

Lo nuevo en la versión 4.84



Pipe Stress Analysis And Sizing



PASS / Start-Prof | Próxima Versión 4.84

Ha pasado aproximadamente un año desde nuestra última versión del software PASS / START-PROF

Nosotros trabajamos duro durante este tiempo

Mire qué hemos preparado para nuestros clientes

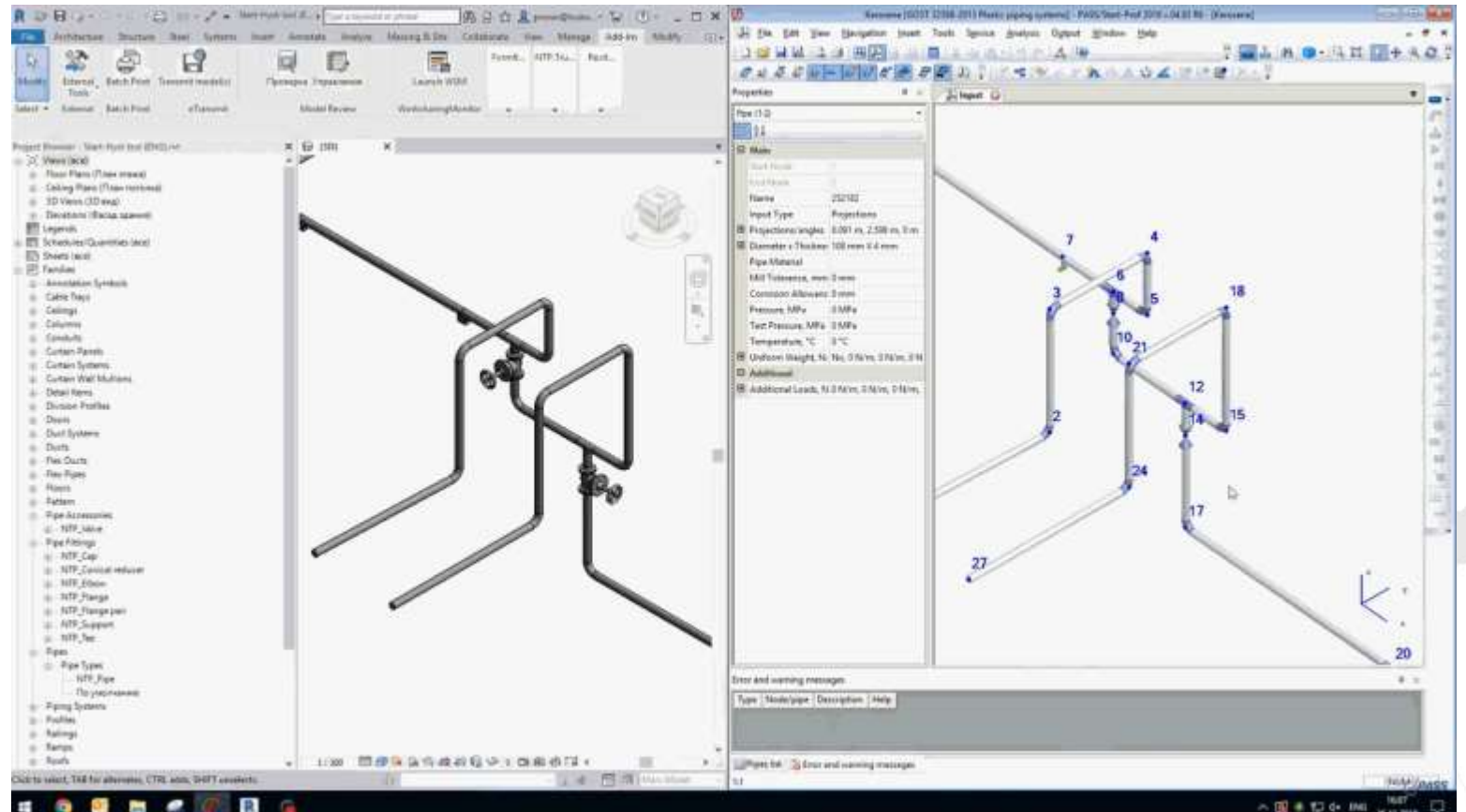


PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS / Start-Prof | Interfaces Externas

- Se agregó Exportación e importación desde AVEVA E3D versión 3.1
- Se agregó Exportación e importación desde AVEVA MARINE version 12.1SP4 and 12.1SP5
- Implementación de soporte para AVEVA MDS
- Se agregó la Importación desde Autodesk REVIT a START-PROF



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

PASS / Start-Prof | Actualizaciones de Códigos

- Se actualizó el Código ASME B31.9-2017 conforme al Building Services Piping (EE. UU.)
- Se actualizó el Código ASME B31.4-2019 Sistemas de transporte por tubería para líquidos y lodos (EE. UU.)
- Se actualizó la base de datos de la ISO 14692-2017. Tuberías de plástico reforzado con fibra de vidrio (GRP)

Material: Wavistrong 55 Class: FRP

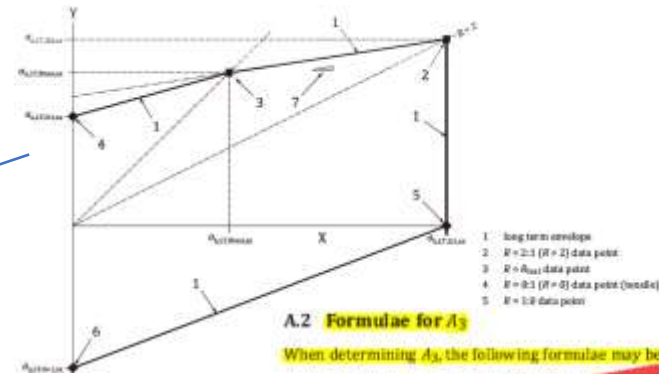
Database can only be edited if database files are open for editing and if stress units are set as MPa (for ASME - ksi)

Data source: Data provided by Future Pipe Industries

Density: 1850 kg/m³

Cyclic long term strength factor, fc: 4

Temperature °C	al(0:1), MPa	al(1:1), MPa	hl(1:1), MPa	al(2:1), MPa	hl(2:1), MPa	qs bend, reducer, MPa	qs tee, nozzle, MPa	Ea, MPa	Eh, MPa	G, MPa	Expansion Coeff. 1/°C	Poisson factor Vh/a	Gxx
20	32.5	0	0	62.5	125	80	64	10500	20500	11500	0.00002	0.65	0.045
40	32.5	0	0	62.5	125	80	64	9765	19475	10925	0.00002	0.65	0.054
60	32.5	0	0	62.5	125	80	64	9135	18450	10350	0.00002	0.65	0.063
65	32.5	0	0	62.5	125	80	64	9161	18091	10149	0.00002	0.65	0.065
80	29.3	0	0	56.3	112.5	72	57.6	9240	17015	9545	0.00002	0.65	0.078
95	26	0	0	50	100	64	51.2	7980	15785	8855	0.00002	0.65	0.092
100	25	0	0	48	96	61.6	49.3	7560	14775	8335	0.00002	0.65	0.105
110	22.9	0	0	44.1	88.1	56.4	45.1	7140	13775	7715	0.00002	0.65	0.125



A.2 Formulae for A3

When determining A3, the following formulae may be used in lieu of the graph.

$$f_c = \frac{\sigma_{static 100\ 000}}{\sigma_{cyclic 150\ 000\ 000}} \quad (A.1)$$

The cyclic long term strength factor, f_c , is defined as the ratio of the projected stress values at 100 000 h (static loading) and 150 000 000 cycles (cyclic loading) respectively. These values shall be determined from regression analysis as defined in the ASTM D2992-96, Procedures A (cyclic) and B (static). In case no test data is available, f_c shall be 4,0.

When $R_c > 0,4$:

$$A_3 = \left(\frac{1 - f_c}{0,6 f_c} \right) \left(\frac{1 - R_c}{\log(150 \times 10^6) - \log(7\ 000)} \right) \log(N) + 1 - \gamma_{AN} \left[\left(\frac{1 - f_c}{0,6 f_c} \right) \left(\frac{1 - R_c}{\log(150 \times 10^6) - \log(7\ 000)} \right) \right] \log(7\ 000) \quad (A.2)$$

When $R_c \leq 0,4$:

$$A_3 = \left(\frac{1 - f_c}{f_c} \right) \left(\frac{1}{\log(150 \times 10^6) - \log(7\ 000)} \right) \log(N) + 1 - \left(\frac{1 - f_c}{f_c} \right) \left(\frac{1}{\log(150 \times 10^6) - \log(7\ 000)} \right) \log(7\ 000) \quad (A.3)$$

A_3 shall be greater than or equal to $1/f_c$. A_3 shall be 1,0 if the calculated value is between 0,9 and 1,0. At 7 000 cycles or less, A_3 shall be 1,0. The minimum value for A_3 shall be 0,25.



PIPING AND EQUIPMENT ANALYSIS & SIZING SUITE

$$A_0 = \frac{1}{10^{(\log(t) - \log(175\ 200)) \cdot G_{23}}} \quad (1)$$

where

t is the time expressed in h;

G_{23} is the gradient of regression line at xx °C;

A_0 shall not be greater than 1,0.



PASS / Start-Prof | Actualizaciones de Códigos

Las tensiones de flexión del anillo se calculan utilizando el método de elemento finito con no linealidad geométrica y se considera el efecto de rigidez por la presión.

7.8 Allowable stresses

The sum of the hoop stresses shall be defined by the following formulae:

$$\sigma_{h, \text{sum}} = \sigma_{hp} + \sigma_{hu} \quad (10)$$

$$\sigma_{hp} = \frac{P \times D_{r, \text{min}}}{2 \times t_{r, \text{min}}} \quad (11)$$

$$\sigma_{hu} = r_c \times D_f \times E_{hb} \times \frac{\Delta y}{D_{r, \text{min}}} \times \frac{t_{r, \text{min}}}{D_{r, \text{min}}} \quad (12)$$

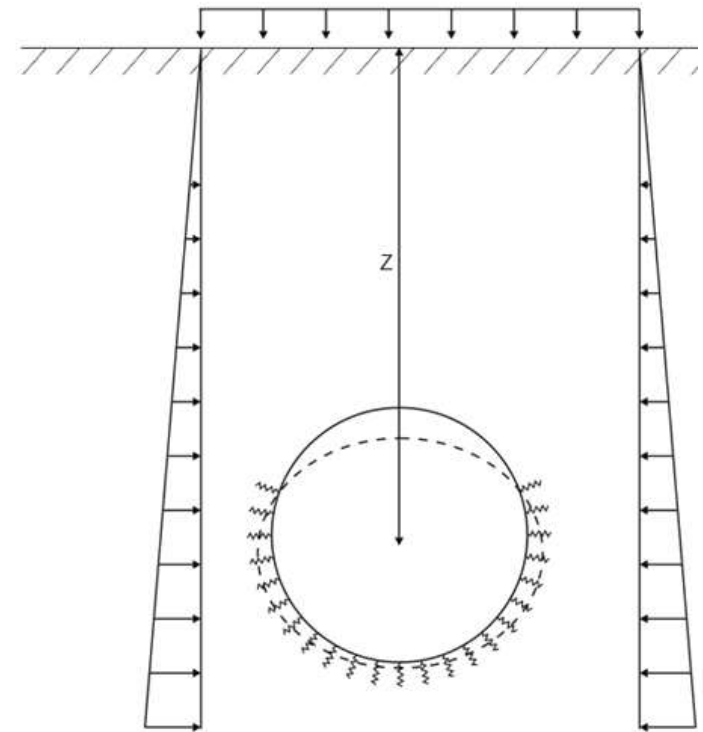
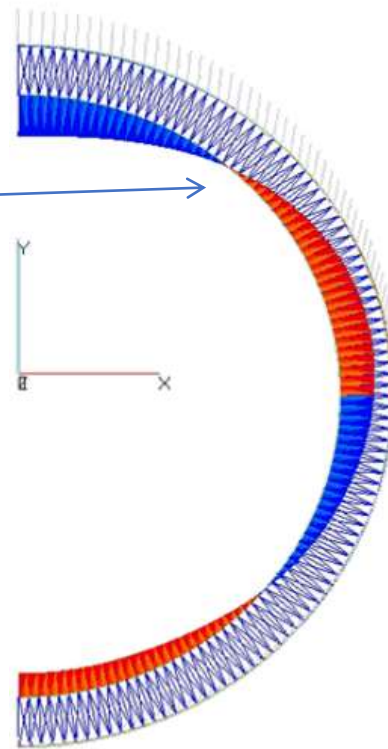
where

- P is the internal pressure, expressed in MPa;
- $t_{r, \text{min}}$ is the minimum reinforced pipe wall thickness, expressed in mm;
- $D_{r, \text{min}}$ is the mean diameter of the minimum reinforced pipe wall, expressed in mm;
- t_l is the internal liner thickness of the pipe wall, expressed in mm;
- r_c is the rerounding coefficient, for $P \leq 3$ then $r_c = 1 - P/3$, for $P > 3$ then $r_c = 0$;
- D_f is the shape factor, see AWWA Manual M45 (second edition), [Table 1](#);
- $\Delta y/D_{r, \text{min}}$ is the predicted vertical pipe deflection [see [Formula \(9\)](#)];
- E_{hb} is the hoop bending modulus, expressed in MPa.

