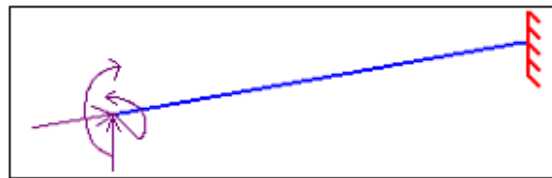


TEST SCHEDULE R 47	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
RESISTANCE	COMPRESSION+BENDING2 AND 3+SHEAR2 AND 3	EC3.RES.NNM2M3T2T3.001



Program: WEURO © version October 2007 for Sargon and Cescoplus
Keywords: EN 1993, Eurocode 3, example, validation, benchmark, reliability, quality control, error measure. **Parole chiave:** Eurocodice 3, esempio, validazione, test, affidabilità, controllo di qualità, misura dell'errore
Tv=exploitation target value, Cv=exploitation computed value
Authors: Ing. Marco Croci, Ing. Paolo Rugarli

BEAM		
Length [mm]	Left end	Right end
1 (*)	FREE	FIXED

LOADS			
Type	Value	Point of application	
BENDING MOMENT M ₂	M=2.000.000Nmm	LEFT END	
Type	Value	Point of application	
BENDING MOMENT M ₃	M=1.500.000Nmm	LEFT END	
Type	Value	Point of application	
COMPRESSION	N=70.000N	LEFT END	
Type	Value	Point of application	
SHEAR T ₂	T=35.400	LEFT END	
Type	Value	Point of application	
SHEAR T ₃	T=35.400	LEFT END	

MATERIAL	A572/60					
f _y [N/mm ²]	f _u [N/mm ²]	E [N/mm ²]	ν	γ _{M0}	γ _{M1}	γ _{M2}
414	517	2,000e+05	0,3	1,1	1,1	1,25

CROSS SECTION	O 54x3,2	CLASS: N⁻ →1	M₂ →1	M₃ →1	N⁻ + M₂ + M₃ →1 (reclasses metod**)
A [mm ²]	J ₂ [mm ⁴]	J ₃ [mm ⁴]	J _t [mm ⁴]	W ₂ [mm ³]	W ₃ [mm ³]
510,7	1,654e+05	1,654e+05	3,308e+05	6,126e+03	6,126e+03
W _{pl2} [mm ³]	W _{pl3} [mm ³]	i ₂ [mm]	i ₃ [mm]	i _t [mm]	
8,269E+03	8,269E+03	18	18	0	

OTHER DATA			
N _{pl} =A _f γ _{M0} [N]	M _{pl} =W _{pl} f _y /γ _{M0} [Nmm]	A _v =2A/π [mm ²]	V _{pl} =A _v *f _y /√3/γ _{M0} [N]
192.209	4.937.891	325,1	70.647
M _s = √(M ₂ ² + M ₃ ²) ***	T _s = √(T ₂ ² + T ₃ ²) ***	η = √(1 - (T _s /V _{pl}) ²) ***	
2.500.000	50.063	0,706	

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$T_v = \frac{M_s}{M_{pl} \eta \cos\left(\frac{N}{\eta N_{pl}} \frac{\pi}{2}\right)} \quad ***$$

Tv
1,653E+00

CHECKER'S RESULTS (COMPUTED VALUES) AND COMPARISON WITH THE TARGET

Cv	(Cv-Tv)/Tv
1,653E+00	2,514E-04

(*) length is only 1mm in order to diminish the increase of moment along the beam

(**) P. Rugarli, *Strutture in acciaio, La classificazione delle sezioni, Commento all'Eurocodice 3*, EPC Libri, 2007

(***) formulae given in J. Rondal, K.-G. Wurker, D.Dutta, J. Wardenier, N. Yeomans, *Structural stability of hollow sections*, Verlag TUV Rheinland, 1992

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