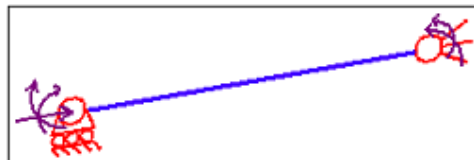


TEST SCHEDULE B 39	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
BUCKLING	COMPRESSION + BENDING 2 + BENDING 3	EC3.BUC.NNM2M3.005



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
1000	$\beta_1=0 \quad \beta_2=1 \quad \beta_3=1$	SIMPLY SUPPORTED	HINGE

LOAD			
Type	Value	Point of application	
COMPRESSION	N=500.000N	LEFT END	
Type	Value	Point of application	
BENDING MOMENT M_2	M=1.000.000Nmm	LEFT END	
BENDING MOMENT M_2	M=-1.000.000Nmm	RIGHT END	
Type	Value	Point of application	
BENDING MOMENT M_3	M=1.500.000Nmm	LEFT END	
BENDING MOMENT M_3	M=-1.500.000Nmm	RIGHT END	

MATERIAL	S355					
f_y [N/mm ²]	f_u [N/mm ²]	E [N/mm ²]	ν	γ_{M0}	γ_{M1}	γ_{M2}
355	510	2,10e+05	0,3	1,1	1,1	1,25

CROSS SECTION	RHS 90x90x7x14	CLASS: N⁻→1 M₂→1 M₃→1 N⁺ + M₂ + M₃→1 (reclasses method****)			
A [mm ²]	J ₂ [mm ⁴]	J ₃ [mm ⁴]	J ₁ [mm ⁴]	W ₂ [mm ³]	W ₃ [mm ³]
2198	2,486e+06	2,486e+06	4,117e+06	5,525e+04	5,525e+04
W _{pl2} [mm ³]	W _{pl3} [mm ³]	i ₂ [mm]	i ₃ [mm]	i _t [mm]	
6,699e+04	6,699e+04	33,63	33,63	0	
h	b	t	r		
90	90	7	14		

OTHER DATA*				
	k_{yy}	k_{yz}	k_{zy}	k_{zz}
Method 1	0,950	0,577	0,577	0,950
Method 2	1,140	0,684	0,684	1,140

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

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

Tv _{method1} **	Tv _{method2} ***
8,302E-01	8,483E-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
8,302E-01	-4,120E-05	8,483E-01	-4,744E-05

(*) 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