COL·LEGI OFICIAL D'ARQUITECTES ILLES BALEARS
03.08.2017 11/06449/17
Segellat
(Ley 25/2009. R.D. 1000/2010-MEH. Llei 10/1998-CAIB)
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1.- VERSIÓN DEL PROGRAMA Y NÚMERO DE LICENCIA.

Versión: 2017

Número de licencia: 138765

1.- DATOS DE OBRA

1.1.- Normas consideradas

Acero conformado: CTE DB SE-A

Aceros laminados y armados: CTE DB SE-A

1.2.- Estados límite

E.L.U. de rotura. Acero conformado E.L.U. de rotura. Acero laminado	CTE Cota de nieve: Altitud inferior o igual a 1000 m
Desplazamientos	Acciones características

1.2.1.- Situaciones de proyecto

Para las distintas situaciones de proyecto, las combinaciones de acciones se definirán de acuerdo con los siguientes criterios:

- **Con coeficientes de combinación**

$$\sum_{j\geq 1}\gamma_{Gj}G_{kj}+\gamma_P P_k+\gamma_{Q1}\Psi_{p1}Q_{k1}+\sum_{i>1}\gamma_{Qi}\Psi_{ai}Q_{ki}$$

- **Sin coeficientes de combinación**

$$\sum_{j\geq 1}\gamma_{Gj}G_{kj}+\gamma_P P_k+\sum_{i\geq 1}\gamma_{Qi}Q_{ki}$$

- Donde:

G_k Acción permanente
P_k Acción de pretensado
Q_k Acción variable
g_G Coeficiente parcial de seguridad de las acciones permanentes
g_P Coeficiente parcial de seguridad de la acción de pretensado
$g_{Q,1}$ Coeficiente parcial de seguridad de la acción variable principal
$g_{Q,i}$ Coeficiente parcial de seguridad de las acciones variables de acompañamiento
$y_{p,1}$ Coeficiente de combinación de la acción variable principal
$y_{a,i}$ Coeficiente de combinación de las acciones variables de acompañamiento

Para cada situación de proyecto y estado límite los coeficientes a utilizar serán:

E.L.U. de rotura. Acero conformado: CTE DB SE-A

E.L.U. de rotura. Acero laminado: CTE DB SE-A

Persistente o transitoria				
	Coeficientes parciales de seguridad (g)		Coeficientes de combinación (y)	
	Favorable	Desfavorable	Principal (y_p)	Acompañamiento (y_a)
Carga permanente (G)	0.800	1.350	-	-

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Desplazamientos

Acciones variables sin sismo		
	Coeficientes parciales de seguridad (g)	
	Favorable	Desfavorable
Carga permanente (G)	1.000	1.000

2.- ESTRUCTURA

2.1.- Geometría

2.1.1.- Nudos

Referencias:

D_x, D_y, D_z: Desplazamientos prescritos en ejes globales.

q_x, q_y, q_z: Giros prescritos en ejes globales.

Cada grado de libertad se marca con 'X' si está coaccionado y, en caso contrario, con '-'.

Nudos										
Referencia	Coordenadas			Vinculación exterior						Vinculación interior
	X (m)	Y (m)	Z (m)	D_x	D_y	D_z	q_x	q_y	q_z	
N1	19.622	8.428	3.020	-	-	-	-	-	-	Empotrado
N2	18.863	8.220	2.970	-	-	-	-	-	-	Empotrado
N3	20.231	6.218	2.941	-	-	-	-	-	-	Empotrado
N4	19.606	6.047	2.899	-	-	-	-	-	-	Empotrado
N5	20.535	5.113	2.901	-	-	-	-	-	-	Empotrado
N6	19.776	4.906	2.850	-	-	-	-	-	-	Empotrado
N7	19.926	7.323	2.981	-	-	-	-	-	-	Empotrado
N8	19.167	7.115	2.930	-	-	-	-	-	-	Empotrado
N9	19.774	7.875	3.001	-	-	-	-	-	-	Empotrado
N10	19.015	7.668	2.950	-	-	-	-	-	-	Empotrado
N11	20.079	6.770	2.961	-	-	-	-	-	-	Empotrado
N12	19.755	6.682	2.939	-	-	-	-	-	-	Empotrado
N13	20.383	5.666	2.921	-	-	-	-	-	-	Empotrado
N14	19.623	5.458	2.870	-	-	-	-	-	-	Empotrado
N15	17.418	7.826	2.873	-	-	-	-	-	-	Empotrado
N16	16.638	7.613	2.820	-	-	-	-	-	-	Empotrado
N17	18.027	5.616	2.793	-	-	-	-	-	-	Empotrado
N18	17.246	5.403	2.740	-	-	-	-	-	-	Empotrado
N19	19.471	6.011	2.890	-	-	-	-	-	-	Empotrado
N20	18.331	4.511	2.753	-	-	-	-	-	-	Empotrado
N21	17.760	4.355	2.715	-	-	-	-	-	-	Empotrado
N22	17.723	6.721	2.833	-	-	-	-	-	-	Empotrado
N23	16.942	6.508	2.780	-	-	-	-	-	-	Empotrado
N24	18.868	7.034	2.910	-	-	-	-	-	-	Empotrado
N25	17.570	7.274	2.853	-	-	-	-	-	-	Empotrado
N26	16.790	7.060	2.800	-	-	-	-	-	-	Empotrado
N27	17.982	7.386	2.880	-	-	-	-	-	-	Empotrado
N28	17.875	6.169	2.813	-	-	-	-	-	-	Empotrado

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Nudos										
Referencia	Coordenadas			Vinculación exterior						Vinculación interior
	X (m)	Y (m)	Z (m)	D_x	D_y	D_z	q_x	q_y	q_z	
N29	17.094	5.956	2.760	-	-	-	-	-	-	Empotrado
N30	19.319	6.563	2.910	-	-	-	-	-	-	Empotrado
N31	18.179	5.064	2.773	-	-	-	-	-	-	Empotrado
N32	17.398	4.851	2.720	-	-	-	-	-	-	Empotrado
N33	18.683	5.201	2.807	-	-	-	-	-	-	Empotrado
N34	17.550	4.298	2.701	-	-	-	-	-	-	Empotrado
N35	17.047	3.505	2.863	-	-	-	-	-	-	Empotrado
N36	16.828	3.466	2.895	-	-	-	-	-	-	Empotrado
N37	16.250	8.123	3.028	-	-	-	-	-	-	Empotrado
N38	15.841	8.051	3.088	-	-	-	-	-	-	Empotrado
N39	16.350	7.546	3.008	-	-	-	-	-	-	Empotrado
N40	15.538	7.402	3.127	-	-	-	-	-	-	Empotrado
N41	16.449	6.969	2.987	-	-	-	-	-	-	Empotrado
N42	15.637	6.824	3.106	-	-	-	-	-	-	Empotrado
N43	16.549	6.391	2.966	-	-	-	-	-	-	Empotrado
N44	15.737	6.247	3.085	-	-	-	-	-	-	Empotrado
N45	16.748	5.237	2.925	-	-	-	-	-	-	Empotrado
N46	15.936	5.092	3.044	-	-	-	-	-	-	Empotrado
N47	16.948	4.082	2.884	-	-	-	-	-	-	Empotrado
N48	16.136	3.938	3.003	-	-	-	-	-	-	Empotrado
N49	16.848	4.659	2.904	-	-	-	-	-	-	Empotrado
N50	16.036	4.515	3.023	-	-	-	-	-	-	Empotrado
N51	16.649	5.814	2.946	-	-	-	-	-	-	Empotrado
N52	15.837	5.670	3.065	-	-	-	-	-	-	Empotrado
N53	14.579	3.066	3.225	-	-	-	-	-	-	Empotrado
N54	13.929	2.950	3.320	-	-	-	-	-	-	Empotrado
N55	16.235	3.360	2.982	-	-	-	-	-	-	Empotrado
N56	13.781	7.684	3.390	-	-	-	-	-	-	Empotrado
N57	13.132	7.569	3.486	-	-	-	-	-	-	Empotrado
N58	15.438	7.979	3.147	-	-	-	-	-	-	Empotrado
N59	13.881	7.107	3.370	-	-	-	-	-	-	Empotrado
N60	13.231	6.991	3.465	-	-	-	-	-	-	Empotrado
N61	15.351	7.368	3.154	-	-	-	-	-	-	Empotrado
N62	13.981	6.530	3.349	-	-	-	-	-	-	Empotrado
N63	13.331	6.414	3.444	-	-	-	-	-	-	Empotrado
N64	14.860	6.686	3.220	-	-	-	-	-	-	Empotrado
N65	14.080	5.952	3.328	-	-	-	-	-	-	Empotrado
N66	13.431	5.837	3.424	-	-	-	-	-	-	Empotrado
N67	14.370	6.004	3.286	-	-	-	-	-	-	Empotrado
N68	14.280	4.798	3.287	-	-	-	-	-	-	Empotrado
N69	14.147	4.774	3.306	-	-	-	-	-	-	Empotrado
N70	14.479	3.643	3.246	-	-	-	-	-	-	Empotrado
N71	13.829	3.527	3.341	-	-	-	-	-	-	Empotrado
N72	15.934	3.902	3.032	-	-	-	-	-	-	Empotrado
N73	14.379	4.220	3.266	-	-	-	-	-	-	Empotrado
N74	13.730	4.105	3.362	-	-	-	-	-	-	Empotrado
N75	15.040	4.338	3.169	-	-	-	-	-	-	Empotrado
N76	14.180	5.375	3.308	-	-	-	-	-	-	Empotrado

