



# TENSILE TESTING OF STEEL



Student:

Year:

Date:

Teacher:

## Program:

- Specimens and principles of tensile test
- Properties determined from tensile test
- Engineering and True stress-strain diagram
- Distribution of deformation alongside the test specimen

## TENSILE TEST (EN ISO 6892-1)

### Tasks:

- Perform tensile test using tensile specimen made of steel S235JR
- Determine yield strength, ultimate strength, area of reduction and ductility of short and long proportional test bar.
- Draw engineering and true stress-strain daigram of tested steel
- Draw relation of deformation alongside test bar

### Tested material:

According to EN: **S235JR**, where: **S** → structural steel, **235** → minimum yield strength 235 MPa, **JR** → material toughness (Charpy V-Notch impact test at 27J at room temperature)

### Determination of measured quantity:

Initial length of specimen → Short bar:  
Long bar:

Yield strength:

Ultimate streghth:

Area of reduction:

Ductility:

**TABLE 1:** Tensile test of steel S235JR – measured and calculated values

Initial dimensions		Measured values				Calculated values					
$d_0$	$L_0$	$F_e$	$F_m$	$D_u$	$L_u$	$S_0$	$R_e$	$R_m$	$S_u$	$Z$	*A **A <sub>11,3</sub>
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
	*										
	**										

\* short proportional bar, \*\* long proportional bar

**Annotation:**

Round off the values of yield strength, ultimate strength and ductility to the nearest whole number and area of reduction to 0,5.



**Fig. 1:** Schematic sketch of engineering and true strain-stress diagram of steel S235JR

**Annotation:**

Distinguish diagrams (including description of axes) with using colors. Mark yield strength, ultimate strength and area of elastic and plastic deformation.

**TABLE 2:** Distribution of deformation alongside the test specimen

segment	1	2	3	4	5	6	7	8	9	10	11	12	13	14
$L_{ui}$ [ ]														
$A_i$ [ ]														

*\* short proportional bar, \*\* long proportional bar*

Measure single segment with 0,1 mm accuracy.



**Fig. 2:** *Distribution of deformation alongside the test specimen*

**Annotation:**

Mark ductility of short and long test specimen ( $A$  and  $A_{11,3}$ ) in diagram.

**Conclusion:**