



**CERTIFICADO DE CALIDAD**  
**INSPECTION CERTIFICATE**  
(DIN EN 10204:2004E - ISO 10474.3.1.B)

Tubos de Acero de México, S.A.  
Carr. My-Laredo Km 24.2  
Apartado Postal 43  
(65550) C. de Flores, N.L. Méx.  
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(52) 81 8305 9620 fax

Vendido a: **PROVEEDORA DE MATERIALES ANGER, S. A.**  
DE C. V.  
Pedido del Cliente No: **5275 - 5279 - 5292 - 5299 - 5274**  
Factura/Invoice: **11065**  
Fecha/Date: **27 de Noviembre de 2008**

Sold to: **PROVEEDORA DE MATERIALES ANGER, S. A.**  
Customers Order No: **5275 - 5279 - 5292 - 5299 - 5274**  
Bocas / Ends: **Biselado / Bevelled ends**

Especificaciones y Grados / Standard or Specification and Steel Grade,  
Dimensiones y tolerancias / Dimension and tolerances

Seamless Fittings according to ASTM A 234 "W" WPB-07, A234 "W" WPB-08a, NACE MR0103-2003  
ASME B 16.9 - 2007 and ASME B 16.28 - 1994

Conform to ASME II Ed. 2001 ASME SA-234 "W", Grade WPB, NACE MR0103-2003

ART. ITEM	COLADA HEAT CODE	CANTIDAD QUANTITY	DESCRIPCION / DESCRIPTION	PRUEBAS MECANICAS / MECHANICAL TEST			PRUEBA DE IMPACTO 0°C / IMPACT TEST 0°C				
				ESF. CEDENCIA YIELD STRENGTH (Mpa)	ESF. RUPTURA TENSILE STRENGTH (Mpa)	ELONG. % <sup>2"</sup>	DUREZA HARDNESS HBW	DIMENSIONES SAMPLE DIM mm	1 Joules	2 Joules	3 Joules
1	S28475	28	CODO 4 X 90° R. I. CED-STD	322	498	32	105				
2	S22585	2	CODO 2 1/2 X 90° R. I. CED-STD	331	485	30	125				
3	S21171	322	CODO 2 1/2 X 90° R. I. CED-STD	327	500	31	122				
4	S46693	13	CODO 2 1/2 X 90° R. I. CED-STD	337	486	32	118				
5	S22312	6	CODO 2 1/2 X 90° R. I. CED-STD	324	498	30	123				
6	T41644	42	CODO 12 X 90° R. I. CED-STD	306	471	34	98				
7	S38130	80	CODO 1 1/4 X 90° R. I. CED-XS	363	535	34	122				
8	T39736	18	TEE 10 CED-STD	302	466	38	109				
9	T27741	4	TEE 16 CED-XS	350	500	48	123				
10	T33541	4	RED. CONC. 16 X 8 CED-XS	339	476	37	95				
11	S29808	100	CODO 2 1/2 X 45° CED-XS	292	451	35	124				

**ANALISIS QUIMICO / CHEMICAL ANALYSIS**

PROCESO PROCESS	COLADA HEAT CODE	COLAD/HEAT M.P./MOTHER PIPE	%C.E.	%C	%Mn.	%P	%S	%SI	%Cr	%Cu	%Mo	%Ni	%V	%Nb
HF	S28475	28475	0.340	0.180	0.830	0.008	0.001	0.310	0.050	0.056	0.030	0.040	0.001	0.000
HF	S22585	22585	0.310	0.170	0.760	0.012	0.001	0.270	0.040	0.026	0.010	0.022	0.001	0.002
HF	S21171	21171	0.310	0.180	0.740	0.010	0.001	0.290	0.010	0.018	0.010	0.010	0.001	0.002
HF	S46693	46693	0.320	0.180	0.720	0.013	0.001	0.270	0.050	0.038	0.010	0.025	0.001	0.001
HF	S22312	22312	0.320	0.180	0.750	0.011	0.001	0.300	0.030	0.019	0.010	0.011	0.001	0.002
HF	T41644	41644	0.300	0.170	0.660	0.013	0.001	0.280	0.050	0.051	0.009	0.030	0.000	0.000
HF	S38130	38130	0.313	0.180	0.710	0.009	0.001	0.280	0.030	0.043	0.020	0.022	0.001	0.001
HF	T39736	39736	0.300	0.170	0.630	0.009	0.001	0.270	0.040	0.049	0.011	0.020	0.000	0.000
HF	T27741	27741	0.320	0.180	0.670	0.010	0.002	0.260	0.070	0.081	0.036	0.040	0.000	0.000
CE	T33541	33541	0.300	0.170	0.650	0.013	0.002	0.270	0.070	0.063	0.031	0.030	0.000	0.000
HF	S29808	29808	0.332	0.190	0.720	0.008	0.001	0.290	0.050	0.060	0.020	0.060	0.001	0.001

**Notes:**  
Hot formed fittings in a range from 620°C to 980°C, cooled in still air.  
Cold formed normalized at 840°C max.  
Holding time 10'.  
Visual dimensional check: Satisfactory

**Notes:**  
The Products described herein were produced in accordance with the above referenced specification and are identified with the "R" which is permanently marked on each fitting. The values of hardness for fittings NPS 2 1/2" and smaller ones obtain from the conversion of hardness Rockwell B to hardness Brinell HBW by means of table WILSON DESK CHART 60.  
Los valores de dureza para conexiones de NPS de 2 1/2" y menores, se obtienen de la conversión de dureza Rockwell B a dureza Brinell HBW mediante la tabla WILSON DESK CHART 60.

Inspección Dimensional: Satisfactoria. **CF: FORMADO EN FRIO/COLD FORMED**  
Inspección Dimensional: Satisfactoria. **CF: FORMADO EN CALIENTE/HOT FORMED**

ING. WALDO GALLEGOS GALVAN