

ICS 43.120
CCS T 40

T

ASSOCIATION STANDARD

T/CSAE 51-2016

Carbon Steel Sheets and Strips for Heat-treated Automobile parts (English Translation)

Issued on: May 26, 2016

Implemented on: May 26, 2016

Issued by: China Society of Automotive Engineers

Table of Contents

Foreword	
1 Scope	
2 Normative references	
3 Grades and classification	
4 Technical requirements	
4.1 Chemical composition	
4.2 Mechanical properties	
4.3 Delivery status	
4.4 Internal defects	
4.5 Metallographic organization	
5 Dimensional accuracy	
5.1 Thickness tolerance	
5.2 Length, width size and tolerance	
6 Shape	
7 Test	
8 Numerical rounding rules	
9 Regulatory requirements	
10 Packaging, Marking and Quality Certificate	

Foreword

This technical standard is one of the technical standards for steel materials of the China Automotive Engineering Society.

This technical standard was proposed by the Materials Branch of the China Automotive Engineering Society.

This technical standard is approved by the China Automotive Engineering Society.

This technical standard is under the jurisdiction of the China Automotive Engineering Society.

This technical standard was drafted. Dongfeng Motor, FAW Group, Shougang and so on.

1 Scope

This standard specifies heat treatable carbon steel sheets and steel strips for automobiles (hereinafter collectively referred to as "steel sheets and strips", which are separately referred to as Grades and classification, dimensions, shape, technical requirements and tests of hot-rolled steel sheets and strips, cold-rolled steel sheets and strips, cold-rolled narrow strips.

This standard is applicable to carbon used in heat treatment parts with certain hardness and special wear resistance in the production vehicles of automobile enterprises.

Steel plates and steel strips (for steel plates and steel strips, if they are not used after heat treatment, it is recommended to use the national standard).

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

Permissible deviation of chemical composition of finished products of GB/T 222 steel GB/T 223 steel and alloy chemical analysis method Decarburization layer depth measurement method for GB/T 224 steel GB/T 231 metal material Brinell hardness test GB/T 230 metal material Rockwell hardness test GB/T 229 metal material Charpy pendulum impact test method Decarburization layer depth measurement method for GB/T 224 steel Determination of non-metallic inclusions in GB/T 10561 steel GB/T 228.1 tensile testing of metallic materials - Part 1 GB/T 2975 steel and steel products mechanical properties test sampling position and sample preparation GB/T.20066 Sampling and sample preparation method for samples for determination of chemical composition of steel and iron GB/T 6394 Determination of average grain size of metals Microstructure evaluation method of GB/T 13299 steel GB/T 708 cold rolled steel sheet and strip size, shape, weight and tolerance GB/T 709 hot rolled steel sheet and strip size, shape, weight and tolerance GB/T 15391 width less than 600mm size, shape and tolerance of cold rolled steel strip General provisions for GB/T 247 steel and steel strip packaging, marking and quality certificates GB/T 8170 Numerical Rounding Rules and Representation and Determination of Limit Values

3 Grades and classification

3.1

Steel plate and steel strip grades and classifications shall comply with the requirements of Table 1.

Table 1 Steel plate and steel strip grades and classification

Brand

Thickness range

Mm Typical application parts general heat treatment method Cold rolled narrow steel strip with hot and cold steel plates and strips S20 0.1~< 1.5 ≥1.5 Engine system. elastic hoop, circlip for holes, etc.

Drive train. intermediate shaft bearing adjustment washer, lock washer, etc.

Steering system. auxiliary vertical arm adjustment gasket, clamp, etc.

Carburizing, carbonitriding, etc.

S35 0.1~< 1.5 ≥1.5 Carbonitriding, quenching and tempering, normalizing, etc. S45 0.1~< 1.5 ≥1.5 S65Mn 0.1~< 1.5 ≥1.5 tempering, etc.

Note: When selecting the steel plate near the lower limit of thickness, it is necessary to communicate with the steel mill to determine its production capacity.

