

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
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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 _y [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 _y /γ _{M0} [N]	M _{pl2} =W _{pl2} *f _y /γ _{M0} [Nmm]	M _{pl3} =W _{pl3} *f _y /γ _{M0} [Nmm]	A _{V2} =2bt _f [mm ²]		
1.668.073	137.282.727	65.330.000	6.000		
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]	ρ ₂	ρ ₃	
2.483	740.058	306.261	6,560E-03	2,013E-03	
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}	a=(A-2bt _f)/A	
0,768	0,318	1.658.596	0,543	0,232	
M _{N2} =M _{pl} [(1-n)/(1-0,5a)] [Nmm]	M _{N3} =M _{pl} [1-((n-a)/(1-a)) ²] [Nmm]	w _{2,2}	w _{2,3}		
71.028.647	54.642.640	0,864	0,230		
w _{3,2}	w _{3,3}	M _{NV2} =M _{N2} *(1-w _{2,2} ρ ₂ -w _{2,3} ρ ₃)	M _{NV3} =M _{N3} *(1-w _{3,2} ρ ₂ -w _{3,3} ρ ₃)		
0,981	0,044	70.593.381	54.286.146		

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

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

T _v
9,858E-01

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

C _v	(C _v -T _v)/T _v
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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