(10)

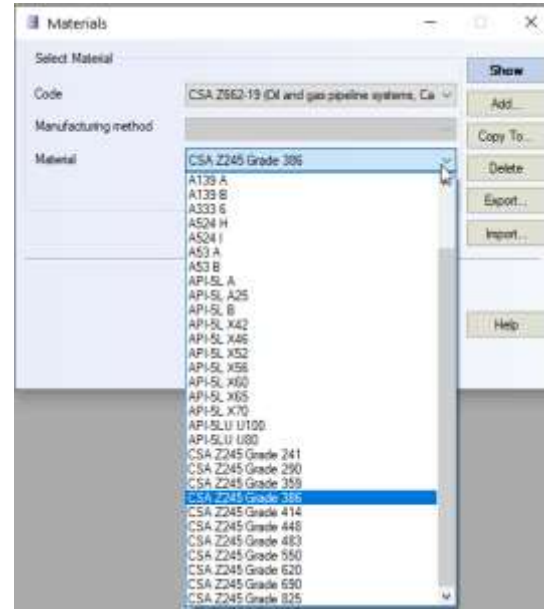
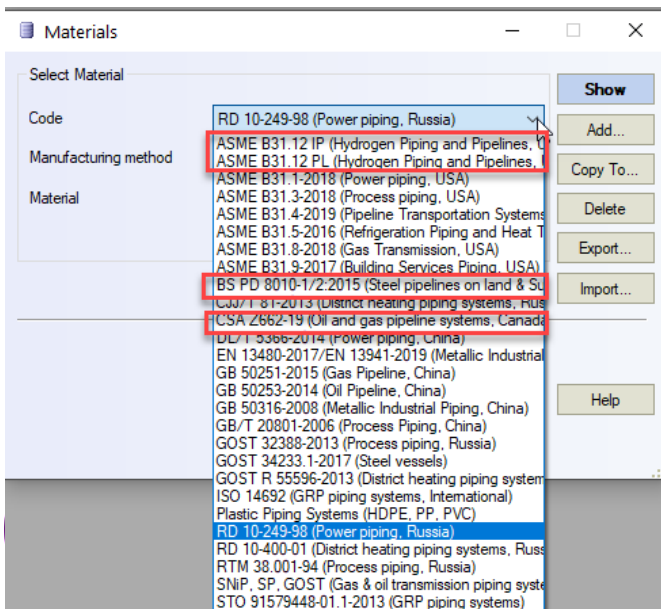
(11)

(12)



PASS / Start-Prof | Códigos nuevos

- ASME B31.12-2014 Tuberías y tuberías de hidrógeno (EE. UU.)
- BS PD 8010-1: 2015 Sistemas de tuberías - Parte 1: Tuberías de acero en tierra (Reino Unido)
- BS PD 8010-2: 2015 Sistemas de tuberías - Parte 2: tuberías submarinas (Reino Unido)
- CSA Z662 + Ch.11 Sistemas de oleoductos y gasoductos (Canadá)
- GOST R 55989-2014 Tuberías de transmisión de gas y petróleo para presiones mayores a 10 MPa
- GOST R 55990-2014 Tuberías de campo (Rusia)
- SP 284.1325800.2016 Tuberías de campo (Rusia)
- SP 33.13330.2012 Tuberías de acero (Rusia)
- Se crearon bases de datos individuales y se incluyeron las propiedades de Material para todos los códigos nuevos.



Material: CSA Z245 Grade 241 Class: Carbon or Low Alloy Steel

Database can only be edited if database files are open for editing and if stress units are set as MPa for ASME - ka)

Data source: CSA Z245

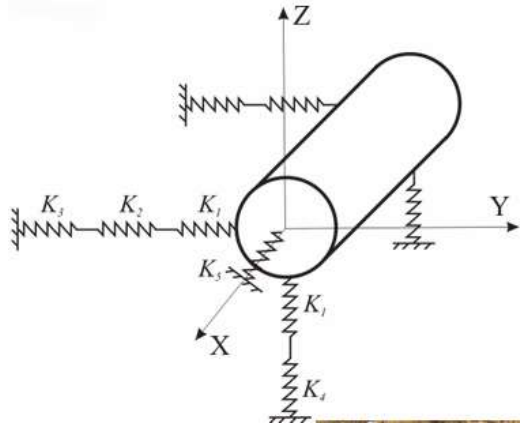
Density: 7830 kg/m3

Temperature °C	Yield Stress (Sy), kgf/sq.cm	Elastic Modulus, kgf/sq.cm	Expansion Coeff, 1/°C	Poisson's Ratio (v)
-30	2409.9934	2070000	1.12e-005	0.3
20	2409.9934	2070000	1.12e-005	0.3
120	2409.9934	2070000	1.12e-005	0.3
150	2337.6936	2070000	1.12e-005	0.3

Buttons: Save, OK, Cancel, Help

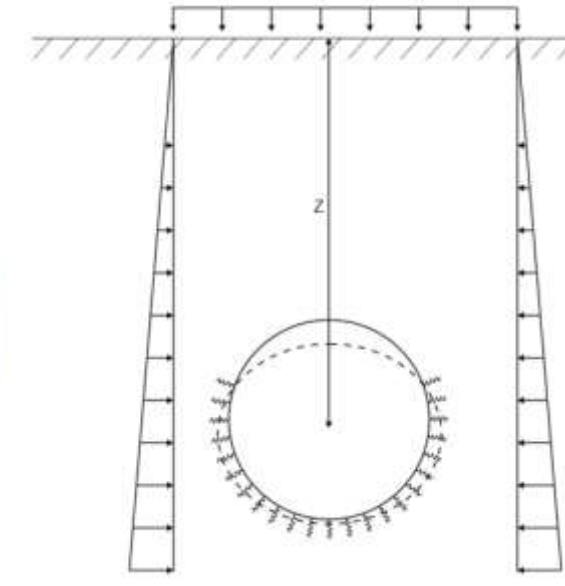
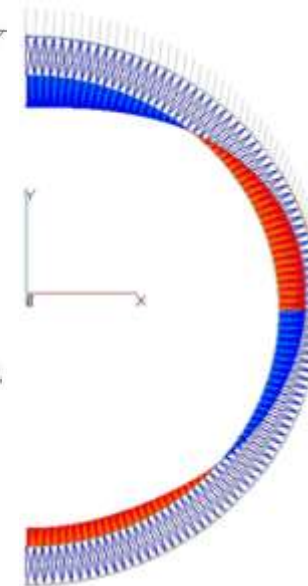
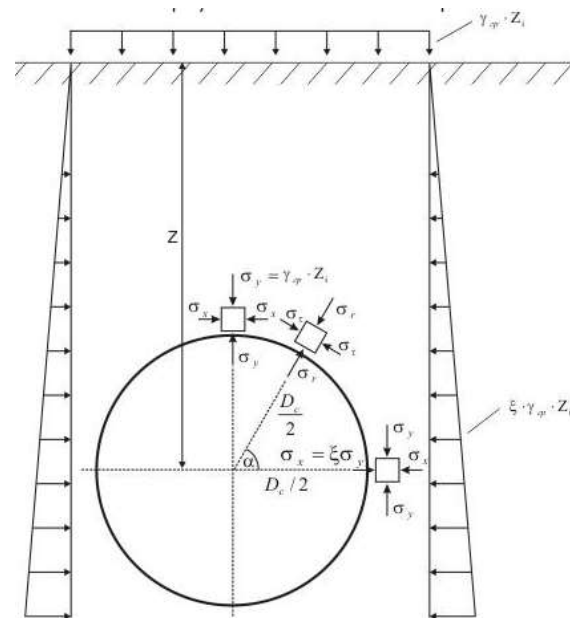
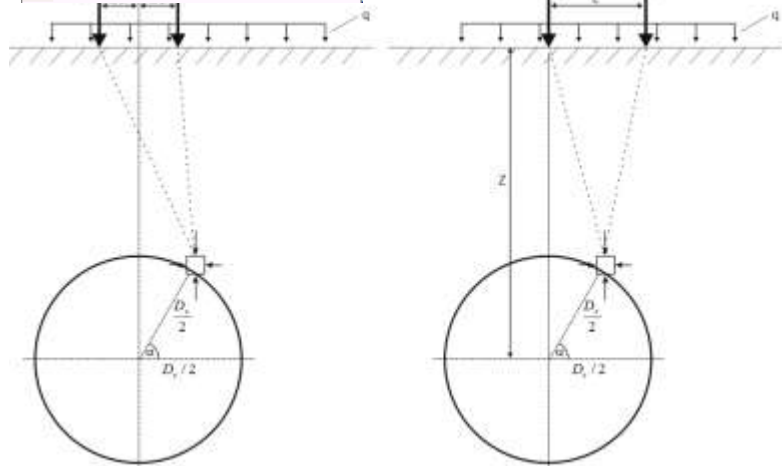
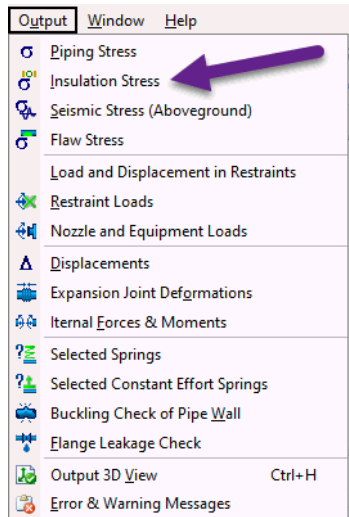
PASS/Start-Prof | Códigos nuevos

EN 13941-2019 Tuberías de calefacción urbana. Diseño e instalación de sistemas de tubería simple y doble con aislamiento térmico para redes de agua caliente directamente enterradas.



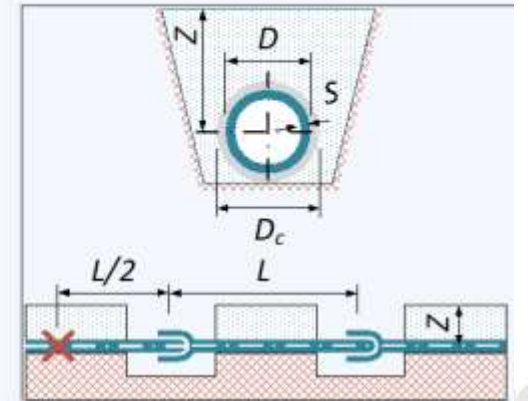
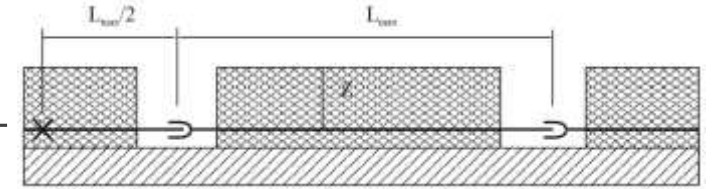
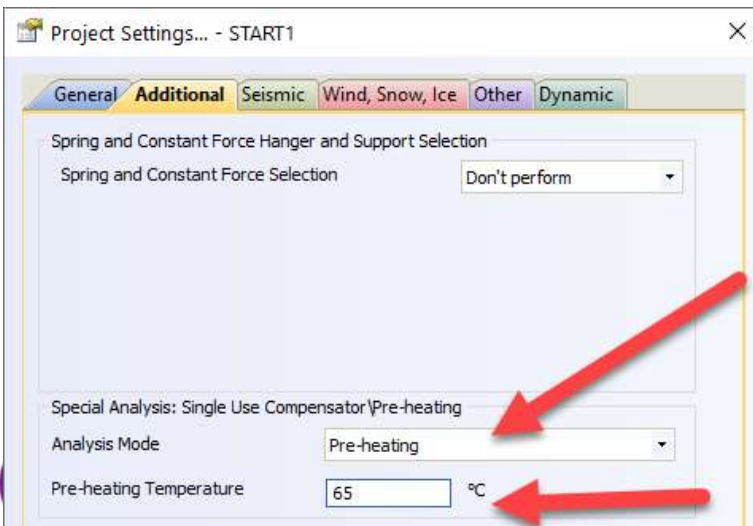
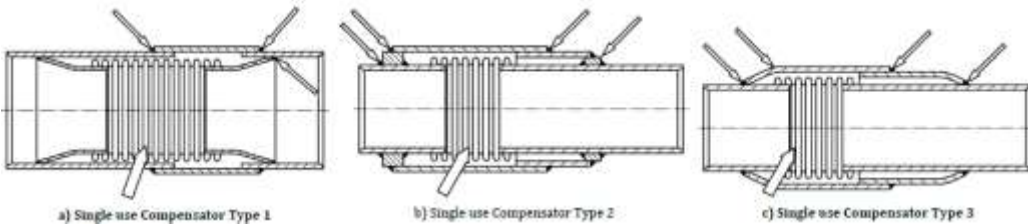
PASS/Start-Prof | Códigos nuevos

Calcula y verifica esfuerzos en aislamiento de Poliuretano (EN 13941 7.3.1, 7.3.2, EN 253). Y verifica los esfuerzos a partir de cargas por vehículos en la superficie.



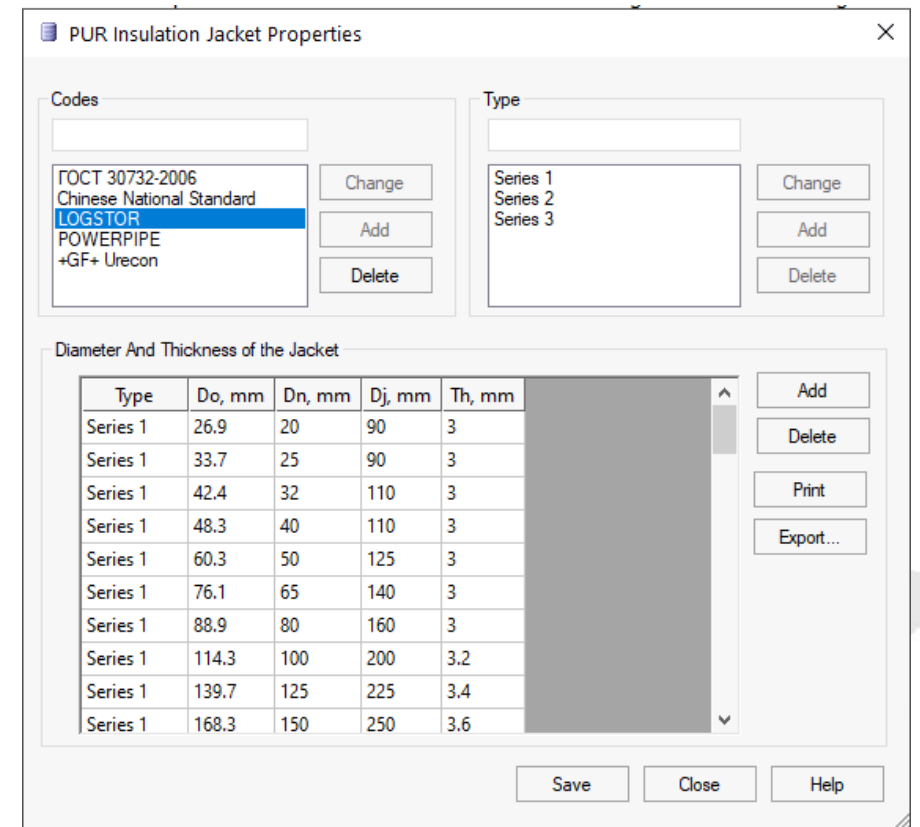
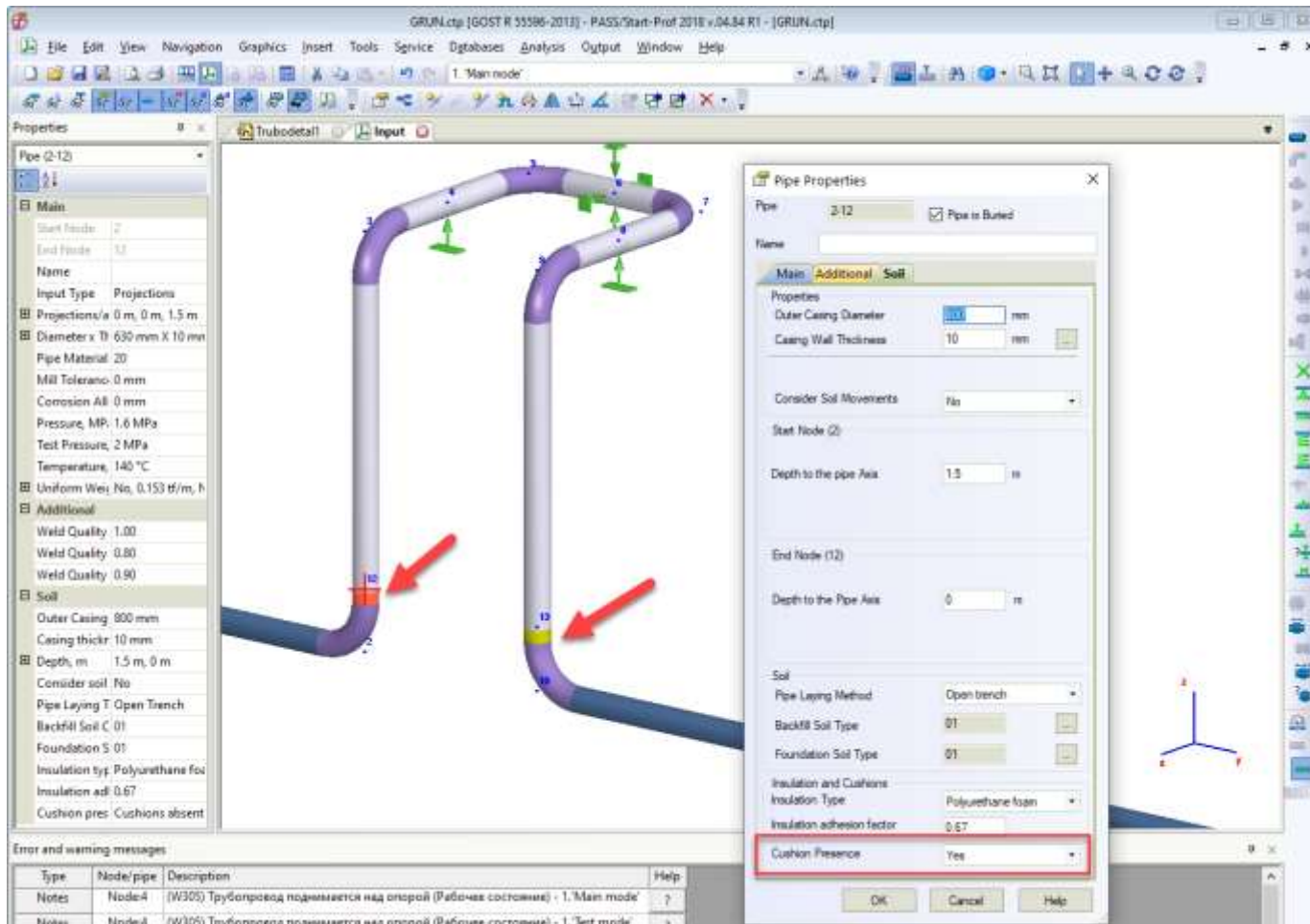
PASS/Start-Prof | Códigos nuevos

