



ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

STEEL, UNALLOYED - INDUCTION HARDENABLE

SQ-M1A9410-A38

SQ-M1A9410-A46

SQ-M1A9410-A53

1. SCOPE

The material defined by this specification is an unalloyed carbon steel.

2. APPLICATION

This specification was released originally for the manufacture of car parts, which have to be induction hardened.

3. REQUIREMENTS

3.1 STATISTICAL PROCESS

Suppliers must conform to the requirements of Ford Quality System Standard Q-101. A mutually acceptable Control Plan as described therein is required for material/source approval. Appropriate statistical tools must be used to analyze process/product data so that variation in the final product is continuously reduced.

3.2 CHEMICAL COMPOSITION, %

Steel Type	SQ-M1A9410-A38	SQ-M1A9410-A46	SQ-M1A9410-A53
C	0.37 - 0.43	0.44 - 0.50	0.52 - 0.57
Si	0.15 - 0.35	0.15 - 0.35	0.15 - 0.35
Mn	0.70 - 0.90	0.60 - 0.85	0.60 - 0.80
S	0.025 - 0.040	0.025 - 0.040	0.025 - 0.040
P	max 0.035	max 0.035	max 0.035
Al	min 0.020	min 0.020	min 0.020
Cr	max 0.20	max 0.30	max 0.20
Ni	max 0.15	max 0.20	max 0.15
Mo	max 0.08	max 0.08	max 0.08
Sum Cr+Ni+Mo	0.15 - 0.35	0.15-0.35	0.15 - 0.35

3.3 AUSTENITE GRAIN SIZE

5 - 8

(Checking according to SAE J 418 a)

3.4 HARDENABILITY

(Checking according to SAE J 406 c)

The hardenability tests have to be carried out with samples with the dimension diameter 28 x 100 mm.

QUENCHING MEDIUM - Water

Date	Release No.	Release/Revision
1993 11 23	EP00E10258833000	para 3.2: was Sum Cr+Ni+Mo min 0,30 /W.Janssen
1992 01 31	C10176261	Revised & Retyped. Was 4 pages.
1983 02 11	SM/EQ5332TP	Released

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3.4 HARDENABILITY (continued)

Steel Type	SQ-M1A9410-A38		SQ-M1A9410-A46		SQ-M1A9410-A53	
Case Depth, mm +	min	max	min	max	min	max
Hardening Temperature C						
780	-	-	-	-	6	10
820	3	6	4	-	6	++
860	3.5	6.5	5	-	7	++
900	4	6.5	-	-	10	++

+) Hardness value limit of case depth 500 HV3

++) Through hardened

3.5 DEGREE OF PURITY

3.5.1 MACROSCOPIC DEGREE OF PURITY

Must conform to Ford specification SQ-M99P9000-A.

3.5.2 MICROSCOPIC DEGREE OF PURITY

Must conform to Ford specification SQ-M99P9001-A.

3.6 SUPPLIERS RESPONSIBILITY

All materials supplied to this specification must be equivalent in all characteristics to the material upon which approval was originally granted.

Prior to making any change in the properties, composition, construction, colour, processing or labelling of the material originally approved under this specification, whether or not such changes affect the material's ability to meet the specification requirements, the Supplier shall notify Purchasing, Toxicology and the affected Materials Engineering activity of the proposed changes and obtain the written approval of the Materials Engineering activity. Test data, test samples and a new code identification are to be submitted with the request.

Substance restrictions imposed by law, regulations or Ford, apply to the materials addressed by this document. The restrictions are defined in Engineering Material Specification WSS-M99P9999-A1, unless a different suffix (e.g. A2 or A3) is specified on the engineering document for the application.