

Tips and Tricks: APA Total Materia Premium Edition



About Total Materia

Total Materia, the world's most comprehensive materials database, and has provided the engineering community with its invaluable resource for over a decade. With over 450,000 metallic and non-metallic materials from 67 international standards Total Materia provides the benchmark for the basics such as cross-referencing, chemical composition, mechanical and physical properties and in addition, a unique vast database module containing thousands of stress strain, fatigue data and other experimental information.

Challenge Objective

To select and compare materials and their properties at the designation level, and then to compare specific stress strain curves of those materials on the same axis.

1.0 Search for the designation of interest to be compared.

2.0 Possibility to view basic and advanced properties for the selected material

Chemical Composition (%)

Criteria	Min.	Max.	Approx.
C	0.0200	0.1300	-
P	-	0.0600	-
S	-	0.0150	-
Ni	-	0.2000	-
Cr	-	0.1500	-
Mo	-	0.0600	-
Cu	-	0.2000	-

Comment: Other

Mechanical Properties

Measurement Units: Metric (SI) Anglo-Saxon

Room Temperature (6) [High Temperatures \(0\)](#)

Sheets; Cold reduced

Yield stress, R _{0.2} (MPa)	340
Tensile stress, R _m (MPa)	410
Elongation, A (%)	22
Reduction of Area (%)	-
Impact, Kv/Ku (J)	-

Sheets; Hot rolled

Yield stress, R _{0.2} (MPa)	340
Tensile stress, R _m (MPa)	410
Elongation, A (%)	25
Reduction of Area (%)	-

Stress [MPa] vs. Plastic strain [m/m]

Strain Amplitude (log scale) vs. Reversals to failure, 2Nf (log scale)

Legend: elastic (blue), plastic (orange), total (red)







3.0 Select equivalency candidates for comparison and replacement from the 20 million cross reference connections and quick compare the original SAE Grade 340X against other global material grades.

Cross Reference Table

Select standard:

[All](#)
[Identical](#)
[Official](#)
[Composition 100%](#)
[Other Sources](#)
[Implicit](#)
[SmartCross²](#)

Result(s) found: 6

MATERIAL	COUNTRY / STANDARD	COMPARE
1.0548	European Union / EN	
H 320 LA	European Union / EN	
HC340LA	European Union / EN	
CR HSLA 340	Generic	
JSC440R	Japan / JFS	
HSLA 350/410	ULSAB AVC	

4.0 Add materials of interest including the original to a four way property comparison.

Comparison View

Materials (4) [Stress Strain Diagrams \(0\)](#)

[Grade 340 X](#)
[1.0548](#)
[JSC440R](#)
[HSLA 350/410](#)

[Basic Information](#)
[Chemical Composition \(%\)](#)
[Mechanical Properties](#)
[Stress Strain Diagrams](#)

Country/Standard: USA / SAE
Group of Materials: Metals
Subgroup: [SAE J 2340 Categorization and SAE J 2340 Categorization and properties of dent resistant, high strength, and high strength automotive sheet steel Comment: Type X - High strength low alloy (HSL) Classification of steel is not based on chemistry. Three surface conditions sheet steel: E - Exposed, U - Unexpo and Z - Semi exposed.]

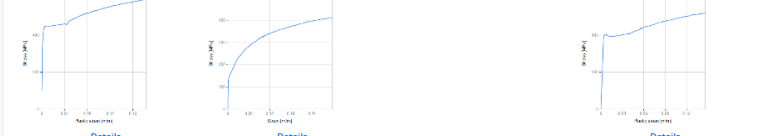
Criteria	Min.	Max.	Approx.
C	0.0200	0.1300	
Cr		0.1500	
Cu		0.2000	
Mo		0.0600	
Ni		0.2000	
P		0.0600	
S		0.0150	

Criteria	Min.	Max.	Approx.
Yield stress, R _{0.2} (MPa)	340	440	
Tensile stress, R _m (MPa)	410		
Elongation, A (%)	22		

Criteria	Min.	Max.	Approx.
Yield stress, R _{0.2} (MPa)	340	440	
Tensile stress, R _m (MPa)	410		
Elongation, A (%)	25		

Conditions: 1: Cold rolled; Sheets; (dynan)

True Stress-Strain



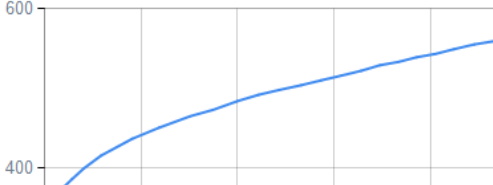
5.0 From the 4 selected materials select specific stress strain curves from all available conditions to compare on the same axis

Conditions
Total items found: 13

CONDITION	
1	Hot rolled; Sheets; (dynamic tensile)
2	Hot-Dip Galvanized; Sheets; (dynamic tensile)
3	Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 0.005; (dynamic tensile)
4	Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 0.1; (dynamic tensile)
5	Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 10; (dynamic tensile)

Condition: Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 0.005; (dynamic tensile)
Comment: Stress strain data originating from dynamic tensile testing

True Stress-Strain Engineering Stress-Strain



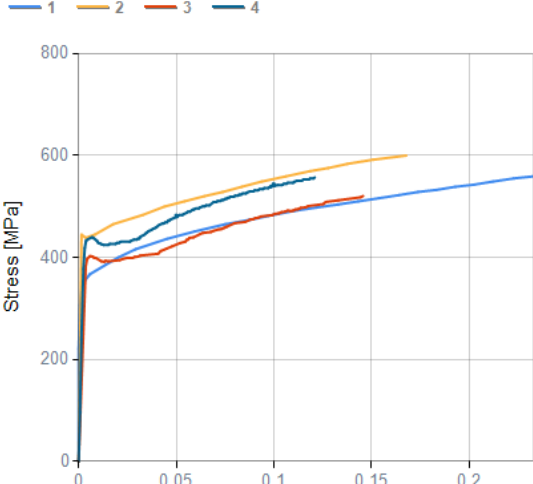
21°C

Strain	Stress (MPa)
0	0
0.0003	220
0.0007	306

Comparison View

Materials (4) Stress Strain Diagrams (4)

True Stress-Strain Engineering Stress-Strain Back



Material	Condition	
1 Grade 340 X SAE	Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 0.005; (dynamic tensile); T=21°C	✕
2 Grade 340 X SAE	Hot-Dip Galvanized; Sheets; Smoothed; Direction: L; Strain rate: (1/s): 10; (dynamic tensile); T=21°C	✕
3 HSLA 350/410 ULSAB AVC	Cold rolled; Sheets; (dynamic tensile); T=21°C	✕
4 1.0548 EN	Hot-dipped galvanized (HDGI); (tensile); T=21°C	✕

Comparison View Compare Materials 4/4 Compare Stress Strain Diagrams 4/6