MOLEX MATERIAL SPECIFICATION – S30100 ALLOY METAL STRIPS

1.0 SCOPE

This specification covers the technical requirements, applicable reference documents, and quality requirements for metal strips. The values listed for acceptance criteria are in SI units.

2.0 PURPOSE

The purpose of this specification is 1) to comprehensively define the Molex requirements for the alloy's chemical composition, physical properties, mechanical properties, and 2) to reference other applicable documents related to quality requirements and dimensional tolerances.

This specification when constructed, was derived from the requirements cited in the primary regional norms typically referenced for strip manufacture in UNS S30100 alloy; ASTM A666, JIS G4313, EN 10151 and various supplier citations.

3.0 REFERENCE DOCUMENTS

This primary specification covers the physical and mechanical properties of S30100 alloy strips that are necessary to ensure Molex product performance. Specification properties are a collection of relevant industry standards, including ASTM A666M, JIS G4313 and EN 10151. Additional Molex documents cover other requirements that are necessary to verify material characteristics that support high quality and manufacturability of products, including:

- 2090580043 Geometric Conditions and Tolerances for Metal Strips
- 2090580044 Metal Strip Surface Conditions and Requirements

These reference documents are crucial to the Molex process / product and therefore all requirements contained within them must be attested to and demonstrate their conformance, within the supplier's process certification.

4.0 ORDER OF PRECEDENCE

This defines the priority order that should be followed when reviewing attributes and requirements of metal strip:

1. Molex Purchase Order
2. Packaging Specifications
3. Molex (Individual) Metal Strip Specification (i.e. Part Number Specification)
4. Molex Material Alloy Specification (**This document** – 2090580059– Molex Material Specification – S30100 Alloy Metal Strips)
5. Surface (2090580044) and Geometric (2090580043) Global Engineering Specifications

5.0 TECHNICAL REQUIREMENTS

5.1 Chemical Composition

UNS #	Fe	Cr	Ni	Mn	Si	C	N	P	S
S30100	Balance	16.0 - 18.0	6.0 - 8.0	≤ 2.00	≤ 1.00	≤ 0.15	≤ 0.10	≤ 0.045	≤ 0.030

Limits for unnamed elements may be established between Molex and the supplier to satisfy certain environmental or customer requirements.

5.2 Mechanical Properties

Mechanical Properties Table S30100					
Molex Designation	**Tensile** (MPa)	**Yield 0.2% offset** (MPa)	**Elongation** % in 50mm	**RTF Grain Size** (mm)	***Notes Reference***
Annealed	≥ 515	≥ 205	≥ 40	≤ 0.03	*"Anneal" per ASTM A666*
H00	≥ 690	≥ 380	≥ 40	≤ 0.03	*"1/8 Hard" per ASTM A666*
H01	≥ 860	≥ 515	≥ 25	≤ 0.03	*"1/4 Hard" per ASTM A666*
H02	≥ 1035	≥ 760	≥ 15	≤ 0.02	*"1/2 Hard" per ASTM A666*
H02M	≥ 1130	≥ 745	≥ 5	≤ 0.02	*"3/4 Hard" per JIS G4313*
H03	≥ 1205	≥ 930	≥ 10	≤ 0.02	*"3/4 Hard" per ASTM A666*
H04	≥ 1275	≥ 965	≥ 8	≤ 0.02	*"Full Hard" per ASTM A666*
H05	≥ 1320	≥ 1030	≥ 3	≤ 0.02	*"Hard" per JIS G4313*
H06	≥ 1570	≥ 1275	≥ 3	≤ 0.02	*"Extra Hard" per JIS G4313*
H08	≥ 1860	≥ 1790	≥ 1	≤ 0.02	*"Super Full Hard" per ASTM A666*

Notes:

(1) Tension testing per ASTM A370

(2) Samples must be taken in the transverse direction and from a width of at least 230 mm (9 inches).

a. Longitudinal test values may be requested for engineering purposes.

5.3 Bending properties

Bending of metal strip samples shall be in accordance with ASTM E290 using the Guided-Bend test method, or ASTM A666 Controlled-Bend test method. The requirement is that the supplier's material when tested at finished thickness and temper shall achieve the inside bend radii as listed in the table below without observable cracking on the outside bend radius (reference 5.3.1 for Molex ranking system for Acceptance Criteria)

If special forming requirements are necessary, those will be listed separately on the part number document.

