF540A, SF590A
JIS G 3202	SFVC1, SFVC2A, SFVC2B
JIS G 3203	SFVAF1, SFVAF2, SFVAF12, SFVAF11A, SFVAF11B, SFVAF22A, SFVAF22B, SFVAF21A, SFVAF21B, SFVAF5A, SFVAF5B, SFVAF5C, SFVAF5D, SFVAF9
JIS G 3205	SFL1, SFL2, SFL3
JIS G 3206	SFVCMF22B, SFVCMF22V, SFVCMF3V
JIS G 3223	SFT590
JIS G 5101	SC360, SC410, SC450, SC480
JIS G 5102	SCW410, SCW450, SCW480, SCW550, SCW620
JIS G 5111	SCC3, SCC5 SCMn1, SCMn2, SCMn3, SCMn5 SCSiMn2 SCMnCr2, SCMnCr3, SCMnCr4 SCMnM3 SCCrM1, SCCrM3 SCMnCrM2, SCMnCrM3 SCNCrM2