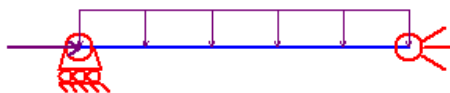


TEST SCHEDULE B 32	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
BUCKLING	COMPRESSION + BENDING 2	EC3.BUC.NN3.005



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]	Buckling factors		Left end		Right end	
4000	$\beta_1=0$	$\beta_2=1$	$\beta_3=1$	FREE		FIXED
LOAD						
Type		Value		Point of application		
COMPRESSION		N=10.000N		LEFT END		
Type		Value				
DISTRIBUTED LOAD q_3		q=80N/mm				
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 M ₂ →1 N ⁻ + M ₂ → 1 (reclasses method****)		
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*						
	k _{yy}	k _{yz}	k _{zy}	k _{zz}		
Method 1	1,001	/	0,522	/		
Method 2	0,952	/	0,571	/		

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$\left. \begin{aligned} Tv_{1,j} &= N / (\chi_2 A f_y / \gamma_{M1}) + k_{yy} M_2 / (\chi_{LT} W_{pl2} f_y / \gamma_{M1}) \\ Tv_{2,j} &= N / (\chi_3 A f_y / \gamma_{M1}) + k_{zy} M_2 / (W_{pl2} f_y / \gamma_{M1}) \end{aligned} \right\} Tv_{method j} = \max(Tv_{1,j}, Tv_{2,j})$$

Tv _{method1} **	Tv _{method2} ***
1,174E+00	1,116E+00

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

Cv _{method1}	(Cv ₁ -Tv ₁)/Tv ₁	Cv _{method2}	(Cv ₂ -Tv ₂)/Tv ₂
1,174E+00	1,078E-04	1,116E+00	-1,980E-04

NOTE: the exploitation for stability using Method 2 is not the most critical condition (resistance check for bending gives an exploitation of 1,166E+00).

(*) formulae given in EN 1993-1-1 6.3.3, annex A and annex B

(**) more accurated

(***) easier to use

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

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