- START-PROF tiene todo lo necesario para análisis de redes de calefacción urbana y es ampliamente utilizado desde 1998.
- Análisis de Pre-Calentamiento
- Análisis de Compensadores de uso simple + base de datos + cálculo de distancia



PASS/Start-Prof | Códigos nuevos

- Agregada base de datos de tamaños y espesor de camisa de tubería pre-aislada de poliuretano LOGSTOR, POWERPIPE, +GF+ URECON, para redes urbanas de refrigeración y calefacción
- Ahora se permite agregar cojines de expansión en tuberías verticales



PASS/Start-Prof | Actualización de códigos

Se actualizaron las bases de datos de Material

EN 13480/EN 13941.

Se adicionan todos los materiales de tubería para

EN 10216-1-2013, EN 10216-2-2013, EN 10216-3-2013, EN 10216-4-2013, EN 10216-5-2013, EN 10217-1-2019, EN 10217-2-2019, EN 10217-3-2019, EN 10217-4-2019, EN 10217-5-2019, EN 10217-6-2019, EN 10217-7-2014, EN 10220-2002 (2007), EN 10253-2-2007.

Se adicionan la selección automática de propiedades de materiales dependiendo del espesor de pared y la opción propia de con o sin costura

Material: 1.0345/P235GH Class: Carbon or Low Alloy Steel

Database can only be edited if database files are open for editing and if stress units are set as MPa (for ASME - ksi)

Data source: EN 10216-2-2013

Density: 7850 kg/m³

Factor A, %: 23

Th, cm	Yield Stress (Rp), ksi	Tensile Strength (Rm), ksi
1.6	34.084	52.214
4	32.633	52.214
6	31.183	52.214

Temperature F	Yield Stress (Rp), ksi	Tensile Strength (Rm), ksi	Elastic Modulus ksi	Expansion Coeff. 1/F	Poisson's Ratio (v)	SRTt 10 000 h, ksi	SRTt 100 000 h, ksi	SRTt 200 000 h, ksi	SRTt 250 000 h, ksi
68	0	0	30714.787	6.277e-006	0.3	0	0	0	0
212	28.717	52.214	29887.637	6.611e-006	0.3	0	0	0	0
302	27.122	52.214	29353.463	6.804e-006	0.3	0	0	0	0
392	24.656	52.214	28805.946	6.986e-006	0.3	0	0	0	0
482	21.756	52.214	28245.375	7.155e-006	0.3	0	0	0	0
572	19.145	52.214	27671.460	7.313e-006	0.3	0	0	0	0
662	17.405	52.214	27084.493	7.458e-006	0.3	0	0	0	0
752	16.244	52.214	26484.181	7.592e-006	0.3	26.397	20.450	18.565	17.695
770	16.128	52.214	26362.495	7.617e-006	0.3	24.076	18.565	16.679	15.809
788	16.012	52.214	26240.228	7.642e-006	0.3	21.901	16.534	14.794	14.069
806	15.896	52.214	26117.526	7.667e-006	0.3	20.015	14.504	12.908	12.473
824	15.780	52.214	25994.389	7.691e-006	0.3	18.130	12.763	11.168	10.733
842	15.664	52.214	25870.527	7.714e-006	0.3	16.244	11.168	9.572	9.282



PIPING AND EQUIPMENT ANALYSIS & SIZING SUITE

PASS/Start-Prof | Nuevas funciones

Se adiciona cálculo de Temperatura Mínima de Metal en el Diseño (MDMT) de acuerdo con ASME B31.3-2018 323.2.2 (a), (b), (d), (e), (f), (g), (h), (i), (j). Lo anterior fue Incorporado en la base de datos de materiales.

PASS/START-PROF calcula el MDMT de acuerdo con figura 323.2.2A y figura 323.2.2B dependiendo de la relación de esfuerzo calculado si el usuario selecciona la opción apropiada en los "settings" del proyecto, considerando los requerimientos de código 323.2.2 (g), (h), (i).

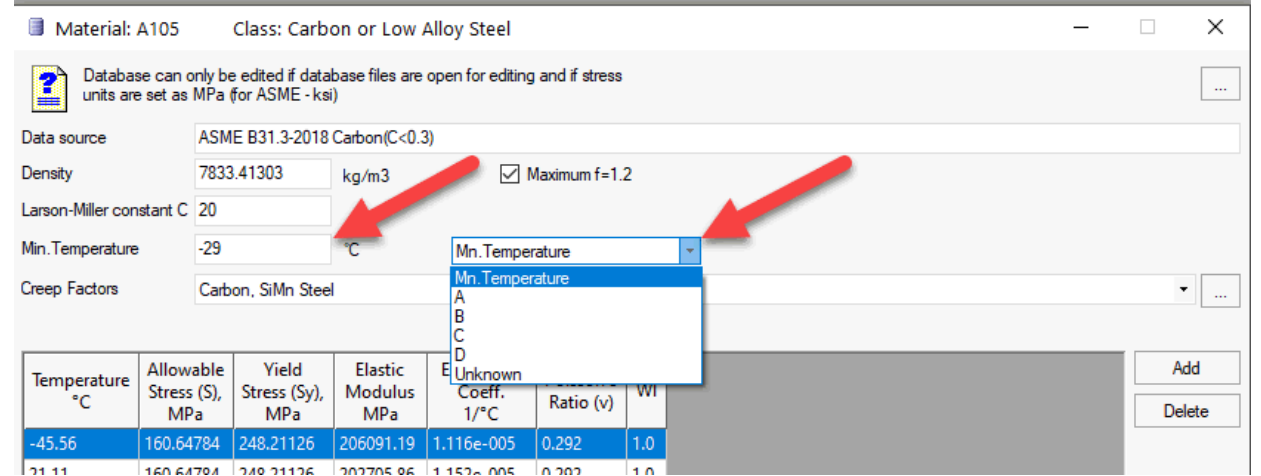


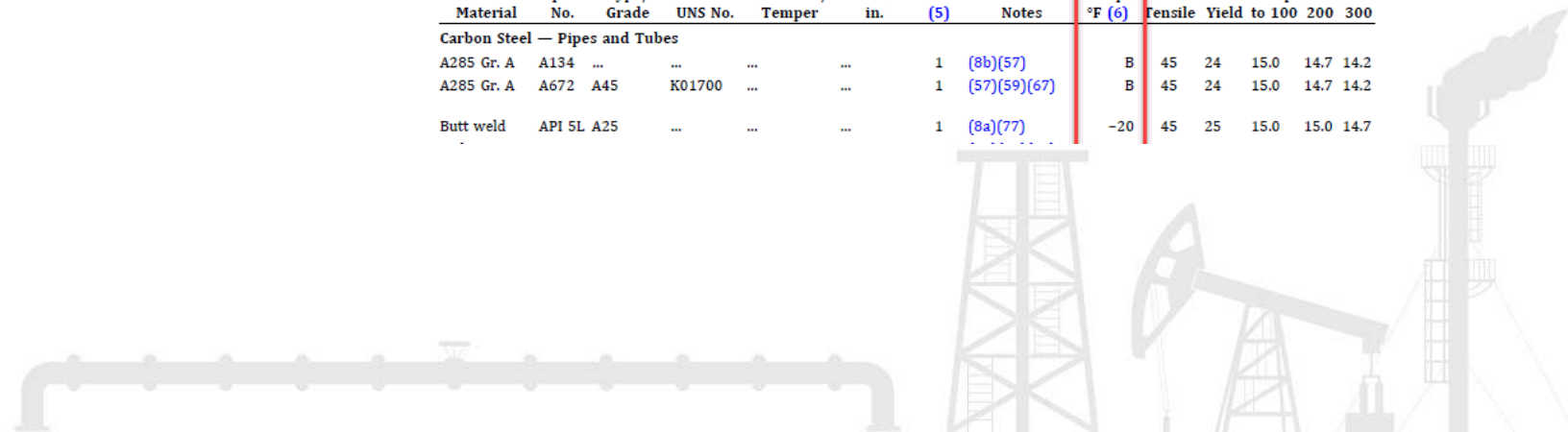
Table A-1 Basic Allowable Stresses in Tension for Metals (Cont'd)

Numbers in Parentheses Refer to Notes for Appendix A Tables: Specifications Are ASTM Unless Otherwise Indicated

Material	Spec. No.	Type/Grade	UNS No.	Class/Condition/ Temper	Size, in.	P-No. (5)	Notes	Min. Temp., °F (6)	Specified Min. Strength, ksi		Basic Allowable Stress, S, ksi, at Metal Temperature, °F [Note (1)]		
									Tensile	Yield	100	200	300
Carbon Steel — Pipes and Tubes													
A285 Gr. A	A134	...	...	...	...	1	(8b)(57)	B	45	24	15.0	14.7	14.2
A285 Gr. A	A672	A45	K01700	...	...	1	(57)(59)(67)	B	45	24	15.0	14.7	14.2
Butt weld	API 5L	A25	...	...	...	1	(8a)(77)	-20	45	25	15.0	15.0	14.7



PIPING AND EQUIPMENT ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas funciones

Tras el análisis se obtiene la tabla del reporte. Para cada tubo START-PROF muestra si la prueba de impacto se requiere o no.

Object	Start End node	Thickness, cm	Material	Stress Ratio, r	Tmin, °C	MDMT, °C	Output
Above ground pipe	3,Restrained	0.600	A106 B	0.294	-40	-48	OK
Above ground pipe	23	0.600	A106 B	0.395	-40	-48	OK
	5,Bend	0.600	A106 B	0.840	-40	-37.869	Impact Test
Above ground pipe	6,0 Flange	0.600	A106 B	0.436	-40	-48	OK
	24	0.600	A106 B	0.400	-40	-48	OK
Above ground pipe	6,0 Flange	0.600	A106 B	0.342	-40	-48	OK
	8	0.600	A106 B	0.373	-40	-48	OK
Above ground pipe	8	0.600	A106 B	0.317	-40	-48	OK
	25	0.600	A106 B	0.283	-40	-48	OK
Above ground pipe	27	0.600	A106 B	0.430	-40	-48	OK
	9	0.600	A106 B	0.951	-40	-31.783	Impact Test
Above ground pipe	8	0.600	A106 B	0.330	-40	-48	OK

Figure 323.2.2A Minimum Temperatures Without Impact Testing for Carbon Steel Materials (See Table A-1 or Table A-1M for Designated Curve for a Listed Material; see Table 323.2.2A for Tabular Values)

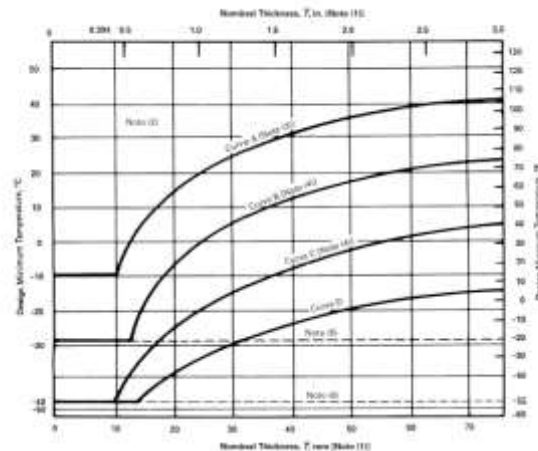
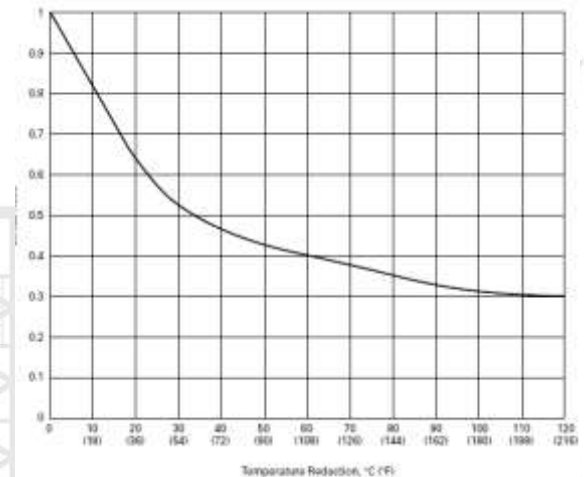


