

MOLEX MATERIAL SPECIFICATION – C18160 ALLOY METAL STRIPS

1. SCOPE

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

2. 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 various supplier citations referenced for copper alloy strip manufacture in UNS C18160 alloy.

3. REFERENCE DOCUMENTS

This primary specification focuses on the physics of C18160 alloy and related mechanical properties to assure Molex product performance. 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:

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

4. 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 – 2090580063– Molex Material Specification – C18160 Alloy Metal Strips**)
5. Surface (2090580044) and Geometric (2090580043) Global Engineering Specification

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	NEW RELEASE			MOLEX MATERIAL SPECIFICATION– C18160 ALLOY METAL STRIPS			
CHANGE NO.	849683						
REVISED BY		DATE		DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY		DATE		QMD	ENGINEERING STANDARD	000	209058
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	RYAN YINKSAMIEC	DATE	2026/04/15	MOLEX INTERNAL	2090580063	A	1 OF 5
INITIAL APPR	DANIEL MOLLA	DATE	2026/04/15				

5. TECHNICAL REQUIREMENTS

5.1 Chemical Composition

UNS #	Cu	Cr	Zr	Fe	Si
C18160 ¹	Remainder ²	0.2 - 1.2	0.05 – 0.25	≤ 0.1	≤ 0.1

- Limits for unnamed elements may be established between Molex and the supplier to satisfy certain environmental or customer requirements. Reference “Molex Chemical Substances Specification for Products and Packaging: Supplier Requirements” (2014040014).
- Copper + Sum of Named Elements = 99.7% min. (all values in weight percent) including Ag.

5.2 Mechanical Properties (longitudinal direction)

Mechanical Properties Table C18160			
Designation	Tensile Strength (1) (MPa)	Yield Strength (1) 0.2% offset (MPa)	Elongation % in 50 mm
TM04 (R480)	480 - 560	≥ 450	≥ 10
TM08 (R540)	540 - 660	≥ 500	≥ 4
TR08 (R540S)	540 – 620	≥ 480	≥ 8
TM10 (R600)	600 – 690	≥ 560	≥ 2

Notes:

(1) Tensile requirements are longitudinal values in uniaxial tension in accordance with ASTM E8M.

5.3 Electrical Conductivity

5.3.1 The test standard shall be ASTM E 1004 (eddy current) or ASTM B 193 (resistivity)

Temper	Conductivity @ 20°C (%IACS)
TM04 (R480)	83% - 92%
TM08 (R540)	83% - 91%
TR08 (R540S)	83% - 91%
TM10 (R600)	80% - 90%

Note: The acceptance is determined by the minimum value.

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	NEW RELEASE			MOLEX MATERIAL SPECIFICATION– C18160 ALLOY METAL STRIPS				
CHANGE NO.	849683							
REVISED BY	DATE	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES			
REV APPR BY	DATE	QMD	ENGINEERING STANDARD	000	209058			
INITIAL RELEASE		CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET			
INITIAL DRWN	RYAN YINKSAMIEC	DATE	2026/04/15	MOLEX INTERNAL		2090580063	A	2 OF 5
INITIAL APPR	DANIEL MOLLA	DATE	2026/04/15					

5.4 Bending properties






Bending of metal strip samples shall be in accordance with ASTM B820, Bend Test for Formability of Copper Alloy Spring Material. 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 5.4.1.)

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

Bend Formability Table C18160				
Temper Designation	90° Good Way	180° Good Way	90° Bad Way	180° Bad Way
TM04 (R480)	0.5 r/t	1.0 r/t	0.5 r/t	1.0 r/t
TM08 (R540)	1.0 r/t	2.5 r/t	1.0 r/t	2.5 r/t
TR08 (R540S)	0.25 r/t	1.0 r/t	0.25 r/t	1.5 r/t
TM10 (R600)	1.5 r/t	-	2.5 r/t	-
Test specimen criteria:				
Thickness ≤ 0.5 mm				
Width to thickness ratio ≥ 10:1				

Note: r/t = inside bend radius to thickness ratio.

5.4.1 Acceptance Criteria for Bending

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

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	NEW RELEASE			MOLEX MATERIAL SPECIFICATION- C18160 ALLOY METAL STRIPS			
CHANGE NO.	849683						
REVISED BY	DATE	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES		
REV APPR BY	DATE	QMD	ENGINEERING STANDARD	000	209058		
INITIAL RELEASE			CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET	
INITIAL DRWN	RYAN YINKSAMIEC	DATE	2026/04/15	MOLEX INTERNAL	2090580063	A	3 OF 5
INITIAL APPR	DANIEL MOLLA	DATE	2026/04/15				

5.5 Thermal Stress Relaxation Resistance (Nominal expected performance as measured by the Ring Method in compliance with ASTM E328)

C18160 Thermal Stress Relaxation - Percent Retained @ 1000 Hours			
Precipitation Hardened Condition			
Temp °C	50% Rp _{0.2}	80% Rp _{0.2}	100% Rp _{0.2}
125	96%	96%	96%
150	93%	93%	93%
200	87%	87%	87%

Note:

1. Rp_{0.2} is equivalent to 0.2% offset Yield strength
2. This table represents the “Thermal Stress Relaxation” in the precipitation hardened state, common in most Molex applications. The values shown are intrinsic material characteristics primarily governed by alloy composition and are therefore independent of the applied stress level. What is not represented here is certain types of supplier processing such as, final cold rolling, stretch-bend-levelling, etc., that negatively influence the stress relaxation curve. Additional strong negative influences come from the types and intensities of part forming processes along with the strain component applied at the separable interface. Therefore, this thermal relaxation is only one component of the total relaxation that could be experienced in use.

6. CERTIFICATION REQUIREMENTS

Certification at P.O. Level	Supplied Data at P.O. Level	Annual Capability Statement	Engineering Data by Request
Chemical Composition (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)			

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	NEW RELEASE			MOLEX MATERIAL SPECIFICATION- C18160 ALLOY METAL STRIPS			
CHANGE NO.	849683						
REVISED BY	DATE	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES		
REV APPR BY	DATE	QMD	ENGINEERING STANDARD	000	209058		
INITIAL RELEASE			CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET	
INITIAL DRWN	RYAN YINKSAMIEC	DATE	2026/04/15	MOLEX INTERNAL	2090580063	A	4 OF 5
INITIAL APPR	DANIEL MOLLA	DATE	2026/04/15				

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 TM04 to TM10 designation range at 100% of yield strength for 1000 hours at 125°C and 150°C. The supplier shall select an 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 include 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

Initial Release.

THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

REVISION DESCRIPTION	NEW RELEASE			MOLEX MATERIAL SPECIFICATION– C18160 ALLOY METAL STRIPS			
CHANGE NO.	849683						
REVISED BY	DATE			DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES
REV APPR BY	DATE			QMD	ENGINEERING STANDARD	000	209058
INITIAL RELEASE				CUSTOMER	DOCUMENT NUMBER	REVISION	SHEET
INITIAL DRWN	RYAN YINKSAMIEC	DATE	2026/04/15	MOLEX INTERNAL	2090580063	A	5 OF 5
INITIAL APPR	DANIEL MOLLA	DATE	2026/04/15				