Bend Formability Table S301					
Molex Designation	Bending Orientation	Material Thickness	90° Bend	180° Bend	Bending Width to Thickness ratio
Annealed	Independent	≤ 0.50mm	0.0 r/t	0.0 r/t	10:1
H00	Independent	≤ 0.50mm	0.5 r/t	0.5 r/t	10:1
H01	Independent	≤ 0.50mm	0.5 r/t	0.5 r/t	10:1
H02	Independent	≤ 0.50mm	0.5 r/t	1.0 r/t	10:1
H02M	Independent	≤ 0.50mm	0.5 r/t	1.0 r/t	10:1
H03	Independent	≤ 0.15mm	1.0 r/t	1.0 r/t	10:1
H04	Independent	≤ 0.15mm	1.0 r/t	1.0 r/t	10:1
H05	N/A	N/A	N/A	N/A	N/A
H06	N/A	N/A	N/A	N/A	N/A
H08	N/A	N/A	N/A	N/A	N/A

***Test specimen criteria:**

- Width = 10 times the thickness with 10mm being the maximum bending width.
- R/T = inside bend radius divided by the strip thickness.
- “0 r/t” defined as an inside bend radius of ≤25% of the strip thickness.

5.3.1 Acceptance Criteria for Bending

When examined at a magnification of 30X, bend test samples shall be evaluated using the following acceptance criteria. Metallographic cross section shall be used as a referee method, examining at 150X magnification.

Bending Observations	Acceptance Criteria	Rank
	"Accepted", smooth, no orange peel, no cracks	1
	"Accepted", small orange peel, no cracks	2
	"Accepted", heavy orange peel, no cracks	3
	"Rejected", heavy orange peel, shallow cracks	4
	"Rejected", heavy orange peel, deep cracks	5

6.0 CERTIFICATION REQUIREMENTS

Certification at P.O. Level	Supplied Data at P.O. Level	Annual Capability Statement	Engineering Data by Request
Chemical Compostion (data)		Chemical Capability	
Tensile (data)		Tensile Capability	Transverse properties
Yield (data)		Yield Capability	Spring Bending Limit
Elongation (data)			
Grain size (data)			
			Elastic Modulus (data)
Thickness (data)		Thickness Capability	
Width (data)		Width Capability	
Camber (pass/fail)			
Surface Roughness (data)			
		Stress Relaxation Verification	
Burr (pass/fail)			
Bend Formability (pass/fail)			ASTM B820 Appendix narrow beam reporting table, or other
Electrical Conductivity (data)			
			Other Physical Properties
Reference Documents (pass/fail)			

6.1 Requirements for "Annual Capability Assessment" of critical characteristics

6.1.1 Chemical composition requires a statistical assessment on an annual basis to verify capability. This assessment be on file and available to Molex when requested.

6.1.2 Mechanical properties, requires a statistical assessment on an annual basis to verify capability. This assessment be on file and available to Molex when requested.

6.1.3 Dimensional tolerances, requires a statistical assessment on an annual basis to verify capability. This assessment be on file and available to Molex when requested.

6.1.4 Stress relaxation resistance is to be verified for a temper and a process in the H04 to H08 designation range at 80% of yield strength for 1000 hours at 75ºC and 125ºC. The supplier shall select and active Molex item to fulfill this requirement. It is acceptable to utilize Larson Miller Parameters to facilitate this annual verification audit.

6.2 Engineering Data

Acceptance of this material specification and the requirements includes the supplier's commitment to provide other engineering data when requested. These types of data may include transverse properties, spring bending limits or other physical properties of this material.

6.3 Recent Change Summary

Document ID# Change from **400005034-ES** → **2090580059**.

Updated **Section 3: Reference Documents** to reflect new **2090580043** and **2090580044** titles and content.

Changed **Section 4: Definitions** (with no entries) to **Section 4: Order of Precedence**.

Removal of what was previous **Section 6: Dimensional Requirements**

- All current Geometric and Dimensional Requirements are contained in **2090580043: GEOMETRIC CONDITIONS AND TOLERANCES FOR METAL STRIPS**. Including:
  - Strip Thickness
  - Strip Width
  - Burr
  - Camber
- All current Surface Condition Requirements are contained in **2090580044: METAL STRIP SURFACE CONDITIONS AND REQUIREMENTS**. Including:
  - Surface Roughness

Therefore, the previous **Section 7: Certification Requirements** and associated 7.X.Y subsections have decreased by one to become **Section 6: Certification Requirements** and associated 6.X.Y subsections.