Figure 323.2.2B Reduction in Lowest Exemption Temperature for Steels Without Impact Testing (See Table 323.2.2B for Tabular Values)



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

PASS/Start-Prof | Nuevas funciones

Actualizadas las librerías de materiales, incluyendo los factores de reducción por soldadura para ASME B31.3-2018. Se adicionó cálculo del esfuerzo permisible para fluidos de servicio a alta temperatura conforme al ASME B31.3-2018, 302.3.6 (2) Se agregó el Apéndice V. Se agregaron opciones de "Duración de tiempo", "Ocasional alternativa" al editor de modo de operación. Se Agrego la constante "C" de Larson-Miller en base de datos de material del ASME B31.3

Object	Start End node	Primary Loads Stress, (ksi)			Notes
		SI_Alt	k*Sh	%	
Above ground pipe	14	5.012	5.960	84.1	
	29,2 Flange	7.181	5.960	120.5	1
Forged Elbow	29,2 Flange	8.444	Sh, 4.684 ksi		
Above ground pipe	29,2 Flange	7.805	Sy, 18.616 ksi		
	15	4.266	ti= 5000 hour		
Above ground pipe	14	5.172	C=20		
	16	5.325	Te, 481.384305068139 °C		
Weldolet (branch welded-on fitting)	16	12.256	S02, 5.960 ksi		
Above ground pipe	16	3.967	min(4Sh,0.8*0.9Sy,S02), 5.960 ksi		

Material: A106 A Class: Carbon or Low Alloy Steel

Database can only be edited if database files are open for editing and if stress units are set as MPa (for ASME - ksi)

Data source: ASME B31.3-2018 Carbon(C<93)

Density: 7833.41303 Maximum f=1.2

Larson-Miller constant C: 20

Creep Factors: Carbon, SiMn Steel

Temperature F	Allowable Stress (S), ksi	Yield Stress (Sy), ksi	Elastic Modulus ksi	Expansion Coeff. 1/F	Poisson's Ratio (v)	WI
-325	16	30	31400	5.5e-006	0.292	1.0
-200	16	30	30800	5.79e-006	0.292	1.0
-150	16	30	30300	5.9e-006	0.292	1.0
-50	16	30	29891	6.2e-006	0.292	1.0
70	16	30	29400	6.4e-006	0.292	1.0
100	16	30	29262	6.47e-006	0.292	1.0
200	16	27.500	28800	6.7e-006	0.292	1.0

Buttons: Save, OK, Cancel, Help

(-a) the weld strength reduction factor times 90% of the yield strength at the metal temperature for the occasional condition being considered
 (-b) four times the basic allowable stress provided in Appendix A
 (-c) for occasional loads that exceed 10 h over the life of the piping system, the stress resulting in a 20% creep usage factor in accordance with Appendix V
 For (-a), the yield strength shall be as listed in ASME BPVC, Section II, Part D, Table Y-1 or determined in accordance with para. 302.3.2. The strength reduction factor represents the reduction in yield strength with long-term exposure of the material to elevated temperatures and, in the absence of more-applicable data, shall be taken as 1.0 for austenitic stainless steel and 0.8 for other materials.
 For (-b), the basic allowable stress for castings shall also be multiplied by the casting quality factor, E_c . Where the allowable stress value exceeds two-thirds of yield strength at temperature, the allowable stress value must be reduced as specified in para. 302.3.2(e).
 (b) Test. Stresses due to test conditions are not subject to the limitations in para. 302.3. It is not necessary to consider other occasional loads, e.g., wind and earthquake, as occurring concurrently with test loads.

Smart Operation Mode Editor

* #	Name	Hanger Sizing	High temperature	Cold State	Seismic	Wind	Snow/Ice	Friction Multiplier	Weight Multiplier	Time Duration, hour	Mode Type	Stress Range Between	Help
1 (0)	OPE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.00	1.00	0.00	SUS	1-1A	?
1.1 (0)	occ1.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	-	OCC Std		?
2 (2)	occ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.00	1.00	0.00	OCC Std	2-1A	?
3 (1)	Test mode	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	-	SUS		?

Dropdown menu for Mode Type: SUS, OCC Std, OCC Alt, Test

PASS/Start-Prof | Nuevas Funciones

Se agregó el cálculo automático de factor de uso de ruptura por fluencia de acuerdo con ASME B31.3-2018 Apéndice V (V303.1-V303.3)

V303.2 Determine Creep-Rupture Usage Factor

The usage factor, u , is the summation of individual usage factors, t_i/t_{ri} , for all service conditions considered in para. V303.1. See eq. (V4).

$$u = \sum (t_i/t_{ri}) \quad (V4)$$

where

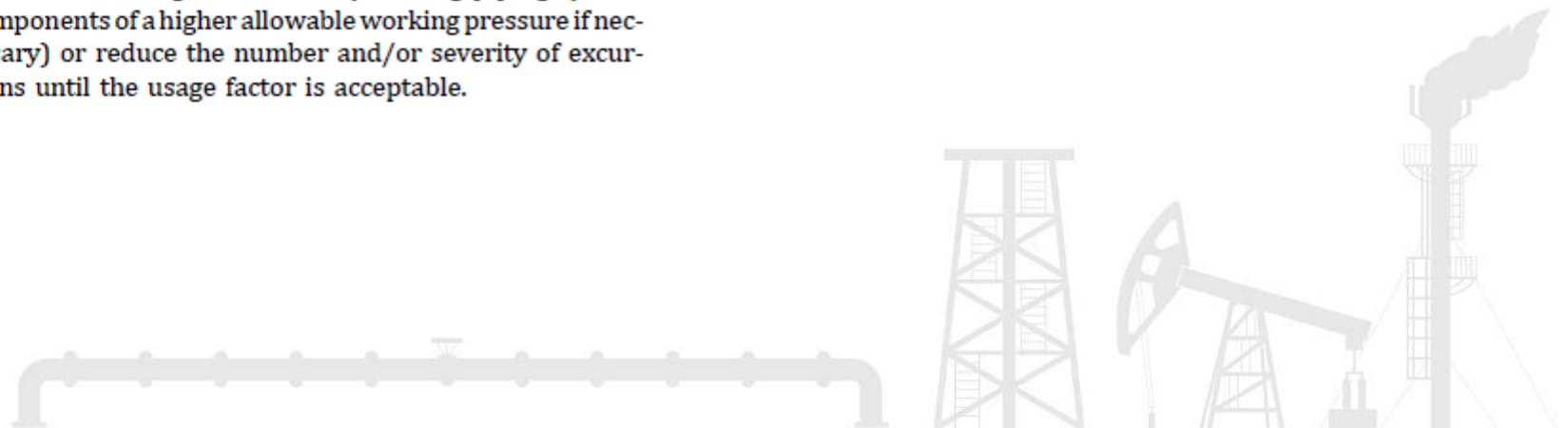
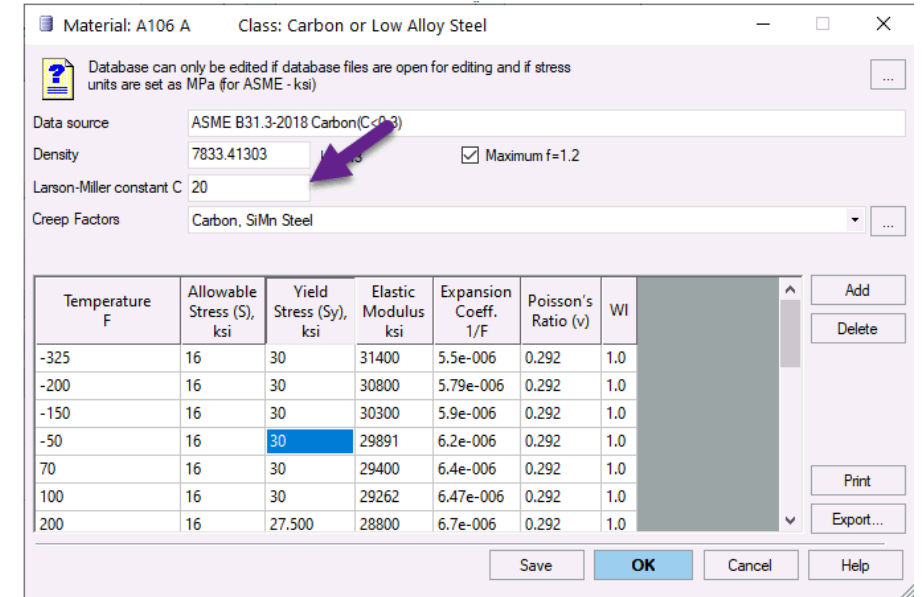
i = as a subscript, 1 for the prevalent operating condition; $i = 2, 3$, etc., for each of the other service conditions considered

t_i = total duration, h, associated with any service condition, i , at pressure, P_i , and temperature, T_i

t_{ri} = as defined in para. V303.1.4

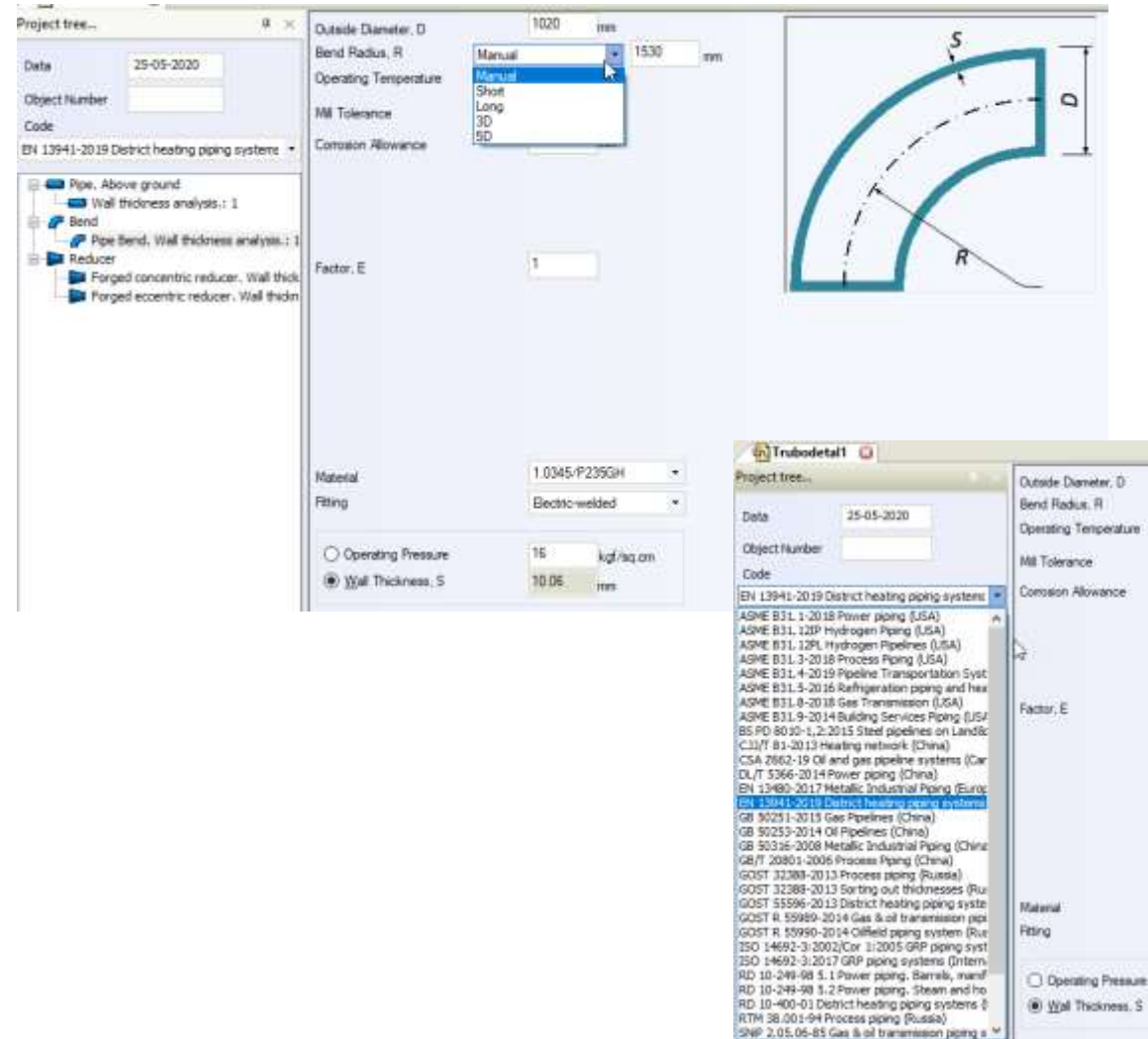
V303.3 Evaluation

The calculated value of u indicates the nominal amount of creep-rupture life expended during the service life of the piping system. If $u \leq 1.0$, the usage factor is acceptable including excursions. If $u > 1.0$, the designer shall either increase the design conditions (selecting piping system components of a higher allowable working pressure if necessary) or reduce the number and/or severity of excursions until the usage factor is acceptable.