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	X (m)	Y (m)	Z (m)	D_x	D_y	D_z	q_x	q_y	q_z	
N77	13.880	5.321	3.352	-	-	-	-	-	-	Empotrado
N78	8.389	4.253	2.463	-	-	-	-	-	-	Empotrado
N79	7.955	4.173	2.564	-	-	-	-	-	-	Empotrado
N80	5.273	3.677	3.184	-	-	-	-	-	-	Empotrado
N81	6.060	3.823	-0.250	X	X	X	X	X	X	Empotrado
N82	8.264	4.930	2.463	-	-	-	-	-	-	Empotrado
N83	7.830	4.851	2.564	-	-	-	-	-	-	Empotrado
N84	5.148	4.354	3.184	-	-	-	-	-	-	Empotrado
N85	5.935	4.499	-0.250	X	X	X	X	X	X	Empotrado
N86	8.139	5.606	2.463	-	-	-	-	-	-	Empotrado
N87	7.705	5.526	2.564	-	-	-	-	-	-	Empotrado
N88	4.772	6.383	3.184	-	-	-	-	-	-	Empotrado
N89	5.560	6.530	-0.250	X	X	X	X	X	X	Empotrado
N90	5.023	5.030	3.184	-	-	-	-	-	-	Empotrado
N91	5.810	5.176	-0.250	X	X	X	X	X	X	Empotrado
N92	7.889	6.960	2.463	-	-	-	-	-	-	Empotrado
N93	7.455	6.879	2.564	-	-	-	-	-	-	Empotrado
N94	8.014	6.283	2.463	-	-	-	-	-	-	Empotrado
N95	7.580	6.203	2.564	-	-	-	-	-	-	Empotrado
N96	4.897	5.707	3.184	-	-	-	-	-	-	Empotrado
N97	5.685	5.853	-0.250	X	X	X	X	X	X	Empotrado
N98	7.764	7.636	2.463	-	-	-	-	-	-	Empotrado
N99	7.330	7.556	2.564	-	-	-	-	-	-	Empotrado
N100	4.647	7.060	3.184	-	-	-	-	-	-	Empotrado
N101	5.435	7.206	-0.250	X	X	X	X	X	X	Empotrado
N102	13.630	4.682	3.382	-	-	-	-	-	-	Empotrado
N103	13.530	5.259	3.403	-	-	-	-	-	-	Empotrado
N104	12.784	5.416	3.007	-	-	-	-	-	-	Empotrado
N105	12.007	5.416	2.939	-	-	-	-	-	-	Empotrado
N106	12.784	7.386	3.007	-	-	-	-	-	-	Empotrado
N107	12.007	7.386	2.939	-	-	-	-	-	-	Empotrado
N108	12.784	6.073	3.007	-	-	-	-	-	-	Empotrado
N109	12.007	6.073	2.939	-	-	-	-	-	-	Empotrado
N110	12.784	4.760	3.007	-	-	-	-	-	-	Empotrado
N111	12.007	4.760	2.939	-	-	-	-	-	-	Empotrado
N112	12.784	8.043	3.007	-	-	-	-	-	-	Empotrado
N113	12.221	8.043	2.958	-	-	-	-	-	-	Empotrado
N114	12.784	6.730	3.007	-	-	-	-	-	-	Empotrado
N115	12.007	6.730	2.939	-	-	-	-	-	-	Empotrado
N116	12.784	4.103	3.007	-	-	-	-	-	-	Empotrado
N117	12.007	4.103	2.939	-	-	-	-	-	-	Empotrado
N118	9.815	5.416	2.750	-	-	-	-	-	-	Empotrado
N119	8.998	5.416	2.679	-	-	-	-	-	-	Empotrado
N120	9.815	7.386	2.750	-	-	-	-	-	-	Empotrado
N121	8.998	7.386	2.679	-	-	-	-	-	-	Empotrado
N122	10.805	7.386	2.835	-	-	-	-	-	-	Empotrado
N123	9.815	6.073	2.750	-	-	-	-	-	-	Empotrado
N124	8.998	6.073	2.679	-	-	-	-	-	-	Empotrado

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	X (m)	Y (m)	Z (m)	D_x	D_y	D_z	q_x	q_y	q_z	
N125	9.815	4.760	2.750	-	-	-	-	-	-	Empotrado
N126	8.998	4.760	2.679	-	-	-	-	-	-	Empotrado
N127	10.874	4.760	2.841	-	-	-	-	-	-	Empotrado
N128	9.815	8.043	2.750	-	-	-	-	-	-	Empotrado
N129	8.998	8.043	2.679	-	-	-	-	-	-	Empotrado
N130	12.007	8.043	2.939	-	-	-	-	-	-	Empotrado
N131	9.815	6.730	2.750	-	-	-	-	-	-	Empotrado
N132	9.390	6.730	2.713	-	-	-	-	-	-	Empotrado
N133	9.815	4.103	2.750	-	-	-	-	-	-	Empotrado
N134	8.998	4.103	2.679	-	-	-	-	-	-	Empotrado
N135	8.998	6.730	2.679	-	-	-	-	-	-	Empotrado
N136	18.810	8.413	2.976	-	-	-	-	-	-	Empotrado
N137	18.400	4.261	2.744	-	-	-	-	-	-	Empotrado
N138	19.845	4.655	2.841	-	-	-	-	-	-	Empotrado
N139	19.490	5.941	2.887	-	-	-	-	-	-	Empotrado
N140	19.229	6.891	2.921	-	-	-	-	-	-	Empotrado
N141	18.250	4.805	2.764	-	-	-	-	-	-	Empotrado
N142	17.485	7.583	2.863	-	-	-	-	-	-	Empotrado
N143	17.365	8.019	2.880	-	-	-	-	-	-	Empotrado
N144	13.737	7.940	3.399	-	-	-	-	-	-	Empotrado
N145	16.269	3.163	2.975	-	-	-	-	-	-	Empotrado
N146	14.613	2.869	3.218	-	-	-	-	-	-	Empotrado
N147	14.129	5.670	3.318	-	-	-	-	-	-	Empotrado
N148	16.161	3.791	2.998	-	-	-	-	-	-	Empotrado
N149	14.296	4.701	3.283	-	-	-	-	-	-	Empotrado
N150	15.506	7.585	3.133	-	-	-	-	-	-	Empotrado
N151	15.394	8.235	3.157	-	-	-	-	-	-	Empotrado
N152	7.992	3.977	2.564	-	-	-	-	-	-	Empotrado
N153	7.669	5.723	2.564	-	-	-	-	-	-	Empotrado
N154	7.275	7.854	2.564	-	-	-	-	-	-	Empotrado
N155	9.815	8.303	2.750	-	-	-	-	-	-	Empotrado
N156	12.007	3.903	2.939	-	-	-	-	-	-	Empotrado
N157	9.815	5.078	2.750	-	-	-	-	-	-	Empotrado
N158	9.815	6.927	2.750	-	-	-	-	-	-	Empotrado
N159	12.007	4.419	2.939	-	-	-	-	-	-	Empotrado
N160	9.815	3.903	2.750	-	-	-	-	-	-	Empotrado
N161	12.007	8.303	2.939	-	-	-	-	-	-	Empotrado
N162	12.007	7.944	2.939	-	-	-	-	-	-	Empotrado
N163	16.812	3.487	2.620	-	-	-	-	-	-	Empotrado
N164	16.802	3.478	2.620	-	-	-	-	-	-	Empotrado
N165	16.802	3.478	2.899	-	-	-	-	-	-	Empotrado
N166	16.709	3.393	2.610	-	-	-	-	-	-	Empotrado
N167	20.134	6.531	2.951	-	-	-	-	-	-	Empotrado
N168	18.109	7.335	2.884	-	-	-	-	-	-	Empotrado
N169	19.000	5.492	2.838	-	-	-	-	-	-	Empotrado
N170	17.223	7.687	2.855	-	-	-	-	-	-	Empotrado
N171	16.873	3.444	2.888	-	-	-	-	-	-	Empotrado
N172	15.072	6.980	3.192	-	-	-	-	-	-	Empotrado

