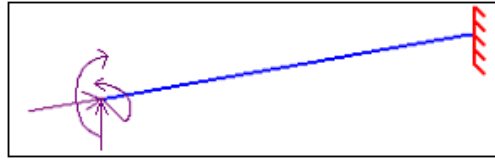


<b>TEST SCHEDULE R 44</b>	<b>EN 1993-1-1: 2005 (EUROCODE 3)</b>	<b>Sargon ©, Cescoplus ©</b>
RESISTANCE	COMPRESSION+BENDING2+BENDING3+SHEAR3	<b>EC3.RES.NNM2M3T3.001</b>



**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

<b>BEAM</b>		
Length [mm]	Left end	Right end
1 (*)	FREE	FIXED

<b>LOADS</b>			
Type	Value	Point of application	
BENDING MOMENT $M_2$	$M=3.000.000.000\text{Nmm}$	LEFT END	
BENDING MOMENT $M_3$	$M=2.000.000.000\text{Nmm}$	LEFT END	
COMPRESSION	$N=30.000.000\text{N}$	LEFT END	
SHEAR $T_3$	$T=2.000.000\text{N}$	LEFT END	

<b>MATERIAL</b>	<b>S490</b>					
$f_y$ [N/mm <sup>2</sup> ]	$f_u$ [N/mm <sup>2</sup> ]	$E$ [N/mm <sup>2</sup> ]	$\nu$	$\gamma_{M0}$	$\gamma_{M1}$	$\gamma_{M2}$
490→450	570	2,10E+05	0,3	1,1	1,1	1,25

<b>CROSS SECTION</b>	<b>HSH 600X828</b>	<b>CLASS: N' →1 M<sub>2</sub> →1 M<sub>3</sub> →1 N' + M<sub>2</sub> + M<sub>3</sub> →1 (reclasses metod**)</b>			
A [mm <sup>2</sup> ]	$J_2$ [mm <sup>4</sup> ]	$J_3$ [mm <sup>4</sup> ]	$J_t$ [mm <sup>4</sup> ]	$W_2$ [mm <sup>3</sup> ]	$W_3$ [mm <sup>3</sup> ]
1,055E+05	6,544e+09	2,737e+09	1,813e+08	2,181e+07	9,124e+06
$W_{pl2}$ [mm <sup>3</sup> ]	$W_{pl3}$ [mm <sup>3</sup> ]	$i_2$ [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

<b>OTHER DATA</b>			
$N_{pl}=A f_y / \gamma_{M0}$ [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 <sup>2</sup> ]
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	<b>2,471E-04</b>

(\*) 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/mm<sup>2</sup> has been used.

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