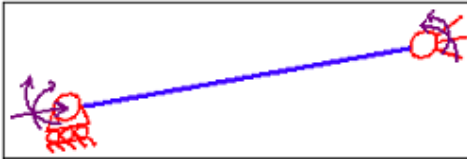


TEST SCHEDULE B 48	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
BUCKLING	COMPRESSION + BENDING 2 + BENDING 3 (with LT)	EC3.BUC.NNM2M3.008



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	
5000	$\beta_1=1$	$\beta_2=1$	$\beta_3=1$	SIMPLY SUPPORTED		HINGE
LOAD						
Type		Value		Point of application		
COMPRESSION		N=100.000N		LEFT END		
Type		Value		Point of application		
BENDING MOMENT M_2		M=2.000.000Nmm		LEFT END		
BENDING MOMENT M_2		M=-2.000.000Nmm		LEFT END		
Type		Value		Point of application		
BENDING MOMENT M_3		M=1.000.000Nmm		RIGHT END		
BENDING MOMENT M_3		M=-1.000.000Nmm		RIGHT 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 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		1,067	0,751	0,564	1,059	
Method 2		1,031	0.698	0.984	1,164	

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$\begin{aligned}
 Tv_{1,j} &= N / (\chi_2 A f_y / \gamma_{M1}) + k_{yy} M_2 / (\chi_{LT} W_{pl2} f_y / \gamma_{M1}) + k_{yz} M_3 / (W_{pl3} f_y / \gamma_{M1}) \\
 Tv_{2,j} &= N / (\chi_3 A f_y / \gamma_{M1}) + k_{zy} M_2 / (\chi_{LT} W_{pl2} f_y / \gamma_{M1}) + k_{zz} M_3 / (W_{pl3} f_y / \gamma_{M1})
 \end{aligned}
 \quad \left. \vphantom{\begin{aligned} Tv_{1,j} \\ Tv_{2,j} \end{aligned}} \right\} Tv_{method\ j} = \max(Tv_{1,j}, Tv_{2,j})$$

Tv _{method1} **	Tv _{method2} ***
1,430E-01	1,518E-01

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
1,430E-01	-3,072E-04	1,518E-01	-1,750E-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