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Nudos										
Referencia	Coordenadas			Vinculación exterior						Vinculación interior
	X (m)	Y (m)	Z (m)	D_x	D_y	D_z	q_x	q_y	q_z	
N173	13.658	5.013	3.382	-	-	-	-	-	-	Empotrado
N174	14.812	4.449	3.204	-	-	-	-	-	-	Empotrado
N175	15.887	8.114	3.082	-	-	-	-	-	-	Empotrado
N176	13.163	4.072	3.040	-	-	-	-	-	-	Empotrado
N177	7.396	5.805	2.540	-	-	-	-	-	-	Empotrado
N178	9.143	5.280	2.691	-	-	-	-	-	-	Empotrado
N179	11.732	4.502	2.916	-	-	-	-	-	-	Empotrado
N180	10.696	7.335	2.826	-	-	-	-	-	-	Empotrado
N181	12.238	8.051	2.959	-	-	-	-	-	-	Empotrado
N182	18.109	7.335	0.150	X	X	X	X	X	X	Empotrado
N183	19.000	5.492	0.197	X	X	X	X	X	X	Empotrado
N184	14.812	4.449	0.197	X	X	X	X	X	X	Empotrado
N185	15.072	6.980	0.197	X	X	X	X	X	X	Empotrado
N186	10.696	7.335	0.197	X	X	X	X	X	X	Empotrado
N187	11.732	4.502	0.197	X	X	X	X	X	X	Empotrado
N188	9.143	5.280	0.197	X	X	X	X	X	X	Empotrado

2.1.2.- Barras

2.1.2.1.- Materiales utilizados

Materiales utilizados							
Material		E (kp/cm²)	n	G (kp/cm²)	f_y (kp/cm²)	$a_{\cdot t}$ (m/m°C)	g (t/m³)
Tipo	Designación						
Acero laminado	S275	2140672.8	0.300	825688.1	2803.3	0.000012	7.850
Acero conformado	S235	2140672.8	0.300	823335.7	2395.5	0.000012	7.850

Notación:
E: Módulo de elasticidad
n: Módulo de Poisson
G: Módulo de cortadura
f_y: Límite elástico
$a_{\cdot t}$: Coeficiente de dilatación
g: Peso específico

2.1.2.2.- Descripción

Descripción									
Material		Barra (Ni/Nf)	Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	b_{xy}	b_{xz}	$Lb_{Sup.}$ (m)	$Lb_{Inf.}$ (m)
Tipo	Designación								
Acero laminado	S275	N164/N163	N164/N163	IPE 220 (IPE)	0.013	1.00	1.00	-	-
		N164/N165	N164/N165	IPE 220 (IPE)	0.279	1.00	1.00	-	-
		N166/N164	N166/N164	IPE 220 (IPE)	0.127	1.00	1.00	-	-
		N4/N167	N4/N167	IPE 220 (IPE)	0.718	1.00	1.00	-	-
		N27/N168	N27/N168	IPE 220 (IPE)	0.137	1.00	1.00	-	-
		N12/N167	N12/N167	IPE 220 (IPE)	0.409	1.00	1.00	-	-
		N163/N21	N163/N21	IPE 220 (IPE)	1.289	1.00	1.00	-	-
		N33/N169	N33/N169	IPE 220 (IPE)	0.432	1.00	1.00	-	-
		N169/N139	N169/N139	IPE 220 (IPE)	0.666	1.00	1.00	-	-
		N139/N4	N139/N4	IPE 220 (IPE)	0.158	1.00	1.00	-	-
		N170/N142	N170/N142	IPE 220 (IPE)	0.282	1.00	1.00	-	-

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Descripción									
Material		Barra	Pieza	Perfil(Serie)	Longitud	b_{xy}	b_{xz}	$Lb_{Sup.}$	$Lb_{Inf.}$
Tipo	Designación	(Ni/Nf)	(Ni/Nf)		(m)			(m)	(m)
		N142/N27	N142/N27	IPE 220 (IPE)	0.535	1.00	1.00	-	-
		N168/N24	N168/N24	IPE 220 (IPE)	0.817	1.00	1.00	-	-
		N24/N140	N24/N140	IPE 220 (IPE)	0.388	1.00	1.00	-	-
		N140/N12	N140/N12	IPE 220 (IPE)	0.566	1.00	1.00	-	-
		N21/N141	N21/N141	IPE 220 (IPE)	0.667	1.00	1.00	-	-
		N141/N33	N141/N33	IPE 220 (IPE)	0.588	1.00	1.00	-	-
		N165/N148	N165/N148	IPE 220 (IPE)	0.720	1.00	1.00	-	-
		N171/N36	N171/N36	IPE 220 (IPE)	0.051	1.00	1.00	-	-
		N61/N172	N61/N172	IPE 220 (IPE)	0.479	1.00	1.00	-	-
		N77/N173	N77/N173	IPE 220 (IPE)	0.382	1.00	1.00	-	-
		N174/N149	N174/N149	IPE 220 (IPE)	0.579	1.00	1.00	-	-
		N72/N75	N72/N75	IPE 220 (IPE)	1.004	1.00	1.00	-	-
		N148/N72	N148/N72	IPE 220 (IPE)	0.255	1.00	1.00	-	-
		N36/N165	N36/N165	IPE 220 (IPE)	0.029	1.00	1.00	-	-
		N150/N61	N150/N61	IPE 220 (IPE)	0.267	1.00	1.00	-	-
		N147/N77	N147/N77	IPE 220 (IPE)	0.430	1.00	1.00	-	-
		N69/N173	N69/N173	IPE 220 (IPE)	0.549	1.00	1.00	-	-
		N149/N69	N149/N69	IPE 220 (IPE)	0.168	1.00	1.00	-	-
		N75/N174	N75/N174	IPE 220 (IPE)	0.257	1.00	1.00	-	-
		N38/N150	N38/N150	IPE 220 (IPE)	0.576	1.00	1.00	-	-
		N67/N147	N67/N147	IPE 220 (IPE)	0.413	1.00	1.00	-	-
		N175/N38	N175/N38	IPE 220 (IPE)	0.079	1.00	1.00	-	-
		N64/N67	N64/N67	IPE 220 (IPE)	0.843	1.00	1.00	-	-
		N172/N64	N172/N64	IPE 220 (IPE)	0.363	1.00	1.00	-	-
		N159/N176	N159/N176	IPE 220 (IPE)	1.212	1.00	1.00	-	-
		N177/N132	N177/N132	IPE 220 (IPE)	2.204	1.00	1.00	-	-
		N153/N178	N153/N178	IPE 220 (IPE)	1.545	1.00	1.00	-	-
		N178/N157	N178/N157	IPE 220 (IPE)	0.704	1.00	1.00	-	-
		N127/N179	N127/N179	IPE 220 (IPE)	0.899	1.00	1.00	-	-
		N179/N159	N179/N159	IPE 220 (IPE)	0.288	1.00	1.00	-	-
		N180/N122	N180/N122	IPE 220 (IPE)	0.121	1.00	1.00	-	-
		N132/N158	N132/N158	IPE 220 (IPE)	0.470	1.00	1.00	-	-
		N177/N153	N177/N153	IPE 220 (IPE)	0.286	1.00	1.00	-	-
		N157/N127	N157/N127	IPE 220 (IPE)	1.109	1.00	1.00	-	-
		N122/N162	N122/N162	IPE 220 (IPE)	1.329	1.00	1.00	-	-
		N158/N180	N158/N180	IPE 220 (IPE)	0.974	1.00	1.00	-	-
		N162/N113	N162/N113	IPE 220 (IPE)	0.237	1.00	1.00	-	-
		N113/N181	N113/N181	IPE 220 (IPE)	0.018	1.00	1.00	-	-
Acero conformado	S235	N2/N1	N2/N1	# 10.0x5.0x10.48 (#)	0.789	1.00	1.00	-	-
		N4/N3	N4/N3	# 10.0x5.0x10.48 (#)	0.649	1.00	1.00	-	-
		N6/N5	N6/N5	# 10.0x5.0x10.48 (#)	0.789	1.00	1.00	-	-
		N8/N7	N8/N7	# 10.0x5.0x10.48 (#)	0.789	1.00	1.00	-	-
		N10/N9	N10/N9	# 10.0x5.0x10.48 (#)	0.789	1.00	1.00	-	-
		N12/N11	N12/N11	# 10.0x5.0x10.48 (#)	0.337	1.00	1.00	-	-
		N14/N13	N14/N13	# 10.0x5.0x10.48 (#)	0.789	1.00	1.00	-	-
		N16/N15	N16/N15	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-
		N15/N2	N15/N2	# 10.0x5.0x10.48 (#)	1.500	1.00	1.00	-	-
		N18/N17	N18/N17	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-