PASS/Start-Prof | Nuevas funciones

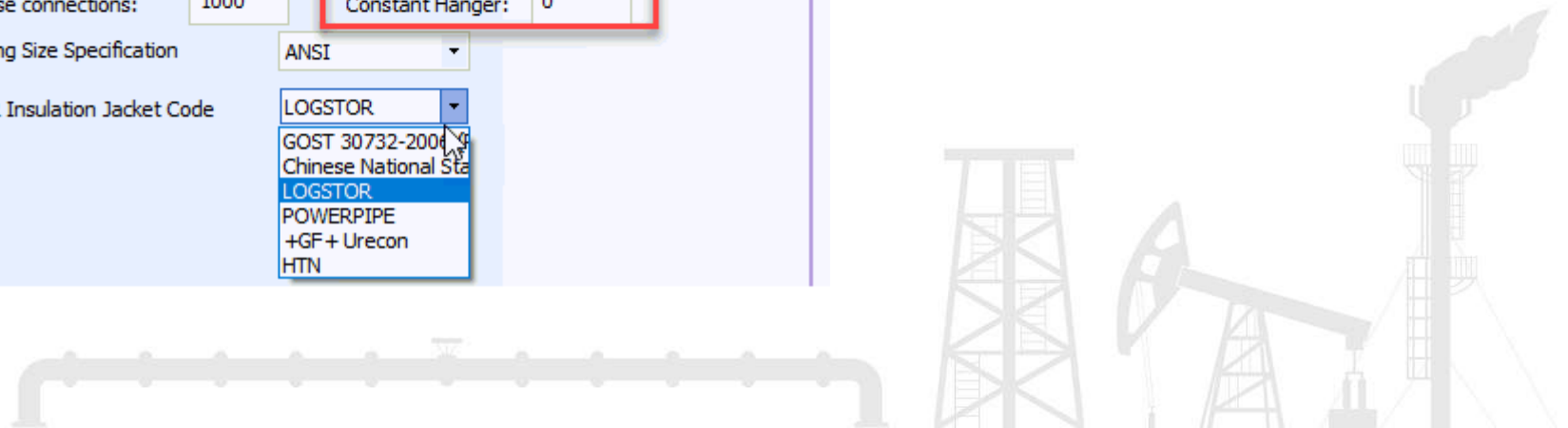
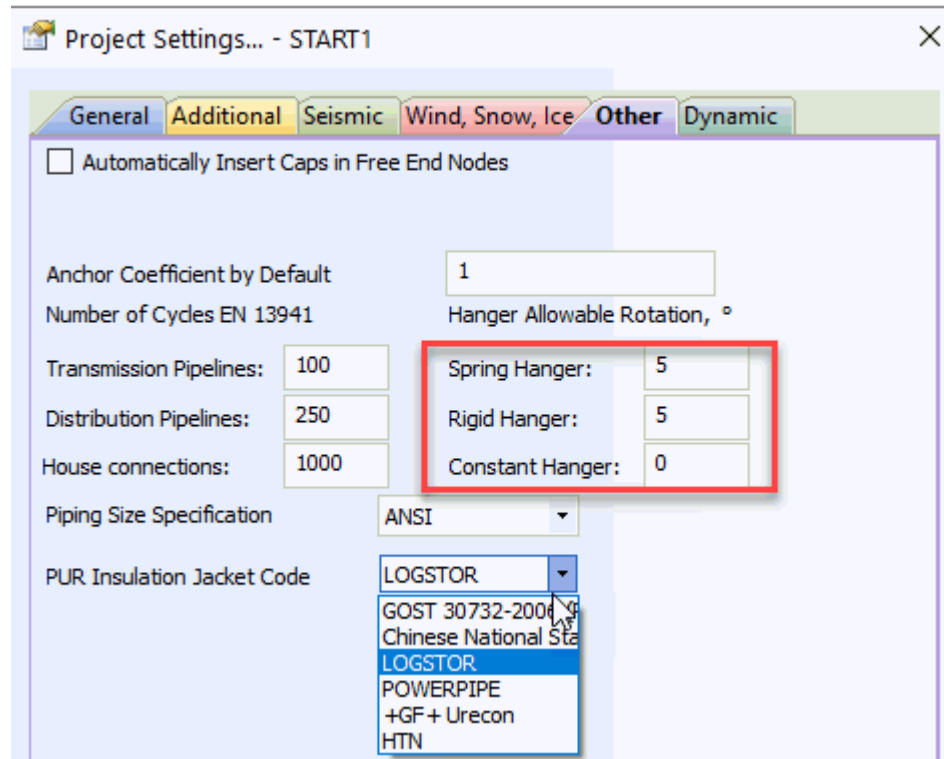
Se agregó el cálculo de espesor de pared del tubo y dobleces para todos los nuevos códigos como ISO 14692-2017, EN 13941, ASME B31.12, BS PD 8010, CSA Z662, GOST R 55989, GOST R 55990, SP 284.1325800.2016, SP 33.13330.2012. Y por supuesto, todos los espesores de pared de accesorios y tubería son revisados automáticamente antes de cada corrida del análisis de esfuerzos de acuerdo con el código seleccionado



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

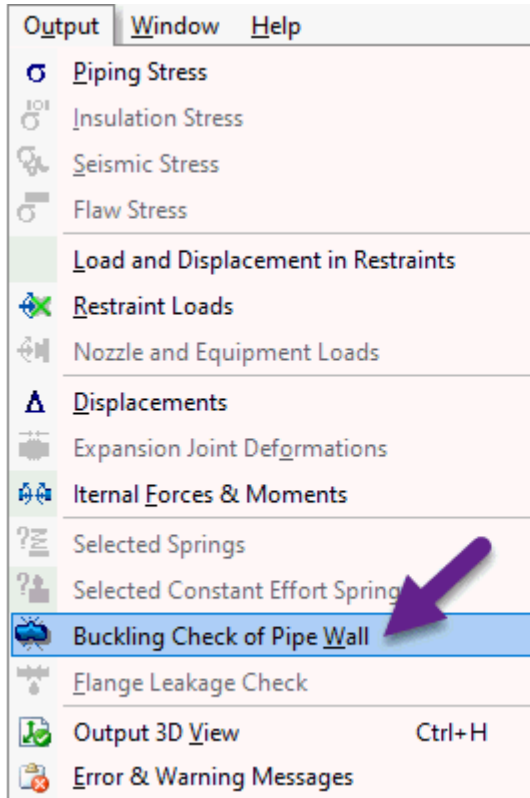
PASS/Start-Prof | Nuevas funciones

Se agrega la habilidad de introducir el ángulo permisible de giro del soporte para diferentes tipos de resortes colgantes. START-PROF revisa automáticamente el ángulo de giro del soporte y muestra mensaje después del análisis en el caso donde la restricción no cumple.



PASS/Start-Prof | Nuevas Funciones

- Se agrego la verificación automática de deformación de pared en el tubo conforme al ASME B31.8-2018
- EN 13941-2019 7.2.4.2

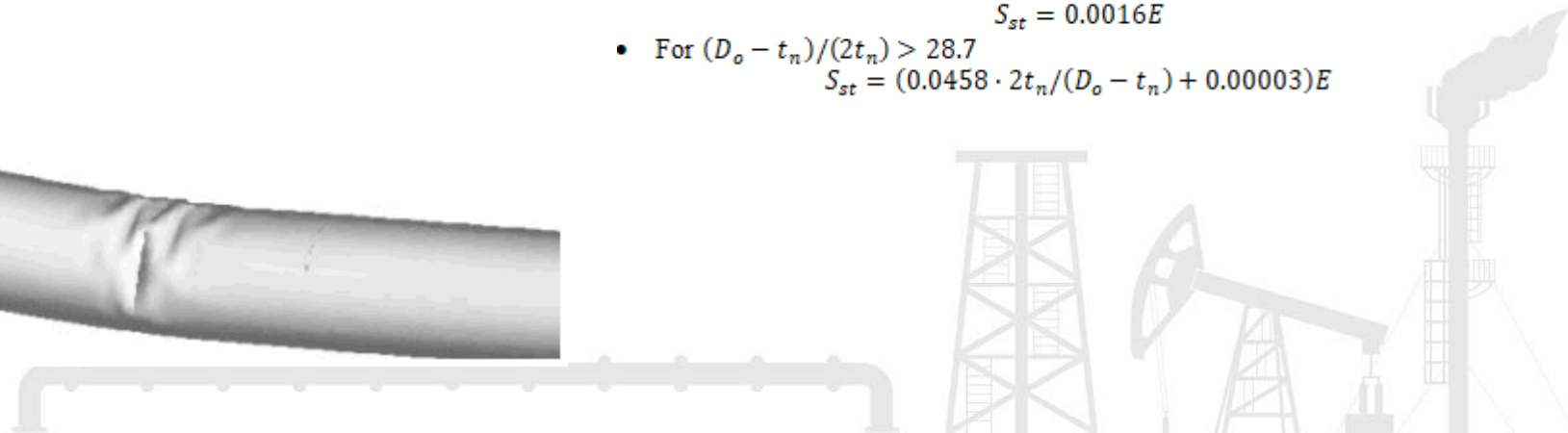


Operating Mode								
1 操作模式 (0) ?								
Object	Start End node	C1 Local Buckling in Hot Condition, (MPa)		C1 Local Buckling in Cold Condition, (MPa)		C1 Local Buckling in Test Condition, (MPa)		Notes
		calculated	allowable	calculated	allowable	calculated	allowable	
Buried pipe	1	36.09	33.88	38.39	33.88	0.01	33.88	1,2
	2	12.95	33.88	34.84	33.88	0	33.88	2
Bend	2							
Buried pipe	2	21.44	33.88	34.63	33.88	0	33.88	2
	3	35.93	33.88	38.89	33.88	0.01	33.88	1,2

- For $(D_o - t_n)/(2t_n) \leq 28.7$

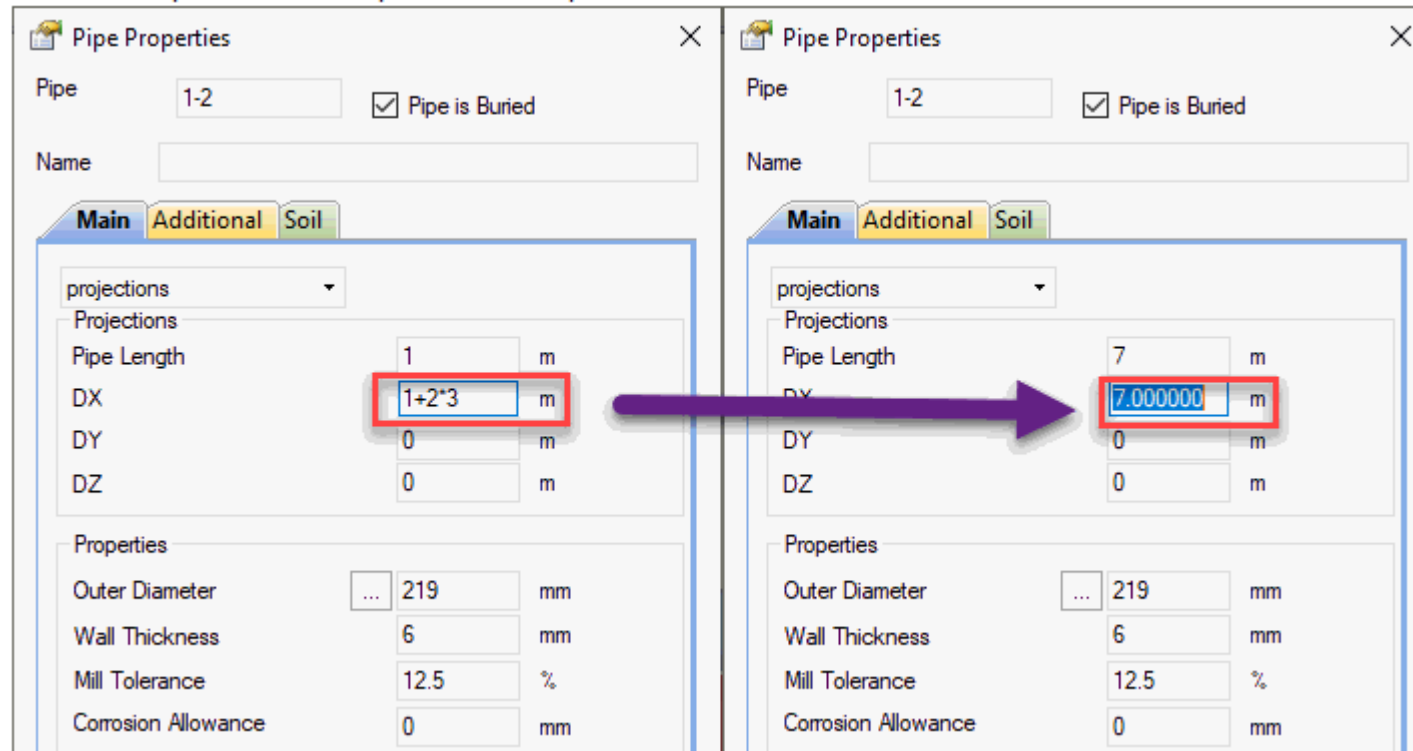
$$S_{st} = 0.0016E$$
- For $(D_o - t_n)/(2t_n) > 28.7$

$$S_{st} = (0.0458 \cdot 2t_n/(D_o - t_n) + 0.00003)E$$

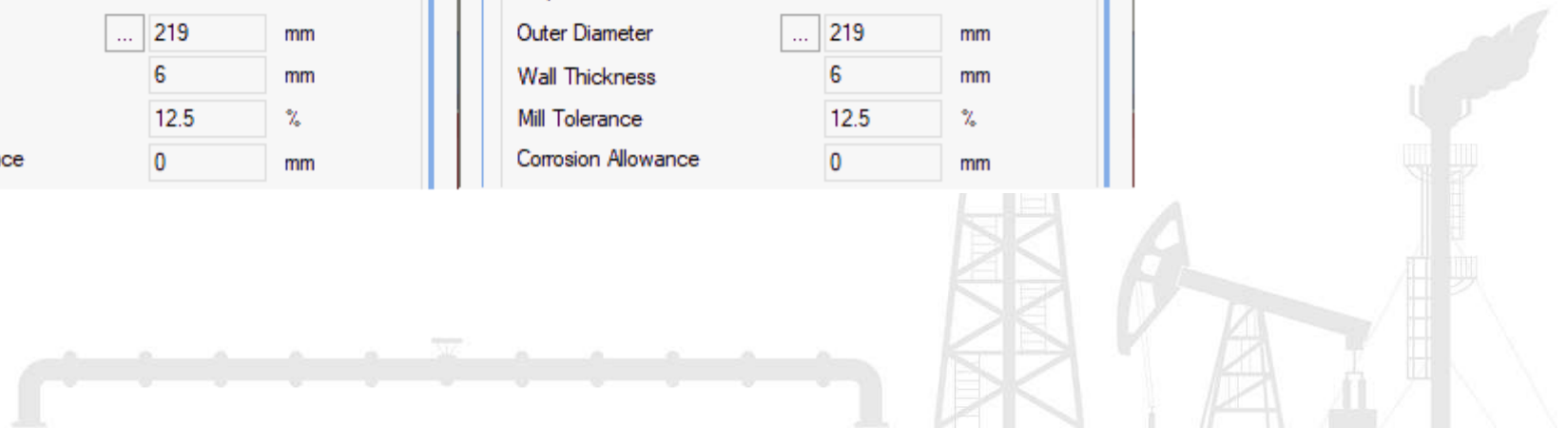


PASS/Start-Prof | Nuevas Funciones

Se adicionó la capacidad de calcular (operaciones básicas) en algunos campos de entrada de datos



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas Funciones

- Se actualizaron las bases de datos del ASME B36.10M-2018
- Se agregó más de 140 nuevos estándares en tubos, tees, codos, y base de datos de reducciones, incluyendo ASME B16.9 y muchos en códigos rusos GOST, OST, RD, TU

The screenshot displays the PASS software interface with two data tables: 'Pipes' and 'Tees'. The 'Pipes' table has columns for Manufacturing Technology, Manufacturing Type, Standard, Assortment, Schedule, NPS, Nominal Diameter, Material, Size, Diameter, Thickness, Mill-Tolerance, Weight, and Standard Group. The 'Tees' table has columns for Manufacturing Technology, Standard, Material, Size, Header Diameter, Branch Diameter, Header DN, Branch DN, Header NPS, Branch NPS, Schedule, Header Thickness, and Branch Thickness. A sidebar menu on the left lists various database categories, with 'Pipes...' highlighted in a red box. The PASS logo is visible in the bottom left corner.