3.2

The definition rules of the grades are shown in Appendix A, and the comparison table of the grades is shown in Appendix B.

T/CSAE XX-XXXX

4.1 Chemical composition

The chemical composition of steel plates and strips is specified in Table 2.

Table 2 Chemical composition

Brand

chemical composition% C Si Mn PS Cr Ni Cu S20 0.1~0.23 0.1~0.35 0.3~0.60 ≤0.030
 ≤0.030 ≤0.25 ≤0.30 ≤0.25 S35 0.3~0.38 0.1~0.35 0.6~0.90 ≤0.030 ≤0.030 ≤0.25
 ≤0.30 ≤0.25 S45 0.4~0.48 0.1~0.35 0.6~0.90 ≤0.030 ≤0.030 ≤0.25 ≤0.30 ≤0.25
 S65Mn 0.6~0.70 0.1~0.37 0.9~1.20 ≤0.035 ≤0.040 ≤0.25 ≤0.25 ≤0.25 Note. 1. If
 there are other requirements for chemical composition, it is specified in the material supply
 technical agreement.

2. The allowable deviation of the chemical composition of the finished steel plate is in accordance with GB/T 222.

4.2 Mechanical properties

The mechanical properties of the material under delivery shall comply with the requirements of Table 3. Recommended steel and steel strip heat treatment temperatures

and heat treatment conditions See Table 4 for the mechanical properties that can be referred to.

Table 3 Mechanical properties of materials under delivery

Brand

Hot rolled state a cold rolled annealed state b tensile strength N/mm² Elongation after break tensile strength N/mm² Elongation after break S20 ≥ 410 ≥ 26 355~500 ≥ 18 S35 ≥ 530 ≥ 20 410 ~ 530 ≥ 15 S45 ≥ 600 ≥ 17 450~570 ≥ 14 S65Mn ≥ 735 ≥ 9 ≤ 735 ≥ 15 Note. 1, a indicates that the tensile specimen takes 00 65.5 sL =, transverse specimen.

2, b indicates tensile specimens take L0 = 80mm, b = 20mm, transverse specimens.

Table 4 Recommended heat treatment temperature of steel plates and strips and mechanical properties under heat treatment conditions

Brand

Phase transition temperature Heat treatment temperature °C hot Mechanical behavior Ac
Ar Normalizing annealing, quenching, tempering, yielding Degree $\geq$ N/mm² Tensile
strength Degree $\geq$ N/mm² After breaking elongation Rate $\geq$ Impact value J/cm²
hardness (N) (A) (H) (HBW) S20 720~845 815~ 870~ Air cooling 860± Furnace cooling - -N
245 402 28 - 116 to 174 A - - - - 114~153 S35 720~800 770~ 840~ Air cooling 830±
Furnace cooling 840~ Water cooling 550~ Fast cold N 304 510 23 - 149~207 A - - - -
126~163 H 392 569 22 98 167-235 S45 720~780 750~ 820~ Air cooling 810± Furnace
cooling 820~ Water cooling 550~ Fast cold N 343 569 20 - 167~229 A - - - - 137~170 H 490
686 17 78.201~269 S65Mn 720~760 740~ 830~ Air cooling 775~ Furnace cooling 780~ Oil
cooler 350~ Fast cold N - - - - ≤ 269 A - - - - ≤ 228 H 780 980 10 - 36 to 50 (HRC)
T/CSAE XX-XXXX

Table 4 Recommended heat treatment temperatures of steel plates and strips and mechanical properties under heat treatment conditions (continued)

Note: 1. The tensile test takes L0=50mm, b=25mm, transverse test.

2. For the thin steel plate with a certain thickness specification, if it is not suitable for the hardness test in the table, it is recommended to measure the hardness of the small load and then perform the hardness conversion.

test.

4.3 Delivery status

There are two types of delivery status.

Cold-rolled annealed state, that is, steel sheet and steel strip are cold rolled and then