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Descripción									
Material		Barra	Pieza	Perfil (Serie)	Longitud	b_{yz}	b_{xz}	$Lb_{Sup.}$	$Lb_{Inf.}$
Tipo	Designación	(Ni/Nf)	(Ni/Nf)		(m)			(m)	(m)
		N17/N19	N17/N19	# 10.0x5.0x10.48 (#)	1.500	1.00	1.00	-	-
		N21/N20	N21/N20	# 10.0x5.0x10.48 (#)	0.594	1.00	1.00	-	-
		N20/N6	N20/N6	# 10.0x5.0x10.48 (#)	1.500	1.00	1.00	-	-
		N23/N22	N23/N22	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-
		N24/N8	N24/N8	# 10.0x5.0x10.48 (#)	0.310	1.00	1.00	-	-
		N26/N25	N26/N25	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-
		N27/N10	N27/N10	# 10.0x5.0x10.48 (#)	1.073	1.00	1.00	-	-
		N29/N28	N29/N28	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-
		N28/N30	N28/N30	# 10.0x5.0x10.48 (#)	1.500	1.00	1.00	-	-
		N32/N31	N32/N31	# 10.0x5.0x10.48 (#)	0.811	1.00	1.00	-	-
		N33/N14	N33/N14	# 10.0x5.0x10.48 (#)	0.977	1.00	1.00	-	-
		N19/N4	N19/N4	# 10.0x5.0x10.48 (#)	0.140	1.00	1.00	-	-
		N30/N12	N30/N12	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N34/N21	N34/N21	# 10.0x5.0x10.48 (#)	0.217	1.00	1.00	-	-
		N22/N24	N22/N24	# 10.0x5.0x10.48 (#)	1.190	1.00	1.00	-	-
		N25/N27	N25/N27	# 10.0x5.0x10.48 (#)	0.427	1.00	1.00	-	-
		N31/N33	N31/N33	# 10.0x5.0x10.48 (#)	0.523	1.00	1.00	-	-
		N35/N36	N35/N36	# 10.0x5.0x10.48 (#)	0.225	1.00	1.00	-	-
		N37/N38	N37/N38	# 10.0x5.0x10.48 (#)	0.420	1.00	1.00	-	-
		N39/N40	N39/N40	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N41/N42	N41/N42	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N43/N44	N43/N44	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N45/N46	N45/N46	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N47/N48	N47/N48	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N49/N50	N49/N50	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N51/N52	N51/N52	# 10.0x5.0x10.48 (#)	0.833	1.00	1.00	-	-
		N53/N54	N53/N54	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N55/N53	N55/N53	# 10.0x5.0x10.48 (#)	1.700	1.00	1.00	-	-
		N56/N57	N56/N57	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N58/N56	N58/N56	# 10.0x5.0x10.48 (#)	1.700	1.00	1.00	-	-
		N59/N60	N59/N60	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N40/N61	N40/N61	# 10.0x5.0x10.48 (#)	0.192	1.00	1.00	-	-
		N62/N63	N62/N63	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N42/N64	N42/N64	# 10.0x5.0x10.48 (#)	0.797	1.00	1.00	-	-
		N65/N66	N65/N66	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N44/N67	N44/N67	# 10.0x5.0x10.48 (#)	1.403	1.00	1.00	-	-
		N68/N69	N68/N69	# 10.0x5.0x10.48 (#)	0.136	1.00	1.00	-	-
		N46/N68	N46/N68	# 10.0x5.0x10.48 (#)	1.700	1.00	1.00	-	-
		N70/N71	N70/N71	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N48/N72	N48/N72	# 10.0x5.0x10.48 (#)	0.207	1.00	1.00	-	-
		N73/N74	N73/N74	# 10.0x5.0x10.48 (#)	0.667	1.00	1.00	-	-
		N50/N75	N50/N75	# 10.0x5.0x10.48 (#)	1.022	1.00	1.00	-	-
		N76/N77	N76/N77	# 10.0x5.0x10.48 (#)	0.308	1.00	1.00	-	-
		N52/N76	N52/N76	# 10.0x5.0x10.48 (#)	1.700	1.00	1.00	-	-
		N78/N79	N78/N79	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N81/N80	N81/N80	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-
		N82/N83	N82/N83	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N85/N84	N85/N84	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-