Manufacturing Technology	Manufacturing Type	Standard	Assortment	Schedule	NPS, in	Nominal Diameter mm	Material	Size	Diameter, cm	Thickness, cm	Mill-Tolerance, cm	Weight, kg	Standard Group
<not set>	<not set>	Remove Filter	et>	10S	1/8	6	<not set>	DN 6; NPS 1/8; SCH 10S	1.028702	0.12446	0	0	ASME
<not set>	<not set>	ASME B36.10M-2018	et>	40S	1/8	6							
<not set>	<not set>	ASME B36.19M-2004	et>	80S	1/8	6							
<not set>	<not set>	ГОСТ 10705-80 rp. B	et>	10	1/8	6							
<not set>	<not set>	ГОСТ 10705-80*	et>	30	1/8	6							
<not set>	<not set>	ГОСТ 10706-76 rp. B	et>	40	1/8	6							
<not set>	<not set>	ГОСТ 10706-76*	et>	STD	1/8	6							
<not set>	<not set>	ГОСТ 11068-81*	et>	40	1/8	6							
<not set>	<not set>	ГОСТ 20295-85	et>	STD	1/8	6							
<not set>	<not set>	ГОСТ 20295-85 тип 2	et>	80	1/8	6							
<not set>	<not set>	ГОСТ 20295-85 тип 3	et>	80	1/8	6							
<not set>	<not set>	ГОСТ 32528-2013	et>	XS	1/8	6							
<not set>	<not set>	ГОСТ 3262-75*	et>	160	1/8	6							
<not set>	<not set>	ГОСТ 32678-2014	et>	160	1/8	6							
<not set>	<not set>	ГОСТ 550-75*	et>	XXS	1/8	6							
<not set>	<not set>	ГОСТ 8696-74*	et>	10	1/4	8							
<not set>	<not set>	ГОСТ 8731-74 rp. B	et>	30	1/4	8							
<not set>	<not set>	ГОСТ 8731-74*	et>	30	1/4	8							
<not set>	<not set>	ГОСТ 8733-74 rp. B	et>	40	1/4	8							
<not set>	<not set>	ГОСТ 8733-74*	et>	40	1/4	8							
<not set>	<not set>	ГОСТ 8733-74*	et>	STD	1/4	8							
<not set>	<not set>	ГОСТ 9940-81*	et>	80	1/4	8							
<not set>	<not set>	ГОСТ 9941-81	et>	80	1/4	8							
<not set>	<not set>	ГОСТ 9941-81*	et>	XS	1/4	8							
<not set>	<not set>	ГОСТ P 53383-2009	et>	160	1/4	8							
<not set>	<not set>	СТО 56517011-042-2010	et>	160	1/4	8							
<not set>	<not set>	ТУ 13.03-011-00212 179-2003	et>	XXS	1/4	8							
<not set>	<not set>	ТУ 1301-039-00212179-2010	et>	XXS	1/4	8							
<not set>	<not set>	ТУ 1303-002-08620133-01	et>	10S	1/4	8							
<not set>	<not set>	ТУ 1310-030-00212179-2007	et>	40S	1/4	8							
<not set>	<not set>	ТУ 14-3-1080-81	et>	40S	1/4	8							
<not set>	<not set>	ТУ 14-3-1128-2000	et>	40S	1/4	8							
<not set>	<not set>	ТУ 14-3-1128-82	et>	40S	1/4	8							

Manufacturing Technology	Standard	Material	Size	Header Diameter, cm	Branch Diameter, cm	Header DN, cm	Branch DN, cm	Header NPS, in	Branch NPS, in	Schedule	Header Thickness, cm	Branch Thickness, cm
<not set>	Remove Filter		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	120	0	0
<not set>	ASME B16.9-2012		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	140	0	0
<not set>	ГОСТ 17376-2001		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	100	0	0
<not set>	OCT 108.104.04-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	160	0	0
<not set>	OCT 108.104.05-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	160	0	0
<not set>	OCT 108.104.06-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	XXS	0	0
<not set>	OCT 108.104.07-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	55	0	0
<not set>	OCT 108.104.08-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	105	0	0
<not set>	OCT 108.104.09-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	20	0	0
<not set>	OCT 108.104.10-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	10	0	0
<not set>	OCT 108.104.11-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	35	0	0
<not set>	OCT 108.104.12-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	40S	0	0
<not set>	OCT 108.104.13-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	40	0	0
<not set>	OCT 108.104.14-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	30	0	0
<not set>	OCT 108.104.15-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	80	0	0
<not set>	OCT 108.104.16-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	80	0	0
<not set>	OCT 108.104.17-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	80S	0	0
<not set>	OCT 108.104.18-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	570	0	0
<not set>	OCT 108.104.19-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	140	0	0
<not set>	OCT 108.104.20-82		21.3-13.7	2.13	1.37	1.5	0.8	1/2	1/4	160	0	0
<not set>	OCT 108.720.01-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	120	0	0
<not set>	OCT 108.720.02-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	XXS	0	0
<not set>	OCT 108.720.03-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	160	0	0
<not set>	OCT 108.720.04-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	120	0	0
<not set>	OCT 108.720.05-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	XXS	0	0
<not set>	OCT 108.720.06-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	160	0	0
<not set>	OCT 108.720.07-82		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	120	0	0
<not set>	OCT 36-23-77		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	XXS	0	0
<not set>	СТО ЦКТИ 720.01-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	160	0	0
<not set>	СТО ЦКТИ 720.02-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	120	0	0
<not set>	СТО ЦКТИ 720.06-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	XXS	0	0
<not set>	СТО ЦКТИ 720.07-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	160	0	0
<not set>	СТО ЦКТИ 720.08-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	120	0	0
<not set>	СТО ЦКТИ 720.09-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	XXS	0	0
<not set>	СТО ЦКТИ 720.10-2009		21.3-17.3	2.13	1.73	1.5	1	1/2	3/8	160	0	0



PIPIN ANALYSIS SOFTWARE

PASS/Start-Prof | Nuevas Funciones

Se agregó el material Polipropileno "PP-B" en la base de datos de material. Datos tomados desde DVS 2205, EN 1778, y DIN 8078

The image displays two overlapping software dialog boxes. The background dialog is 'Project Settings... - plastic.ctp', which has tabs for 'General', 'Additional', 'Seismic', 'Wind, Snow, Ice', 'Other', and 'Dynamic'. The 'General' tab is active, showing fields for 'Date' (15-02-2017), 'Description' (1), 'Piping Type' (All), and 'Stress Analysis Code' (Plastic Piping Systems(HDPE, PP, PVC)). The foreground dialog is 'Pipe Properties', with tabs for 'Main' and 'Additional'. The 'Main' tab is active, showing a 'Pipe' type of '41-42' and a 'Name' field. Below these are geometric parameters: 'cylinder' (Cylindrical), 'Length in XY plane' (3.5 m), 'DZ' (8.881784e-1 m), 'Angle With X Axis' (45°), and 'Angle With Y Axis' (45°). The 'Properties' section includes 'Outer Diameter' (710 mm), 'Wall Thickness' (42.1 mm), and 'Pipe Material' (PE 100). A dropdown menu for 'Pipe Material' is open, listing various materials including 'PE 100', 'PE 67', 'PE 80', 'PE-RT type 1', 'PE-RT type 2', 'PP-B', 'PP-H', 'PP-R', 'PVC-C type 2', and 'PVDF'. A purple arrow points to the 'PP-B' option in this list.

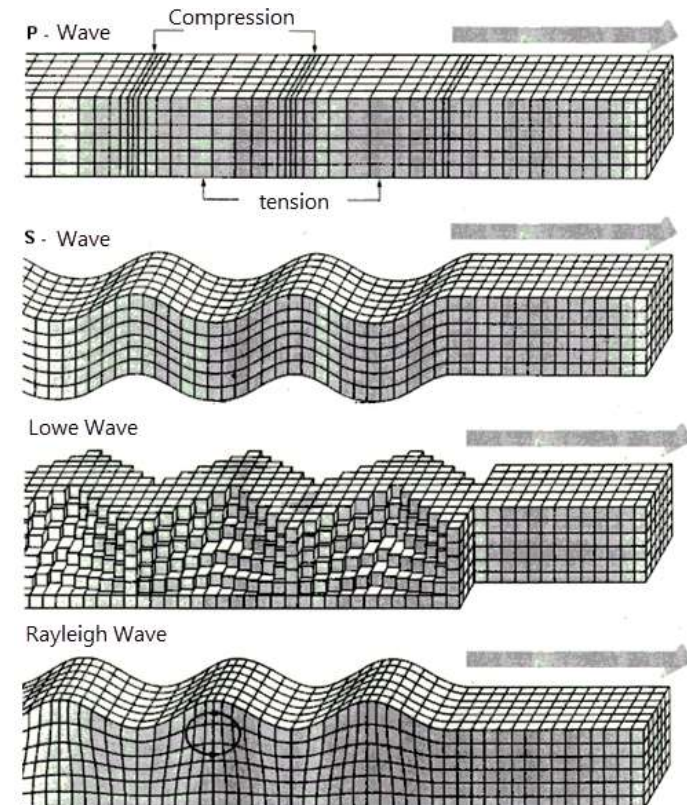


PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

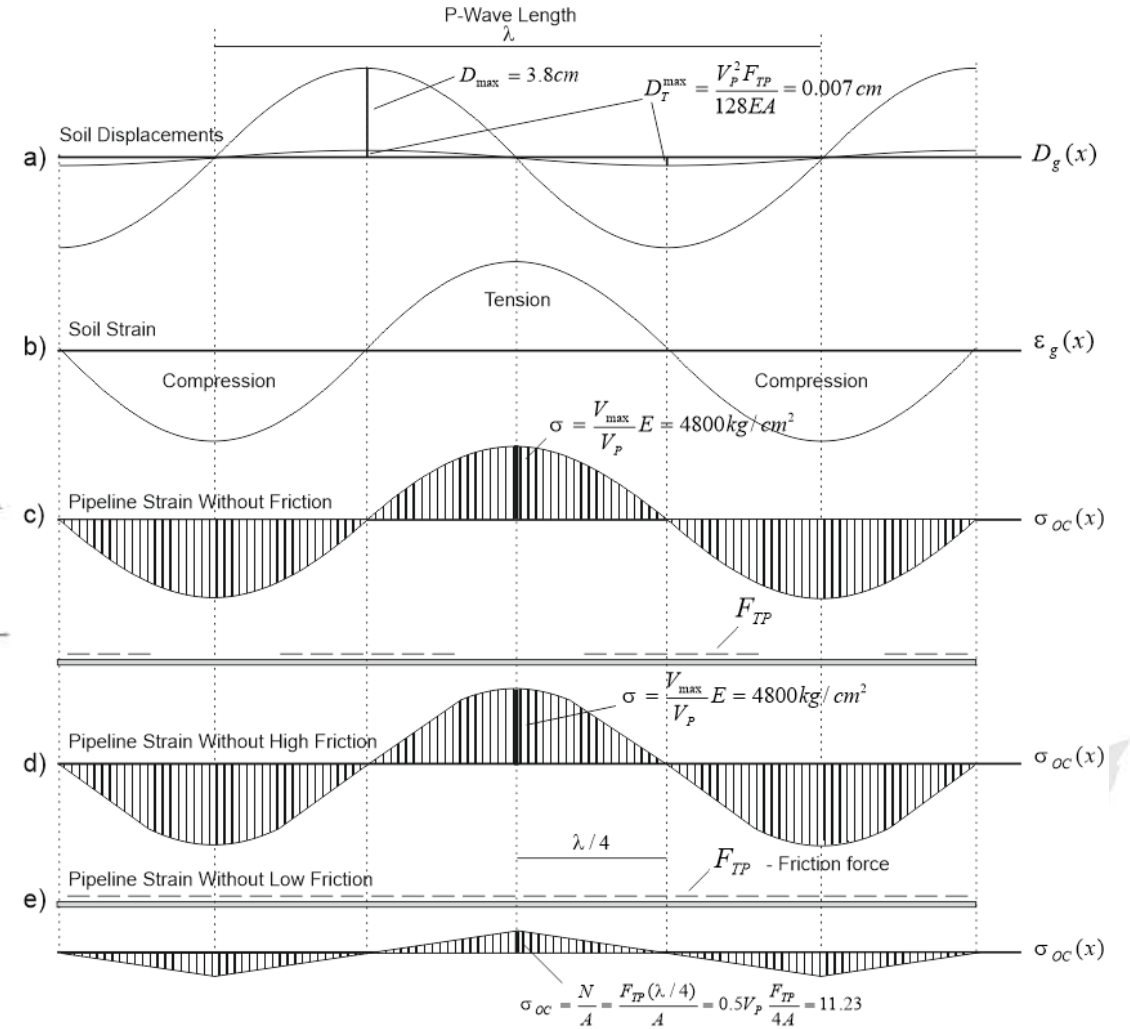
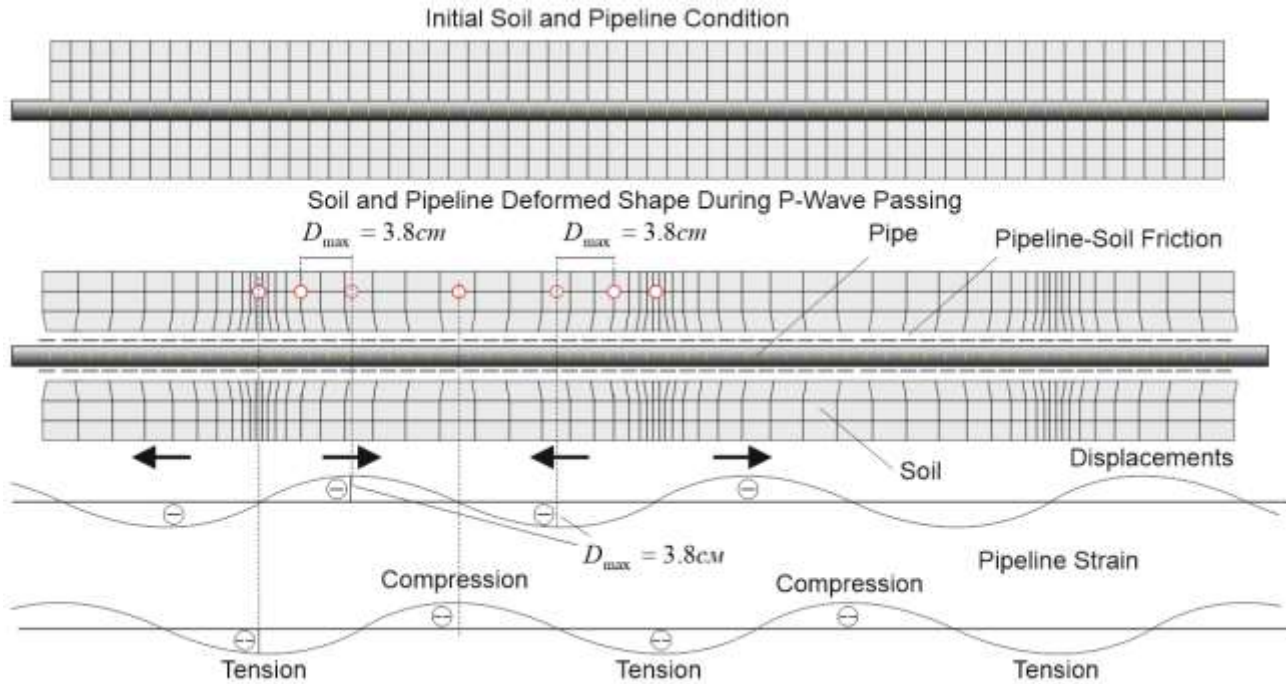
PASS/Start-Prof | Nuevas Funciones

