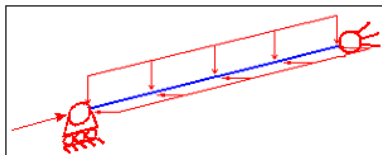


TEST SCHEDULE B 49	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescopius ©
BUCKLING	COMPRESSION + BENDING 2 + BENDING 3 (with LT)	EC3.BUC.NNQ2Q3.007



Program: WEURO © version October 2007 for Sargon and Cescopius
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	
3000	$\beta_1=1$	$\beta_2=1$	$\beta_3=1$	SIMPLY SUPPORTED		HINGE
LOAD						
Type			Value		Point of application	
COMPRESSION			N=100.000N		LEFT END	
Type			Value			
DISTRIBUTED LOAD q_2			q=15N/mm			
Type			Value			
DISTRIBUTED LOAD q_3			q=10N/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 M ₃ →1 N ⁻ + M ₂ + M ₃ →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		1,012	0,696	0,537	0,999	
Method 2		0,961	0,599	0,993	0,999	

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$\left. \begin{aligned}
 T_{v1,j} &= N / (\chi_2 A f_y / \gamma_{M1}) + k_{yy} M_2 / (\chi_{LT} W_{pl2} f_y / \gamma_{M1}) + k_{yz} M_3 / (W_{pl3} f_y / \gamma_{M1}) \\
 T_{v2,j} &= N / (\chi_3 A f_y / \gamma_{M1}) + k_{zy} M_2 / (\chi_{LT} W_{pl2} f_y / \gamma_{M1}) + k_{zz} M_3 / (W_{pl3} f_y / \gamma_{M1})
 \end{aligned} \right\} T_{v\text{method } j} = \max(T_{v1,j}, T_{v2,j})$$

$T_{v\text{method1}}^{**}$	$T_{v\text{method2}}^{***}$
3,832E-01	4,231E-01

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

C_1 computation method	$C_{v\text{method1}}$	$(C_{v1} - T_{v1}) / T_{v1}$	$C_{v\text{method2}}$	$(C_{v2} - T_{v2}) / T_{v2}$
Serna (****)	3,830E-01	-5,602E-04	4,230E-01	-2,592E-04
AISC	3,830E-01	-5,602E-04	4,230E-01	-2,592E-04
BS 2000	3,832E-01	-3,831E-05	4,233E-01	4,498E-04
fixed value ($C_1=1,132$)	3,830E-01	-5,602E-04	4,230E-01	-2,592E-04

(*) 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
 (*****) M. Serna, A. Lopez, I. Puente, D.J. Yong, *Equivalent uniform moment factors for lateral-torsional buckling of steel members*, Tecnum Journal of Constructional Steel Research, n°62, pp. 566-580, 2006

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