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Descripción									
Material		Barra	Pieza	Perfil(Serie)	Longitud	b_{xy}	b_{xz}	$Lb_{Sup.}$	$Lb_{Inf.}$
Tipo	Designación	(Ni/Nf)	(Ni/Nf)		(m)			(m)	(m)
		N86/N87	N86/N87	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N89/N88	N89/N88	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-
		N91/N90	N91/N90	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-
		N92/N93	N92/N93	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N94/N95	N94/N95	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N97/N96	N97/N96	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-
		N98/N99	N98/N99	# 10.0x5.0x10.48 (#)	0.452	1.00	1.00	-	-
		N101/N100	N101/N100	# 10.0x5.0x10.48 (#)	3.527	1.00	1.00	-	-
		N79/N80	N79/N80	# 10.0x5.0x10.48 (#)	2.798	1.00	1.00	-	-
		N83/N84	N83/N84	# 10.0x5.0x10.48 (#)	2.798	1.00	1.00	-	-
		N87/N90	N87/N90	# 10.0x5.0x10.48 (#)	2.798	1.00	1.00	-	-
		N93/N88	N93/N88	# 10.0x5.0x10.48 (#)	2.798	1.00	1.00	-	-
		N95/N96	N95/N96	# 10.0x5.0x10.48 (#)	2.798	1.00	1.00	-	-
		N99/N100	N99/N100	# 10.0x5.0x10.48 (#)	2.797	1.00	1.00	-	-
		N36/N55	N36/N55	# 10.0x5.0x10.48 (#)	0.608	1.00	1.00	-	-
		N38/N58	N38/N58	# 10.0x5.0x10.48 (#)	0.414	1.00	1.00	-	-
		N61/N59	N61/N59	# 10.0x5.0x10.48 (#)	1.508	1.00	1.00	-	-
		N64/N62	N64/N62	# 10.0x5.0x10.48 (#)	0.903	1.00	1.00	-	-
		N67/N65	N67/N65	# 10.0x5.0x10.48 (#)	0.297	1.00	1.00	-	-
		N69/N102	N69/N102	# 10.0x5.0x10.48 (#)	0.530	1.00	1.00	-	-
		N72/N70	N72/N70	# 10.0x5.0x10.48 (#)	1.493	1.00	1.00	-	-
		N75/N73	N75/N73	# 10.0x5.0x10.48 (#)	0.678	1.00	1.00	-	-
		N77/N103	N77/N103	# 10.0x5.0x10.48 (#)	0.359	1.00	1.00	-	-
		N105/N104	N105/N104	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N107/N106	N107/N106	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N109/N108	N109/N108	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N111/N110	N111/N110	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N113/N112	N113/N112	# 10.0x5.0x10.48 (#)	0.565	1.00	1.00	-	-
		N115/N114	N115/N114	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N117/N116	N117/N116	# 10.0x5.0x10.48 (#)	0.780	1.00	1.00	-	-
		N119/N118	N119/N118	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N118/N105	N118/N105	# 10.0x5.0x10.48 (#)	2.200	1.00	1.00	-	-
		N121/N120	N121/N120	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N122/N107	N122/N107	# 10.0x5.0x10.48 (#)	1.206	1.00	1.00	-	-
		N124/N123	N124/N123	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N123/N109	N123/N109	# 10.0x5.0x10.48 (#)	2.200	1.00	1.00	-	-
		N126/N125	N126/N125	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N127/N111	N127/N111	# 10.0x5.0x10.48 (#)	1.137	1.00	1.00	-	-
		N129/N128	N129/N128	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N128/N130	N128/N130	# 10.0x5.0x10.48 (#)	2.200	1.00	1.00	-	-
		N132/N131	N132/N131	# 10.0x5.0x10.48 (#)	0.427	1.00	1.00	-	-
		N131/N115	N131/N115	# 10.0x5.0x10.48 (#)	2.200	1.00	1.00	-	-
		N134/N133	N134/N133	# 10.0x5.0x10.48 (#)	0.820	1.00	1.00	-	-
		N133/N117	N133/N117	# 10.0x5.0x10.48 (#)	2.200	1.00	1.00	-	-
		N130/N113	N130/N113	# 10.0x5.0x10.48 (#)	0.215	1.00	1.00	-	-
		N120/N122	N120/N122	# 10.0x5.0x10.48 (#)	0.994	1.00	1.00	-	-
		N125/N127	N125/N127	# 10.0x5.0x10.48 (#)	1.063	1.00	1.00	-	-
		N135/N132	N135/N132	# 10.0x5.0x10.48 (#)	0.393	1.00	1.00	-	-

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Descripción									
Material		Barra	Pieza	Perfil (Serie)	Longitud	b_{yz}	b_{xz}	$Lb_{Sup.}$	$Lb_{Inf.}$
Tipo	Designación	(Ni/Nf)	(Ni/Nf)		(m)			(m)	(m)
		N2/N136	N2/N136	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N137/N20	N137/N20	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N138/N6	N138/N6	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N6/N14	N6/N14	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N139/N19	N139/N19	O 5x15. (Tubos)	0.072	1.00	1.00	-	-
		N19/N30	N19/N30	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N140/N8	N140/N8	O 5x15. (Tubos)	0.233	1.00	1.00	-	-
		N10/N2	N10/N2	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N17/N28	N17/N28	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N20/N141	N20/N141	O 5x15. (Tubos)	0.305	1.00	1.00	-	-
		N8/N10	N8/N10	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N22/N25	N22/N25	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N28/N22	N28/N22	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N31/N17	N31/N17	O 5x15. (Tubos)	0.573	1.00	1.00	-	-
		N25/N142	N25/N142	O 5x15. (Tubos)	0.321	1.00	1.00	-	-
		N15/N143	N15/N143	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N14/N139	N14/N139	O 5x15. (Tubos)	0.501	1.00	1.00	-	-
		N30/N140	N30/N140	O 5x15. (Tubos)	0.340	1.00	1.00	-	-
		N141/N31	N141/N31	O 5x15. (Tubos)	0.269	1.00	1.00	-	-
		N142/N15	N142/N15	O 5x15. (Tubos)	0.252	1.00	1.00	-	-
		N56/N144	N56/N144	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N145/N55	N145/N55	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N146/N53	N146/N53	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N53/N70	N53/N70	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N70/N73	N70/N73	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N68/N76	N68/N76	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N147/N65	N147/N65	O 5x15. (Tubos)	0.287	1.00	1.00	-	-
		N65/N62	N65/N62	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N62/N59	N62/N59	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N59/N56	N59/N56	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N55/N148	N55/N148	O 5x15. (Tubos)	0.437	1.00	1.00	-	-
		N149/N68	N149/N68	O 5x15. (Tubos)	0.098	1.00	1.00	-	-
		N48/N50	N48/N50	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N52/N44	N52/N44	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N46/N52	N46/N52	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N50/N46	N50/N46	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N42/N40	N42/N40	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N44/N42	N44/N42	O 5x15. (Tubos)	0.586	1.00	1.00	-	-
		N40/N150	N40/N150	O 5x15. (Tubos)	0.186	1.00	1.00	-	-
		N58/N151	N58/N151	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N152/N79	N152/N79	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N153/N95	N153/N95	O 5x15. (Tubos)	0.488	1.00	1.00	-	-
		N79/N83	N79/N83	O 5x15. (Tubos)	0.689	1.00	1.00	-	-
		N95/N93	N95/N93	O 5x15. (Tubos)	0.688	1.00	1.00	-	-
		N83/N87	N83/N87	O 5x15. (Tubos)	0.687	1.00	1.00	-	-
		N93/N99	N93/N99	O 5x15. (Tubos)	0.688	1.00	1.00	-	-
		N87/N153	N87/N153	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N99/N154	N99/N154	O 5x15. (Tubos)	0.303	1.00	1.00	-	-

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Descripción									
Material		Barra	Pieza	Perfil(Serie)	Longitud	b_{xy}	b_{xz}	$Lb_{Sup.}$	$Lb_{Inf.}$
Tipo	Designación	(Ni/Nf)	(Ni/Nf)		(m)			(m)	(m)
		N76/N147	N76/N147	O 5x15. (Tubos)	0.299	1.00	1.00	-	-
		N148/N48	N148/N48	O 5x15. (Tubos)	0.149	1.00	1.00	-	-
		N73/N149	N73/N149	O 5x15. (Tubos)	0.488	1.00	1.00	-	-
		N150/N58	N150/N58	O 5x15. (Tubos)	0.400	1.00	1.00	-	-
		N128/N155	N128/N155	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N156/N117	N156/N117	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N133/N125	N133/N125	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N157/N118	N157/N118	O 5x15. (Tubos)	0.338	1.00	1.00	-	-
		N118/N123	N118/N123	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N123/N131	N123/N131	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N158/N120	N158/N120	O 5x15. (Tubos)	0.459	1.00	1.00	-	-
		N120/N128	N120/N128	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N117/N159	N117/N159	O 5x15. (Tubos)	0.316	1.00	1.00	-	-
		N160/N133	N160/N133	O 5x15. (Tubos)	0.200	1.00	1.00	-	-
		N111/N105	N111/N105	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N115/N107	N115/N107	O 5x15. (Tubos)	0.656	1.00	1.00	-	-
		N109/N115	N109/N115	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N105/N109	N105/N109	O 5x15. (Tubos)	0.657	1.00	1.00	-	-
		N130/N161	N130/N161	O 5x15. (Tubos)	0.260	1.00	1.00	-	-
		N107/N162	N107/N162	O 5x15. (Tubos)	0.558	1.00	1.00	-	-
		N125/N157	N125/N157	O 5x15. (Tubos)	0.318	1.00	1.00	-	-
		N131/N158	N131/N158	O 5x15. (Tubos)	0.197	1.00	1.00	-	-
		N159/N111	N159/N111	O 5x15. (Tubos)	0.341	1.00	1.00	-	-
		N162/N130	N162/N130	O 5x15. (Tubos)	0.099	1.00	1.00	-	-
		N182/N168	N182/N168	O 5x15. (Tubos)	2.734	1.00	1.00	-	-
		N183/N169	N183/N169	O 5x15. (Tubos)	2.641	1.00	1.00	-	-
		N184/N174	N184/N174	O 5x15. (Tubos)	3.007	1.00	1.00	-	-
		N185/N172	N185/N172	O 5x15. (Tubos)	2.994	1.00	1.00	-	-
		N186/N180	N186/N180	O 5x15. (Tubos)	2.629	1.00	1.00	-	-
		N187/N179	N187/N179	O 5x15. (Tubos)	2.718	1.00	1.00	-	-
		N188/N178	N188/N178	O 5x15. (Tubos)	2.494	1.00	1.00	-	-