Se agregó el análisis de propagación de la onda sísmica para tuberías enterradas. START-PROF calcula el esfuerzo y tensión en líneas enterradas causadas por propagación de onda sísmica y verifica que esfuerzos y tensiones estén de acuerdo con

- ASCE 2001 Guidelines for the Design of Buried Steel Pipe (American Lifelines Alliance). Mejorado por los autores de START-PROF, agregando el efecto cortante de onda
- GB 50032 (China)
- GB 50470 (China)
- SNiP 2.05.06-85 (Rusia)
- SP 36.13330.2012 (Rusia)
- GOST R 55989-2014 (Rusia)
- GOST R 55990-2014 (Rusia)
- SP 284.1325800.2016 (Rusia)
- SP 33.13330.2012 (Rusia)



PASS/Start-Prof | Nuevas Funciones

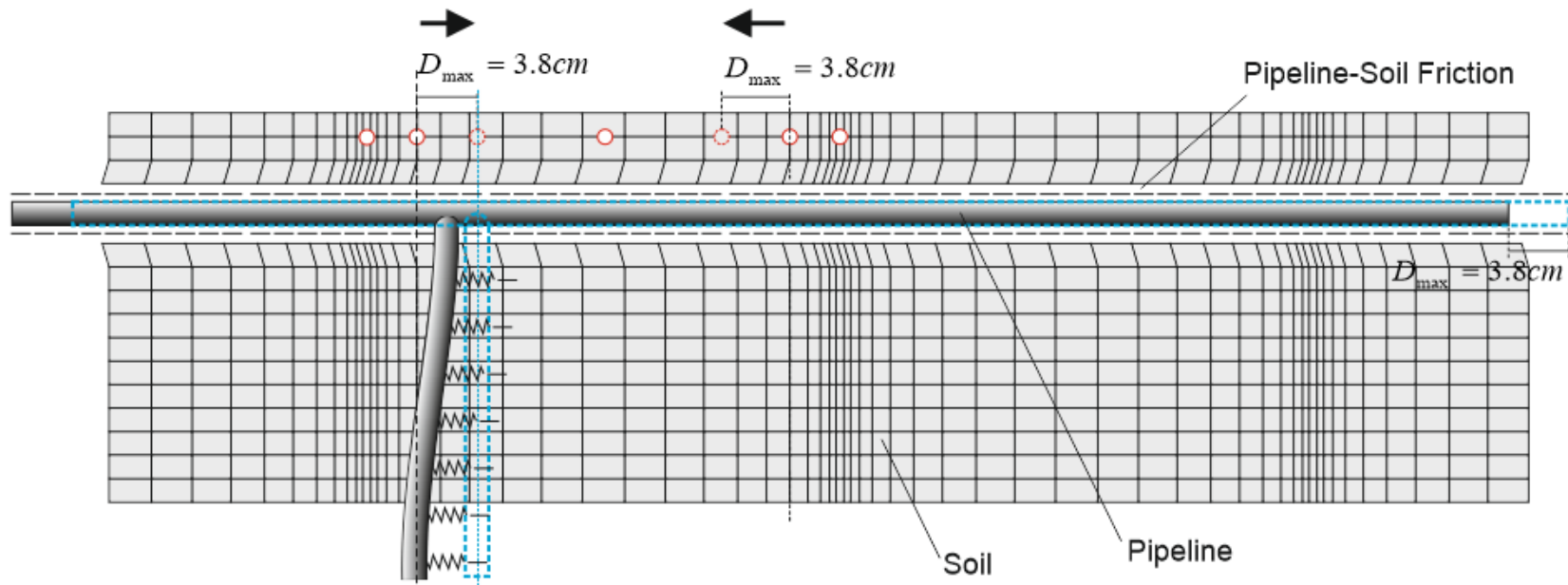


PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

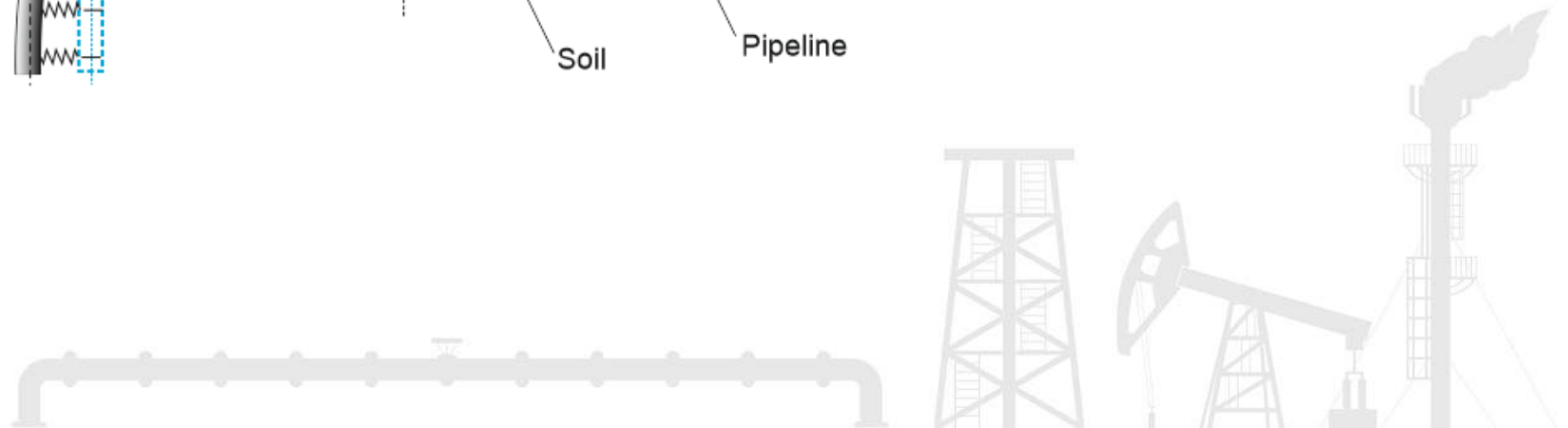


PASS/Start-Prof | Nuevas Funciones

Cada ramal, giro o ancla de la tubería causa grandes esfuerzos axiales y de flexión



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas Funciones

Axial seismic strain due to wave propagation is calculated using equation:

$$\varepsilon = \pm \max \left(\min(\varepsilon_a, \varepsilon_{fr}); \frac{D}{2} \rho_{max} \right) \cos \omega$$

Actually, pipe curvature can cause only the bending moments, but we convert it into equivalent axial strain to simplify the stress analysis procedure in START-PROF software.

ω – Incline angle of the pipe. 0 for horizontal pipe, 90 for vertical pipe

D – Pipe diameter, m

ε_a – Maximum axial strain from P-, S-, R-waves

$$\varepsilon_a = \max \left(\frac{V_g}{C_p}; \frac{V_g}{2C_s}; \frac{V_g}{C_R} \right)$$

Maximum strain from P-wave friction forces is

$$\frac{T_u \lambda}{4EA}$$

λ – Wave length, m

$$\lambda = 0.5C_p$$

So maximum strain caused by friction from P-, S-, R-waves is

$$\varepsilon_{fr} = \max \left(0.5C_p \frac{T_u}{4EA}; 0.5C_s \frac{T_u}{4EA}; 0.5C_R \frac{T_u}{4EA} \right)$$

ρ_{max} – Maximum curvature from P-, S-, R-waves

$$\rho_{max} = \max \left(\frac{0.385A_g}{(C_p)^2}; \frac{A_g}{(C_s)^2}; \frac{A_g}{(C_R)^2} \right)$$

V_g – Peak ground velocity, m/s. Specified by user in pipe properties

A_g – Peak ground acceleration, m/s². Specified by user in pipe properties

A – Pipe cross-section area, m²

T_u – Peak friction force, t/m

$$T_u = \tan(n_m \cdot \varphi) \left[\gamma_a Z \pi D_c \left(\frac{1 + K_0}{2} \cos^2 \alpha - K_0 \sin^2 \alpha \right) \right] + \pi D_c \omega c$$

$$\omega = 0.608 - 0.123c - \frac{0.274}{c^2 + 1} + \frac{0.695}{c^3 + 1}$$

c – Soil cohesion

C_p – Apparent P-wave propagation velocity, m/s. Specified by user in START-PROF pipe properties. Default value 2 km/s

C_s – Apparent S-wave propagation velocity, m/s. Specified by user in START-PROF pipe properties. Default value 1 km/s

C_R – Apparent R-wave propagation velocity, m/s

Rayleigh wave velocity is equal to $C_R = kC_s$, where k is obtained from the equation

$$\frac{1}{8}k^6 - k^4 + \frac{2-\nu}{1-\nu}k^2 - \frac{1}{1-\nu} = 0.$$

Depending on Poisson's ratio values the k values are within $0.92 < k < 0.95$ We approximately assume that $k = 0.92$

$$C_R \approx 0.92C_s$$

Pipe Properties

Pipe: 160-180 Pipe is Buried

Name: _____

Main Additional Soil Seismic

Piping Location

Aboveground/in Underground Channel/On Low Restraints Installation

Overpass/On the Stand/At the First Floor and Above Installation

Automatic Calculation of Kpsi

Factor to Account for the Ability to Dissipate Energy, Kpsi: 1.48

Factor Taking Into Account the Appointment of the Piping, K0: 1.5

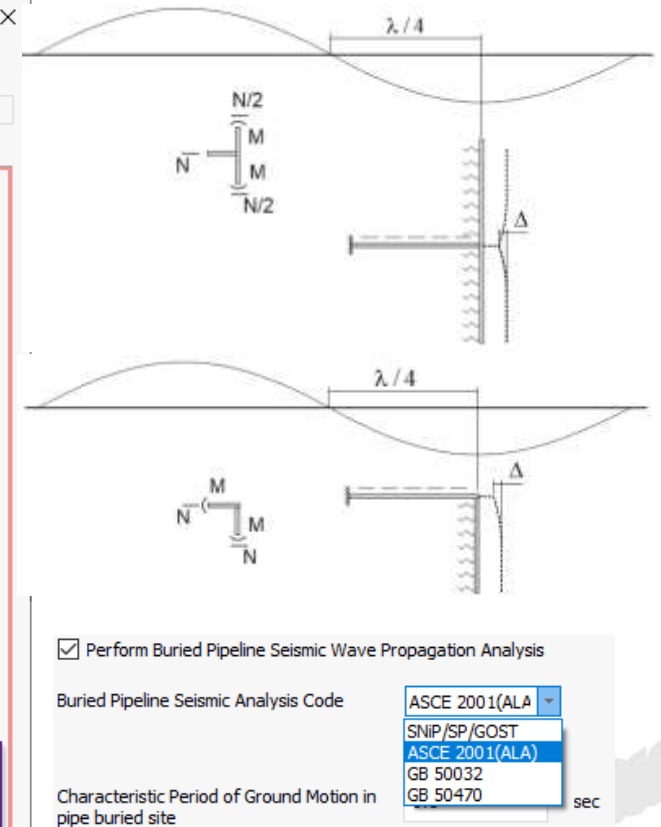
Peak Ground Velocity, Vg: 0.1 m/s

Peak Ground Acceleration, Ag: 4 m/s²

Apparent Propagation Velocity, Ca: 120 m/s

Shear Wave Velocity, Cs: 60 m/s

OK Cancel Help



PASS/Start-Prof | Nuevas Funciones

Se adicionó verificación de deformación de acuerdo con códigos ASCE 2001 Guidelines for the Design of Buried Steel Pipe (American Lifelines Alliance), SNIIP, SP, GOST, GB

Input Stress

Operating Mode: 1.1 'Soil Seismic Wave Propaga

Show Equations Stress Range from Operation to Cold Add Axial Force and Torsion Stress

Object	Start End node	Buried piping Seismic Check, (MPa)			Buried piping Seismic Check, (%)			Notes
		SI	Allow	%	Σ	Allow	%	
Buried pipe	9	515.60	965.27	53.4	0.2009	0.2939	68.4	
	3	515.58	965.27	53.4	0.2009	0.2939	68.4	
Buried pipe	8	510.81	965.27	52.9	0.1985			E, 201051.12 MPa
	9	515.60	965.27	53.4	0.2009			[εa]=0.75(0.5t/D-0.0025+3000(PD/(2Et)) ²), 0.002939
Buried pipe	7	490.91	965.27	50.9	0.1884			[εa]%, 0.2939
	8	510.81	965.27	52.9	0.1985			

Compression strain limit

$$0.75 \left[0.50 \left(\frac{t}{D'} \right) - 0.0025 + 3000 \left(\frac{pD}{2Et} \right)^2 \right]$$

$$D' = \frac{D}{1 - \frac{3}{D}(D - D_{min})}$$

Input Stress

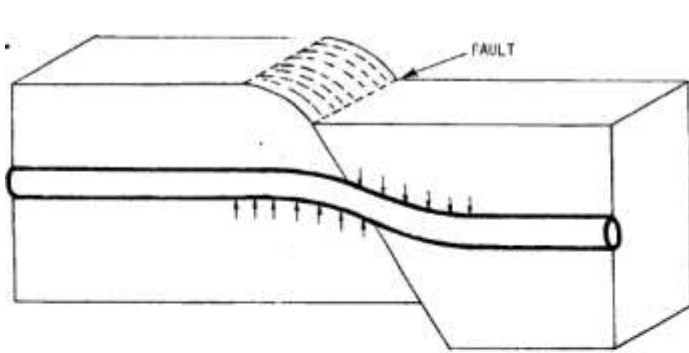
Operating Mode: Maximum

Show Equations Stress Range from Operation to Cold Add Axial Force and Torsion Stress

