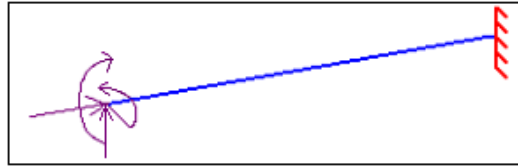


TEST SCHEDULE R 48	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
RESISTANCE	COMPRESSION+BENDING2 AND 3+SHEAR2 AND 3	EC3.RES.NNM2M3T2T3.002



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
5000	FREE	FIXED

LOADS		
Type	Value	Point of application
BENDING MOMENT M ₂	M=70.000.000Nmm	LEFT END
BENDING MOMENT M ₃	M=6.000.000Nmm	LEFT END
COMPRESSION	N=900.000N	LEFT END
SHEAR T ₂	T=400.000N	LEFT END
SHEAR T ₃	T=160.000N	LEFT END

MATERIAL	S235					
f _v [N/mm ²]	f _u [N/mm ²]	E [N/mm ²]	ν	γ _{M0}	γ _{M1}	γ _{M2}
235	360	2,10E+05	0,3	1,1	1,1	1,25

CROSS-SECTION	HE 200 B	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]
7808	5,696e+07	2,003e+07	5,928e+05	5,696e+05	2,003e+05
W _{pl2} [mm ³]	W _{pl3} [mm ³]	i ₂ [mm]	i ₃ [mm]	i _t [mm]	
6,426e+05	3,058e+05	85,40	50,70	57,74	
h	b	t _w	t _f	r	
200	200	9	15	18	

OTHER DATA					
N _{pl} =A f _v /γ _{M0} [N]		M _{pl2} =W _{pl2} *f _v /γ _{M0} [Nmm]		M _{pl3} =W _{pl3} *f _v /γ _{M0} [Nmm]	
1.668.073		137.282.727		65.330.000	
A _{V3} =A-2bt _f +(t _w +2r)t _f [mm ²]		V _{pl2} =A _{V2} *(f _y /√3)/γ _{M0} [N]		V _{pl3} =A _{V3} *(f _y /√3)/γ _{M0} [N]	
2.483		740.058		306.261	
a _{v2}	a _{v3}	N _{pl.v} =N _{pl} *(1-ρ ₂ *a _{v2} -ρ ₃ *a _{v3}) [N]		n _v =N/N _{pl.v}	
0,768	0,318	1.658.596		0,543	
M _{N2} =M _{pl} *(1-n)/(1-0,5a) [Nmm]		M _{N3} =M _{pl} [1-((n-a)/(1-a)) ²] [Nmm]		W _{2,2}	
71.028.647		54.642.640		0,864	
W _{3,2}		W _{3,3}		M _{NV2} =M _{N2} *(1-W _{2,2} ρ ₂ -W _{2,3} ρ ₃)	
0,981		0,044		M _{NV3} =M _{N3} *(1-W _{3,2} ρ ₂ -W _{3,3} ρ ₃)	
				70.593.381	
				54.286.146	

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$T_v = (M_2/M_{NV2})^\alpha + (M_3/M_{NV3})^\beta \quad \text{with } \alpha=2, \beta=5, n_v=2,713$$

Tv
9,858E-01

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

Cv	(Cv-Tv)/Tv
9,864E-01	6,095E-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

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<http://www.castaliaweb.com>
staff@castaliaweb.com