Notación:
Ni: Nudo inicial
Nf: Nudo final
b_{xy}: Coeficiente de pandeo en el plano 'XY'
b_{xz}: Coeficiente de pandeo en el plano 'XZ'
$Lb_{Sup.}$: Separación entre arriostramientos del ala superior
$Lb_{Inf.}$: Separación entre arriostramientos del ala inferior

2.1.2.3.- Características mecánicas

Tipos de pieza	
Ref.	Piezas
1	N164/N163, N164/N165, N166/N164, N4/N167, N27/N168, N12/N167, N163/N21, N33/N169, N169/N139, N139/N4, N170/N142, N142/N27, N168/N24, N24/N140, N140/N12, N21/N141, N141/N33, N165/N148, N171/N36, N61/N172, N77/N173, N174/N149, N72/N75, N148/N72, N36/N165, N150/N61, N147/N77, N69/N173, N149/N69, N75/N174, N38/N150, N67/N147, N175/N38, N64/N67, N172/N64, N159/N176, N177/N132, N153/N178, N178/N157, N127/N179, N179/N159, N180/N122, N132/N158, N177/N153, N157/N127, N122/N162, N158/N180, N162/N113 y N113/N181

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Tipos de pieza	
Ref.	Piezas
2	N2/N1, N4/N3, N6/N5, N8/N7, N10/N9, N12/N11, N14/N13, N16/N15, N18/N17, N20/N19, N21/N20, N20/N6, N23/N22, N24/N8, N26/N25, N27/N10, N29/N28, N28/N30, N32/N31, N33/N14, N19/N4, N30/N12, N34/N21, N22/N24, N25/N27, N31/N33, N35/N36, N37/N38, N39/N40, N41/N42, N43/N44, N45/N46, N47/N48, N49/N50, N51/N52, N53/N54, N55/N53, N56/N57, N58/N56, N59/N60, N40/N61, N62/N63, N42/N64, N65/N66, N44/N67, N68/N69, N46/N68, N70/N71, N48/N72, N73/N74, N50/N75, N76/N77, N52/N76, N78/N79, N81/N80, N82/N83, N85/N84, N86/N87, N89/N88, N91/N90, N92/N93, N94/N95, N97/N96, N98/N99, N101/N100, N79/N80, N83/N84, N87/N90, N93/N88, N95/N96, N99/N100, N36/N55, N38/N58, N61/N59, N64/N62, N67/N65, N69/N102, N72/N70, N75/N73, N77/N103, N105/N104, N107/N106, N109/N108, N111/N110, N113/N112, N115/N114, N117/N116, N119/N118, N118/N105, N121/N120, N122/N107, N124/N123, N123/N109, N126/N125, N127/N111, N129/N128, N128/N130, N132/N131, N131/N115, N134/N133, N133/N117, N130/N113, N120/N122, N125/N127 y N135/N132
3	N2/N136, N137/N20, N138/N6, N6/N14, N139/N19, N19/N30, N140/N8, N10/N2, N17/N28, N20/N141, N8/N10, N22/N25, N28/N22, N31/N17, N25/N142, N15/N143, N14/N139, N30/N140, N141/N31, N142/N15, N56/N144, N145/N55, N146/N53, N53/N70, N70/N73, N68/N76, N147/N65, N65/N62, N62/N59, N59/N56, N55/N148, N149/N68, N48/N50, N52/N44, N46/N52, N50/N46, N42/N40, N44/N42, N40/N150, N58/N151, N152/N79, N153/N95, N79/N83, N95/N93, N83/N87, N93/N99, N87/N153, N99/N154, N76/N147, N148/N48, N73/N149, N150/N58, N128/N155, N156/N117, N133/N125, N157/N118, N118/N123, N123/N131, N158/N120, N120/N128, N117/N159, N160/N133, N111/N105, N115/N107, N109/N115, N105/N109, N130/N161, N107/N162, N125/N157, N131/N158, N159/N111, N162/N130, N182/N168, N183/N169, N184/N174, N185/N172, N186/N180, N187/N179 y N188/N178

Características mecánicas									
Material		Ref.	Descripción	A (cm²)	Avy (cm²)	Avz (cm²)	Iyy (cm4)	Izz (cm4)	It (cm4)
Tipo	Designación								
Acero laminado	S275	1	IPE 220, (IPE)	33.40	15.18	10.70	2772.00	205.00	9.07
Acero conformado	S235	2	# 10.0x5.0x10.48, (#)	13.34	3.75	7.92	157.28	51.97	134.46
		3	O 5x15., (Tubos)	19.16	17.25	17.25	357.14	357.14	714.28

Notación:
Ref.: Referencia
A: Área de la sección transversal
Avy: Área de cortante de la sección según el eje local 'Y'
Avz: Área de cortante de la sección según el eje local 'Z'
Iyy: Inercia de la sección alrededor del eje local 'Y'
Izz: Inercia de la sección alrededor del eje local 'Z'
It: Inercia a torsión
Las características mecánicas de las piezas corresponden a la sección en el punto medio de las mismas.

2.1.2.4.- Tabla de medición

Tabla de medición						
Material		Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	Volumen (m³)	Peso (kg)
Tipo	Designación					
Acero laminado	S275	N164/N163	IPE 220 (IPE)	0.013	0.000	0.34
		N164/N165	IPE 220 (IPE)	0.279	0.001	7.31
		N166/N164	IPE 220 (IPE)	0.127	0.000	3.33
		N4/N167	IPE 220 (IPE)	0.718	0.002	18.82
		N27/N168	IPE 220 (IPE)	0.137	0.000	3.59
		N12/N167	IPE 220 (IPE)	0.409	0.001	10.71
		N163/N21	IPE 220 (IPE)	1.289	0.004	33.80
		N33/N169	IPE 220 (IPE)	0.432	0.001	11.32
		N169/N139	IPE 220 (IPE)	0.666	0.002	17.47
		N139/N4	IPE 220 (IPE)	0.158	0.001	4.13
		N170/N142	IPE 220 (IPE)	0.282	0.001	7.40
		N142/N27	IPE 220 (IPE)	0.535	0.002	14.02
		N168/N24	IPE 220 (IPE)	0.817	0.003	21.42
		N24/N140	IPE 220 (IPE)	0.388	0.001	10.17

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Tabla de medición

Material Tipo	Material Designación	Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	Volumen (m³)	Peso (kg)
		N140/N12	IPE 220 (IPE)	0.566	0.002	14.84
		N21/N141	IPE 220 (IPE)	0.667	0.002	17.50
		N141/N33	IPE 220 (IPE)	0.588	0.002	15.43
		N165/N148	IPE 220 (IPE)	0.720	0.002	18.88
		N171/N36	IPE 220 (IPE)	0.051	0.000	1.33
		N61/N172	IPE 220 (IPE)	0.479	0.002	12.57
		N77/N173	IPE 220 (IPE)	0.382	0.001	10.01
		N174/N149	IPE 220 (IPE)	0.579	0.002	15.18
		N72/N75	IPE 220 (IPE)	1.004	0.003	26.32
		N148/N72	IPE 220 (IPE)	0.255	0.001	6.68
		N36/N165	IPE 220 (IPE)	0.029	0.000	0.75
		N150/N61	IPE 220 (IPE)	0.267	0.001	7.00
		N147/N77	IPE 220 (IPE)	0.430	0.001	11.26
		N69/N173	IPE 220 (IPE)	0.549	0.002	14.40
		N149/N69	IPE 220 (IPE)	0.168	0.001	4.41
		N75/N174	IPE 220 (IPE)	0.257	0.001	6.73
		N38/N150	IPE 220 (IPE)	0.576	0.002	15.09
		N67/N147	IPE 220 (IPE)	0.413	0.001	10.83
		N175/N38	IPE 220 (IPE)	0.079	0.000	2.06
		N64/N67	IPE 220 (IPE)	0.843	0.003	22.10
		N172/N64	IPE 220 (IPE)	0.363	0.001	9.53
		N159/N176	IPE 220 (IPE)	1.212	0.004	31.77
		N177/N132	IPE 220 (IPE)	2.204	0.007	57.79
		N153/N178	IPE 220 (IPE)	1.545	0.005	40.51
		N178/N157	IPE 220 (IPE)	0.704	0.002	18.45
		N127/N179	IPE 220 (IPE)	0.899	0.003	23.58
		N179/N159	IPE 220 (IPE)	0.288	0.001	7.55
		N180/N122	IPE 220 (IPE)	0.121	0.000	3.17
		N132/N158	IPE 220 (IPE)	0.470	0.002	12.33
		N177/N153	IPE 220 (IPE)	0.286	0.001	7.49
		N157/N127	IPE 220 (IPE)	1.109	0.004	29.09
		N122/N162	IPE 220 (IPE)	1.329	0.004	34.83
		N158/N180	IPE 220 (IPE)	0.974	0.003	25.54
		N162/N113	IPE 220 (IPE)	0.237	0.001	6.22
		N113/N181	IPE 220 (IPE)	0.018	0.000	0.47
Acero conformado	S235	N2/N1	# 10.0x5.0x10.48 (#)	0.789	0.001	8.26
		N4/N3	# 10.0x5.0x10.48 (#)	0.649	0.001	6.79
		N6/N5	# 10.0x5.0x10.48 (#)	0.789	0.001	8.26
		N8/N7	# 10.0x5.0x10.48 (#)	0.789	0.001	8.26
		N10/N9	# 10.0x5.0x10.48 (#)	0.789	0.001	8.26
		N12/N11	# 10.0x5.0x10.48 (#)	0.337	0.000	3.52
		N14/N13	# 10.0x5.0x10.48 (#)	0.789	0.001	8.26
		N16/N15	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N15/N2	# 10.0x5.0x10.48 (#)	1.500	0.002	15.71
		N18/N17	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N17/N19	# 10.0x5.0x10.48 (#)	1.500	0.002	15.71
		N21/N20	# 10.0x5.0x10.48 (#)	0.594	0.001	6.22
		N20/N6	# 10.0x5.0x10.48 (#)	1.500	0.002	15.71

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Tabla de medición

Material		Pieza	Perfil(Serie)	Longitud	Volumen	Peso
Tipo	Designación	(Ni/Nf)		(m)	(m3)	(kg)
		N23/N22	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N24/N8	# 10.0x5.0x10.48 (#)	0.310	0.000	3.25
		N26/N25	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N27/N10	# 10.0x5.0x10.48 (#)	1.073	0.001	11.24
		N29/N28	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N28/N30	# 10.0x5.0x10.48 (#)	1.500	0.002	15.71
		N32/N31	# 10.0x5.0x10.48 (#)	0.811	0.001	8.49
		N33/N14	# 10.0x5.0x10.48 (#)	0.977	0.001	10.23
		N19/N4	# 10.0x5.0x10.48 (#)	0.140	0.000	1.47
		N30/N12	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N34/N21	# 10.0x5.0x10.48 (#)	0.217	0.000	2.28
		N22/N24	# 10.0x5.0x10.48 (#)	1.190	0.002	12.46
		N25/N27	# 10.0x5.0x10.48 (#)	0.427	0.001	4.48
		N31/N33	# 10.0x5.0x10.48 (#)	0.523	0.001	5.48
		N35/N36	# 10.0x5.0x10.48 (#)	0.225	0.000	2.36
		N37/N38	# 10.0x5.0x10.48 (#)	0.420	0.001	4.40
		N39/N40	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N41/N42	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N43/N44	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N45/N46	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N47/N48	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N49/N50	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N51/N52	# 10.0x5.0x10.48 (#)	0.833	0.001	8.73
		N53/N54	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N55/N53	# 10.0x5.0x10.48 (#)	1.700	0.002	17.80
		N56/N57	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N58/N56	# 10.0x5.0x10.48 (#)	1.700	0.002	17.80
		N59/N60	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N40/N61	# 10.0x5.0x10.48 (#)	0.192	0.000	2.01
		N62/N63	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N42/N64	# 10.0x5.0x10.48 (#)	0.797	0.001	8.35
		N65/N66	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N44/N67	# 10.0x5.0x10.48 (#)	1.403	0.002	14.69
		N68/N69	# 10.0x5.0x10.48 (#)	0.136	0.000	1.43
		N46/N68	# 10.0x5.0x10.48 (#)	1.700	0.002	17.80
		N70/N71	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N48/N72	# 10.0x5.0x10.48 (#)	0.207	0.000	2.17
		N73/N74	# 10.0x5.0x10.48 (#)	0.667	0.001	6.98
		N50/N75	# 10.0x5.0x10.48 (#)	1.022	0.001	10.70
		N76/N77	# 10.0x5.0x10.48 (#)	0.308	0.000	3.23
		N52/N76	# 10.0x5.0x10.48 (#)	1.700	0.002	17.80
		N78/N79	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N81/N80	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93
		N82/N83	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N85/N84	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93
		N86/N87	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N89/N88	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93
		N91/N90	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93

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1FC34DB09C6CAB3FF78733488E51DE67D6248B93

Tabla de medición

Material Tipo	Material Designación	Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	Volumen (m3)	Peso (kg)
		N92/N93	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N94/N95	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N97/N96	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93
		N98/N99	# 10.0x5.0x10.48 (#)	0.452	0.001	4.74
		N101/N100	# 10.0x5.0x10.48 (#)	3.527	0.005	36.93
		N79/N80	# 10.0x5.0x10.48 (#)	2.798	0.004	29.30
		N83/N84	# 10.0x5.0x10.48 (#)	2.798	0.004	29.30
		N87/N90	# 10.0x5.0x10.48 (#)	2.798	0.004	29.30
		N93/N88	# 10.0x5.0x10.48 (#)	2.798	0.004	29.30
		N95/N96	# 10.0x5.0x10.48 (#)	2.798	0.004	29.30
		N99/N100	# 10.0x5.0x10.48 (#)	2.797	0.004	29.30
		N36/N55	# 10.0x5.0x10.48 (#)	0.608	0.001	6.37
		N38/N58	# 10.0x5.0x10.48 (#)	0.414	0.001	4.33
		N61/N59	# 10.0x5.0x10.48 (#)	1.508	0.002	15.79
		N64/N62	# 10.0x5.0x10.48 (#)	0.903	0.001	9.45
		N67/N65	# 10.0x5.0x10.48 (#)	0.297	0.000	3.11
		N69/N102	# 10.0x5.0x10.48 (#)	0.530	0.001	5.55
		N72/N70	# 10.0x5.0x10.48 (#)	1.493	0.002	15.64
		N75/N73	# 10.0x5.0x10.48 (#)	0.678	0.001	7.10
		N77/N103	# 10.0x5.0x10.48 (#)	0.359	0.000	3.76
		N105/N104	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N107/N106	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N109/N108	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N111/N110	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N113/N112	# 10.0x5.0x10.48 (#)	0.565	0.001	5.92
		N115/N114	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N117/N116	# 10.0x5.0x10.48 (#)	0.780	0.001	8.17
		N119/N118	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N118/N105	# 10.0x5.0x10.48 (#)	2.200	0.003	23.04
		N121/N120	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N122/N107	# 10.0x5.0x10.48 (#)	1.206	0.002	12.63
		N124/N123	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N123/N109	# 10.0x5.0x10.48 (#)	2.200	0.003	23.04
		N126/N125	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N127/N111	# 10.0x5.0x10.48 (#)	1.137	0.002	11.91
		N129/N128	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N128/N130	# 10.0x5.0x10.48 (#)	2.200	0.003	23.04
		N132/N131	# 10.0x5.0x10.48 (#)	0.427	0.001	4.47
		N131/N115	# 10.0x5.0x10.48 (#)	2.200	0.003	23.04
		N134/N133	# 10.0x5.0x10.48 (#)	0.820	0.001	8.59
		N133/N117	# 10.0x5.0x10.48 (#)	2.200	0.003	23.04
		N130/N113	# 10.0x5.0x10.48 (#)	0.215	0.000	2.25
		N120/N122	# 10.0x5.0x10.48 (#)	0.994	0.001	10.41
		N125/N127	# 10.0x5.0x10.48 (#)	1.063	0.001	11.13
		N135/N132	# 10.0x5.0x10.48 (#)	0.393	0.001	4.11
		N2/N136	O 5x15. (Tubos)	0.200	0.000	3.01
		N137/N20	O 5x15. (Tubos)	0.260	0.000	3.91
		N138/N6	O 5x15. (Tubos)	0.260	0.000	3.91

