YILDIZ TECHNICAL UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
CONSTRUCTION MATERIALS DIVISION

MATERIAL SCIENCE / LABORATORY REPORT 2: MECHANICAL PROPERTIES OF STEEL

Name-Surname: **Group:**

Student No.:

TENSION TEST

Specimen		Mild (Low Carbon) RC Steel
Class / Type		S420 / Ribbed
Length (l_{bar}, cm)		
Diameter (d_o, mm)		
Load (P)	**P_{yield} (kN)**	
	P_{max} (kN)	
	$P_{fracture}$ (kN)	
Final Diameter (d_f, mm)		
Gauge Length (l)	**Initial ($l_i=5d_o$, mm)**	
	Final (l_f, mm)	
Yield Strength (σ_y, MPa)		
Tensile Strength (σ_t, MPa)		
Apparent Fracture Strength (σ_{af}, MPa)		
True Fracture Strength (σ_{tf}, MPa)		
Ductility (ε_f, %)		
Necking Ratio (R_A, %)		

Calculations:

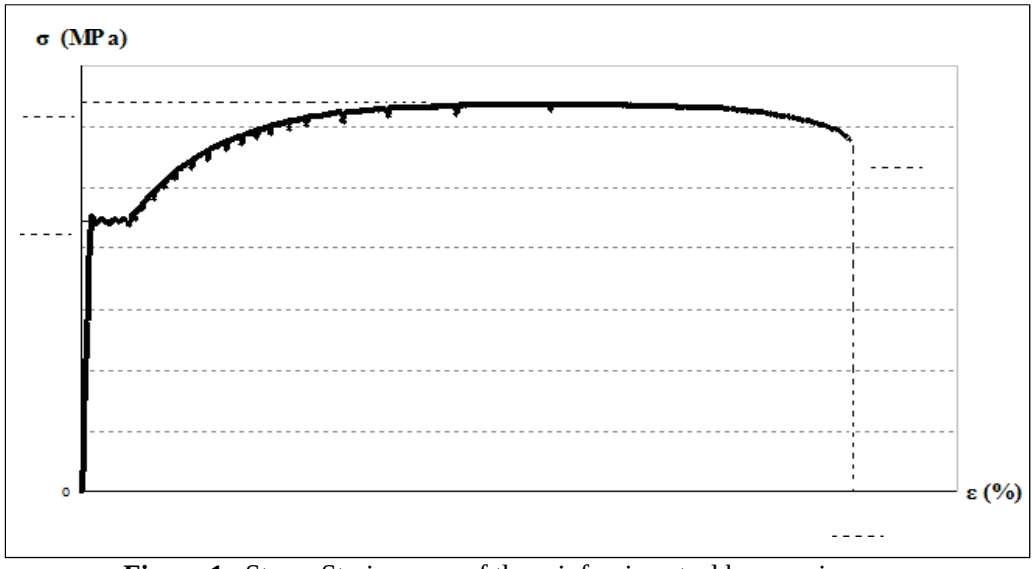


Figure 1. Stress-Strain curve of the reinforcing steel bar specimen

Table 1. Evaluation of the tension test results considering TS 708 (March 2016)

Description of the Steel Sample and Corresponding Limit Values		**Test Results and Evaluation**
Class / Type	S420 / Ribbed	*Test Results* *Discussion*
Yield Strength ≥ 420 (MPa)		σ_{yield} = ... MPa ☐
Tensile Strength ≥ 500 (MPa)		$\sigma_{tensile}$ = ...MPa ☐
$1.15 \le \frac{Tensile\ Strength}{Yield\ Strength} < 1.35^*$		$\sigma_{tensile}/\sigma_{yield}$ = ... ☐
$\frac{Experimental\ Yield\ Strength}{Characteristic\ Yield\ Strength} \le 1.30$		$\sigma_{y,experimental}/\sigma_{y,characteristic}$ = ... ☐
		Ductility = %..... ☐
Ductility ≥ %10		**Conclusion** The tested S420 class steel sample: ***conforms / does not conform*** to the limit values specified in the relevant standard and regulation.

** The upper limit value given as 1.35 in Turkish Seismic Code (2018) is a requirement for the S420 steels to be used in RC buildings that resist to seismic loads.*

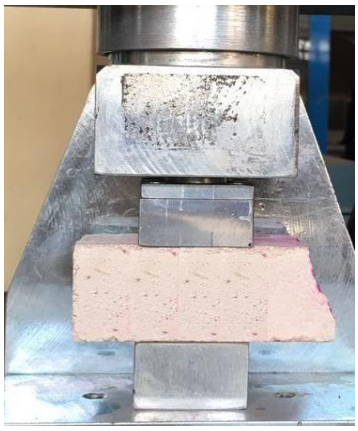
2.1. BENDING TEST

Specimen	Hardened Cement Mortar
Distance Between Supports (l, mm)	
Width (b, mm)	
Height (h, mm)	
Failure Load (kN)	
Flexural Strength (MPa)	

Calculation:

2.2. COMPRESSION TEST

Specimen	Hardened Cement Mortar
Area (mm^2)	
Failure Load (kN)	
Compressive Strength (MPa)	



Calculation: