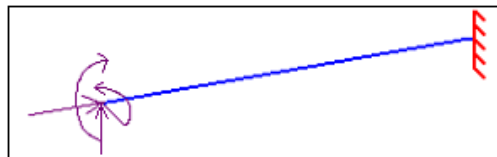


TEST SCHEDULE R 44	EN 1993-1-1: 2005 (EUROCODE 3)	Sargon ©, Cescoplus ©
RESISTANCE	COMPRESSION+BENDING2+BENDING3+SHEAR3	EC3.RES.NNM2M3T3.001



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]	Left end
1 (*)	FREE

LOADS		
Type	Value	Point of application
BENDING MOMENT M_2	M=3.000.000.000Nmm	LEFT END
BENDING MOMENT M_3	M=2.000.000.000Nmm	LEFT END
COMPRESSION	N=30.000.000N	LEFT END
SHEAR T_3	T=2.000.000N	LEFT END

MATERIAL	S490					
f_y [N/mm ²]	f_u [N/mm ²]	E [N/mm ²]	ν	γ_{M0}	γ_{M1}	γ_{M2}
490→450	570	2,10E+05	0,3	1,1	1,1	1,25

CROSS SECTION	HSH 600X828	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]
1,055E+05	6,544E+09	2,737E+09	1,813E+08	2,181E+07	9,124E+06
W_{pl2} [mm ³]	W_{pl3} [mm ³]	i_2 [mm]	i_3 [mm]	i_t [mm]	
2,550E+07	1,379E+07	149	161	173,2	
h	$b_1=b_2$	t_w	$t_{f1}=t_{f2}$		$\beta=5n$
600	600	32	76		3,474

OTHER DATA			
$N_{pl}=A f_y / \gamma_{M0}$ [N]	$M_{pl2}=W_{pl2} f_y / \gamma_{M0}$ [Nmm]	$M_{pl3}=W_{pl3} f_y / \gamma_{M0}$ [Nmm]	$A_v=(h-2t_f) t_w$ [mm ²]
43.173.818	10.431.818.182	5.641.363.636	14.336
$V_{pl3}=A_v f_y / \sqrt{3} / \gamma_{M0}$ [N]	$\rho=(2T/V_{pl3}-1)^2$	a_{v3}	$N_{pl,V}=N_{pl}(1-a_{v3}\rho_3)$ [N]
3.386.002	0,033	0,136	42.980.974
$n_v=N / N_{pl,V}$	$a=(A-2bt_f)/A$	$M_{N2}=M_{pl2}(1-n)/(1-0,5a)$ [Nmm]	$M_{N3}=M_{pl3}[1-((n-a)/(1-a))^2]$ [Nmm]
0,698	0,136	3.380.458.888	3.255.739.659
$w_{2,3}$	$w_{3,3}$	$M_{NV2}=M_{N2}(1-pw_{2,3})$ [Nmm]	$M_{NV3}=M_{N3}(1-pw_{3,3})$ [Nmm]
0,0630	0,0083	3.373.459.813	3.254.849.607

TARGET VALUES BASED ON PRELIMINAR COMPUTATIONS

$$T_v=(M_2/M_{NV2})^\alpha+(M_3/M_{NV3})^\beta \quad \text{with } \alpha=2, \beta=5n_v=3,490$$

T_v
9,747E-01

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

C_v	$(C_v-T_v)/T_v$
9,749E-01	2,471E-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

NOTE: according to table 3.1 when cross section thickness is higher than 40mm yield stress should be decreased: here a yield stress equal to 450N/mm² has been used.

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