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1FC34DB09C6CAB3FF78733488E51DE67D6248B93

Tabla de medición						
Material		Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	Volumen (m3)	Peso (kg)
Tipo	Designación					
		N6/N14	O 5x15. (Tubos)	0.573	0.001	8.62
		N139/N19	O 5x15. (Tubos)	0.072	0.000	1.08
		N19/N30	O 5x15. (Tubos)	0.573	0.001	8.62
		N140/N8	O 5x15. (Tubos)	0.233	0.000	3.51
		N10/N2	O 5x15. (Tubos)	0.573	0.001	8.62
		N17/N28	O 5x15. (Tubos)	0.573	0.001	8.62
		N20/N141	O 5x15. (Tubos)	0.305	0.001	4.58
		N8/N10	O 5x15. (Tubos)	0.573	0.001	8.62
		N22/N25	O 5x15. (Tubos)	0.573	0.001	8.62
		N28/N22	O 5x15. (Tubos)	0.573	0.001	8.62
		N31/N17	O 5x15. (Tubos)	0.573	0.001	8.62
		N25/N142	O 5x15. (Tubos)	0.321	0.001	4.83
		N15/N143	O 5x15. (Tubos)	0.200	0.000	3.01
		N14/N139	O 5x15. (Tubos)	0.501	0.001	7.54
		N30/N140	O 5x15. (Tubos)	0.340	0.001	5.12
		N141/N31	O 5x15. (Tubos)	0.269	0.001	4.04
		N142/N15	O 5x15. (Tubos)	0.252	0.000	3.79
		N56/N144	O 5x15. (Tubos)	0.260	0.000	3.91
		N145/N55	O 5x15. (Tubos)	0.200	0.000	3.01
		N146/N53	O 5x15. (Tubos)	0.200	0.000	3.01
		N53/N70	O 5x15. (Tubos)	0.586	0.001	8.82
		N70/N73	O 5x15. (Tubos)	0.586	0.001	8.82
		N68/N76	O 5x15. (Tubos)	0.586	0.001	8.82
		N147/N65	O 5x15. (Tubos)	0.287	0.001	4.32
		N65/N62	O 5x15. (Tubos)	0.586	0.001	8.82
		N62/N59	O 5x15. (Tubos)	0.586	0.001	8.82
		N59/N56	O 5x15. (Tubos)	0.586	0.001	8.82
		N55/N148	O 5x15. (Tubos)	0.437	0.001	6.58
		N149/N68	O 5x15. (Tubos)	0.098	0.000	1.48
		N48/N50	O 5x15. (Tubos)	0.586	0.001	8.82
		N52/N44	O 5x15. (Tubos)	0.586	0.001	8.82
		N46/N52	O 5x15. (Tubos)	0.586	0.001	8.82
		N50/N46	O 5x15. (Tubos)	0.586	0.001	8.82
		N42/N40	O 5x15. (Tubos)	0.586	0.001	8.82
		N44/N42	O 5x15. (Tubos)	0.586	0.001	8.82
		N40/N150	O 5x15. (Tubos)	0.186	0.000	2.80
		N58/N151	O 5x15. (Tubos)	0.260	0.000	3.91
		N152/N79	O 5x15. (Tubos)	0.200	0.000	3.01
		N153/N95	O 5x15. (Tubos)	0.488	0.001	7.34
		N79/N83	O 5x15. (Tubos)	0.689	0.001	10.36
		N95/N93	O 5x15. (Tubos)	0.688	0.001	10.35
		N83/N87	O 5x15. (Tubos)	0.687	0.001	10.34
		N93/N99	O 5x15. (Tubos)	0.688	0.001	10.35
		N87/N153	O 5x15. (Tubos)	0.200	0.000	3.01
		N99/N154	O 5x15. (Tubos)	0.303	0.001	4.56
		N76/N147	O 5x15. (Tubos)	0.299	0.001	4.50
		N148/N48	O 5x15. (Tubos)	0.149	0.000	2.24
		N73/N149	O 5x15. (Tubos)	0.488	0.001	7.34

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Tabla de medición						
Material		Pieza (Ni/Nf)	Perfil(Serie)	Longitud (m)	Volumen (m³)	Peso (kg)
Tipo	Designación					
		N150/N58	O 5x15. (Tubos)	0.400	0.001	6.02
		N128/N155	O 5x15. (Tubos)	0.260	0.000	3.91
		N156/N117	O 5x15. (Tubos)	0.200	0.000	3.01
		N133/N125	O 5x15. (Tubos)	0.657	0.001	9.88
		N157/N118	O 5x15. (Tubos)	0.338	0.001	5.09
		N118/N123	O 5x15. (Tubos)	0.657	0.001	9.88
		N123/N131	O 5x15. (Tubos)	0.657	0.001	9.88
		N158/N120	O 5x15. (Tubos)	0.459	0.001	6.90
		N120/N128	O 5x15. (Tubos)	0.657	0.001	9.89
		N117/N159	O 5x15. (Tubos)	0.316	0.001	4.75
		N160/N133	O 5x15. (Tubos)	0.200	0.000	3.01
		N111/N105	O 5x15. (Tubos)	0.657	0.001	9.88
		N115/N107	O 5x15. (Tubos)	0.656	0.001	9.87
		N109/N115	O 5x15. (Tubos)	0.657	0.001	9.88
		N105/N109	O 5x15. (Tubos)	0.657	0.001	9.88
		N130/N161	O 5x15. (Tubos)	0.260	0.000	3.91
		N107/N162	O 5x15. (Tubos)	0.558	0.001	8.39
		N125/N157	O 5x15. (Tubos)	0.318	0.001	4.79
		N131/N158	O 5x15. (Tubos)	0.197	0.000	2.97
		N159/N111	O 5x15. (Tubos)	0.341	0.001	5.12
		N162/N130	O 5x15. (Tubos)	0.099	0.000	1.50
		N182/N168	O 5x15. (Tubos)	2.734	0.005	41.13
		N183/N169	O 5x15. (Tubos)	2.641	0.005	39.73
		N184/N174	O 5x15. (Tubos)	3.007	0.006	45.24
		N185/N172	O 5x15. (Tubos)	2.994	0.006	45.05
		N186/N180	O 5x15. (Tubos)	2.629	0.005	39.55
		N187/N179	O 5x15. (Tubos)	2.718	0.005	40.90
		N188/N178	O 5x15. (Tubos)	2.494	0.005	37.52

Notación:
Ni: Nudo inicial
Nf: Nudo final

2.1.2.5.- Resumen de medición

Resumen de medición												
Material		Serie	Perfil	Longitud			Volumen			Peso		
Tipo	Designación			Perfil (m)	Serie (m)	Material (m)	Perfil (m³)	Serie (m³)	Material (m³)	Perfil (kg)	Serie (kg)	Material (kg)
Acero laminado	S275	IPE	IPE 220	26.910	26.910	26.910	0.090	0.090	0.090	705.55	705.55	705.55
Acero conformado	S235	# Tubos	# 10.0x5.0x10.48	117.761	117.761	167.823	0.157	0.157	0.253	1233.28	1233.28	1986.39
			O 5x15.	50.062	50.062		0.096	0.096		753.10	753.10	

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2.1.2.6.- Medición de superficies

Perfiles de acero: Medición de las superficies a pintar					
Tipo	Serie	Perfil	Superficie unitaria (m²/m)	Longitud (m)	Superficie (m²)
Acero conformado	#	# 10.0x5.0x10.48	0.282	117.761	33.260
	Tubos	O 5x15.	0.399	50.062	19.974
				Subtotal	53.233
Acero laminado	IPE	IPE 220	0.868	26.910	23.363
				Subtotal	23.363
				Total	**76.597**