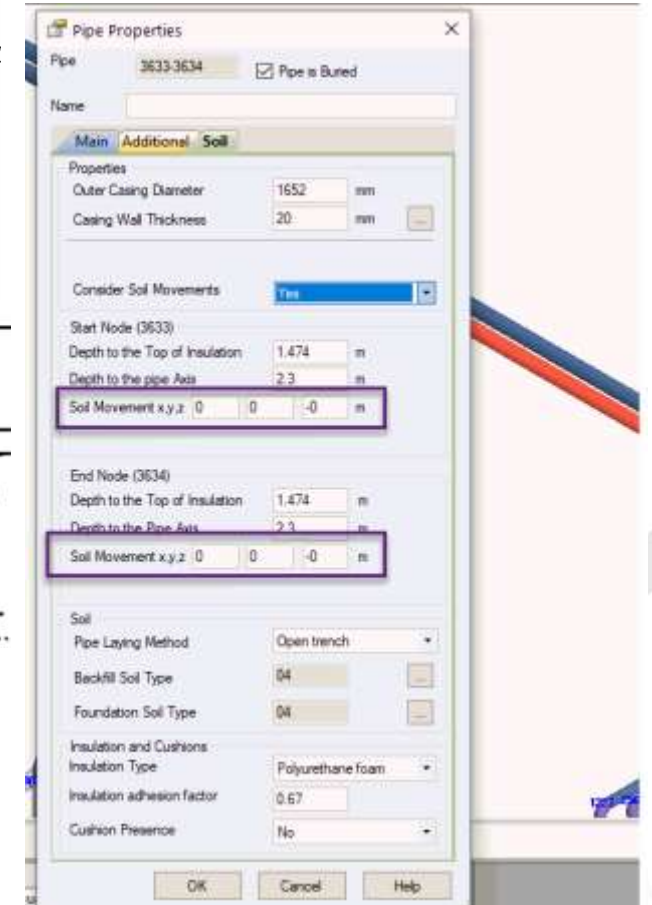
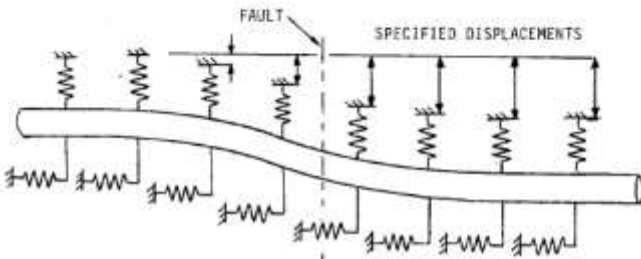
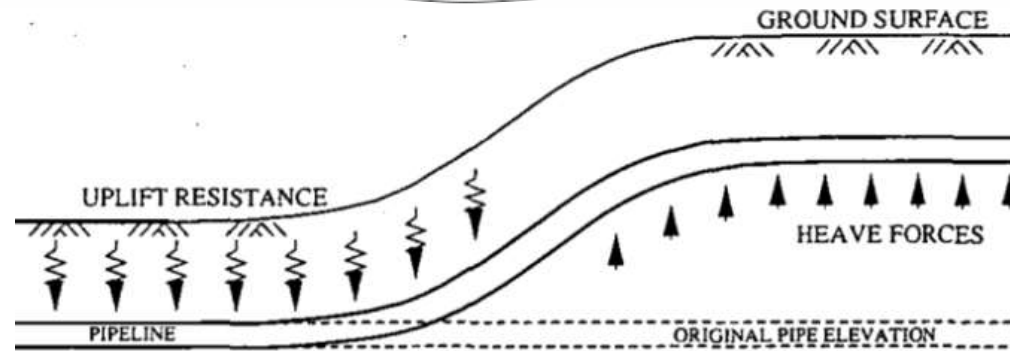
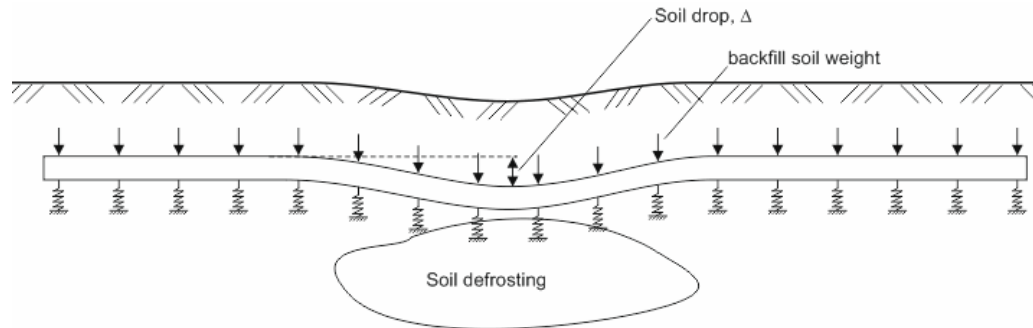
Object	Start End node	Hoop Stress, (MPa)			Primary Loads Stress in Hot State, (MPa)			Primary&Secondary Loads Stress in Hot State, (MPa)						Expansion Stress Range, (MPa)			Buried piping Seismic Check, (MPa)			Buried piping Seismic Check, (%)			Notes		
		Sh	F*E*Sy	%	Seq	F*Sy	%	SI	F*Sy	%	Seq	F*Sy	%	SI	F*Sy	%	Se	Sa	%	SI	Allow	%		Σ	Allow
Buried pipe	9	85	173.75	48.9			24.62	180.99	13.6	154	217.18	70.9	69	217.18	31.8	93.61	217.18	43.1	515.60	965.27	53.4	0.2009	0.2939	68.4	
	3	85	173.75	48.9			24.62	180.99	13.6	154	217.18	70.9	69	217.18	31.8	93.61	217.18	43.1	515.58	965.27	53.4	0.2009	0.2939	68.4	
Buried pipe	8	85	173.75	48.9			24.69	180.99	13.6	153.55	217.18	70.7	68.55	217.18	31.6	93.23	217.18	42.9	510.81	965.27	52.9	0.1985	0.2939	67.5	
	9	85	173.75	48.9			24.62	180.99	13.6	154	217.18	70.9	69	217.18	31.8	93.61	217.18	43.1	515.60	965.27	53.4	0.2009	0.2939	68.4	
Buried pipe	7	85	173.75	48.9			24.98	180.99	13.8	151.70	217.18	69.9	66.70	217.18	30.7	91.60	217.18	42.2	490.91	965.27	50.9	0.1884	0.2939	64.1	
	8	85	173.75	48.9			24.69	180.99	13.6	153.55	217.18	70.7	68.55	217.18	31.6	93.23	217.18	42.9	510.81	965.27	52.9	0.1985	0.2939	67.5	
Long Radius Pipe Bend	2	85	173.75	48.9			35.27	180.99	19.5	204.13	217.18	94.0	119.13	217.18	54.9	84.97	217.18	39.1	732.51	965.27	75.9	0.1589	0.2939	54.1	
Buried pipe	2	85	173.75	48.9			30.03	180.99	16.6	169.99	217.18	78.3	84.99	217.18	39.1	84.91	217.18	39.1	568.23	965.27	58.9	0.1588	0.2939	54.0	
	7	85	173.75	48.9			24.98	180.99	13.8	151.70	217.18	69.9	66.70	217.18	30.7	91.60	217.18	42.2	490.91	965.27	50.9	0.1884	0.2939	64.1	

PASS/Start-Prof | Nuevas Funciones

Deslizamiento de tierra, hundimiento de suelo, peso por congelamiento, deformación permanente del terreno (falla sísmica en el terreno) pueden ser también modelados. La verificación de tensión en la línea de tubería se hace de acuerdo con ASCE 2001 (ALA) y GB 50470



(A) ACTUAL GEOMETRY



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

PASS/Start-Prof | Nuevas Funciones

La verificación de esfuerzos en la línea de tubería se hace de acuerdo con ASCE 2001 (ALA) y GB 50470

Smart Operation Mode Editor

* #	Name	Hanger Sizing	Installation State	Seismic	Wind	Snow/Ice	Friction Multiplier	Weight Multiplier	Mode Type	Stress Range Between	Help
<input checked="" type="checkbox"/>	1 (0) Operating Mode	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.00	1.00	SUS	1-1A	?
<input checked="" type="checkbox"/>	2 (2) Landslide	<input type="checkbox"/>					1.00	1.00	ASCE 2001 (ALA)		?
<input checked="" type="checkbox"/>	3 (1) Test								SUS OCC Test ASCE 2001 (ALA) GB 50470		?

Buttons: Add, Delete, Up, Down

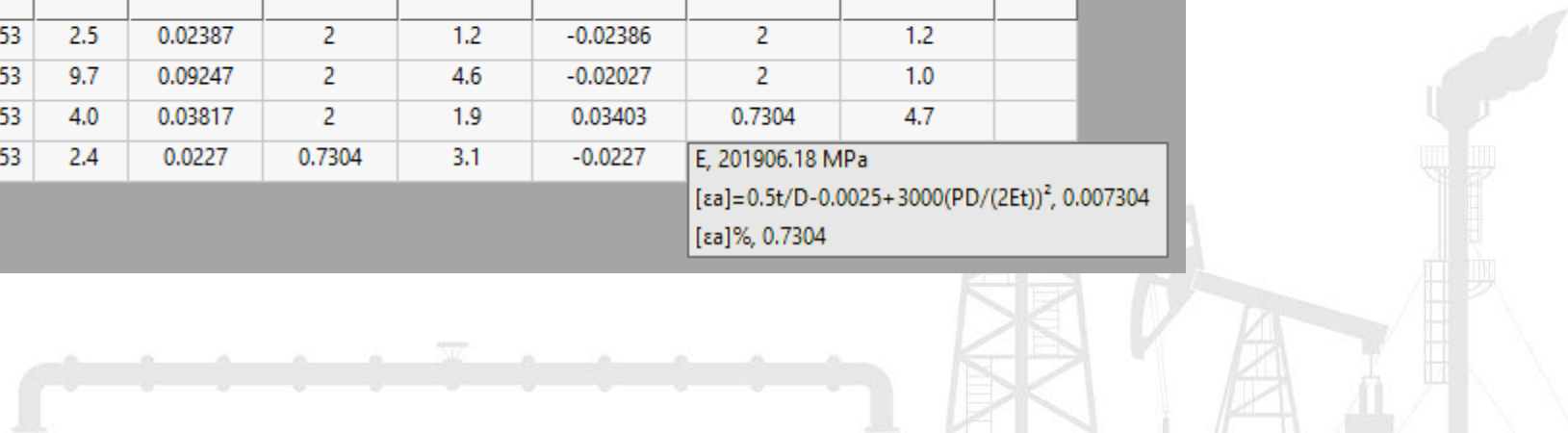
Input Stress

Operating Mode: 2 'Landslide' (2) Expansion Stress Range: 1 '操作模式' (0) (2-1A) Show Equations Stress Range from Operation to Cold Add Axial Force and Torsion Stress

Object	Start End node	Landslide strength, (MPa)			Landslide strength (Tension Area), (%)			Landslide strength (Compression Area), (%)			Notes
		SI	Allow	%	ε	Allow	%	ε	Allow	%	
Buried pipe	1	48.20	1930.53	2.5	0.02387	2	1.2	-0.02386	2	1.2	
	2	186.69	1930.53	9.7	0.09247	2	4.6	-0.02027	2	1.0	
Buried pipe	2	77.07	1930.53	4.0	0.03817	2	1.9	0.03403	0.7304	4.7	
	3	45.84	1930.53	2.4	0.0227	0.7304	3.1	-0.0227			E, 201906.18 MPa [εa]=0.5t/D-0.0025+3000(PD/(2Et)) ² , 0.007304 [εa]%, 0.7304

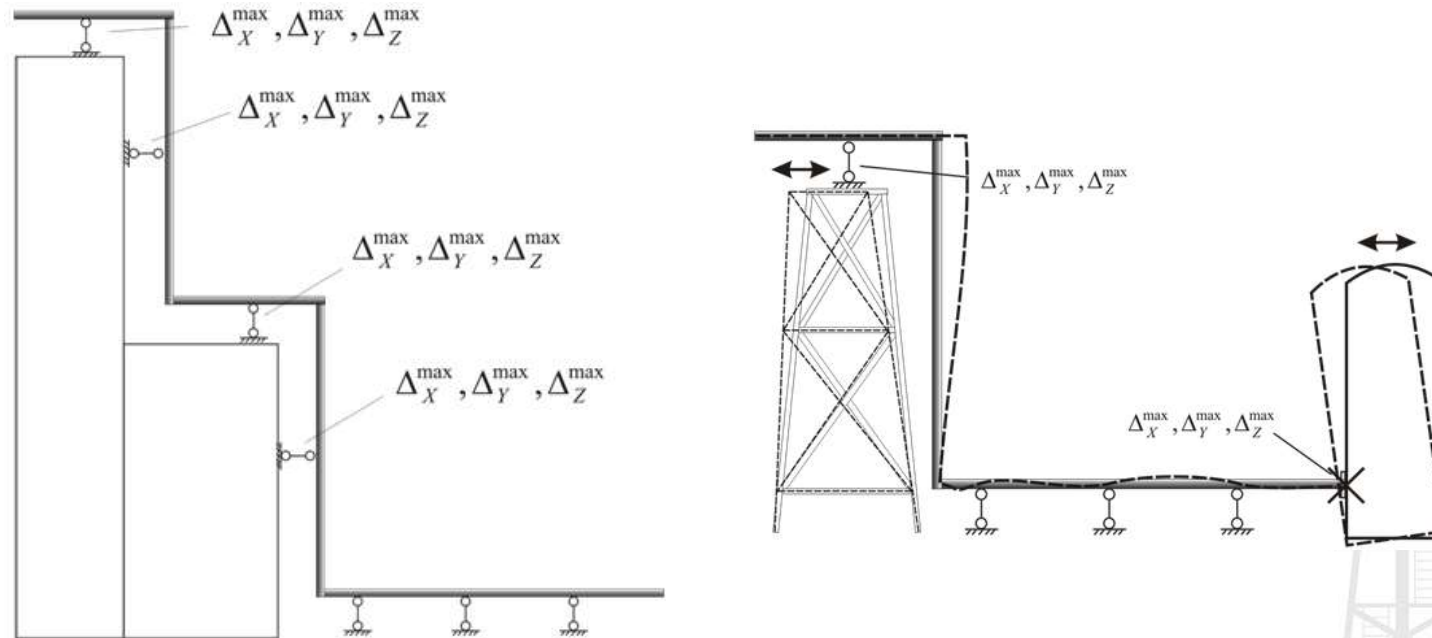


PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas Funciones

- Se agrega la habilidad de especificar diferentes valores de movimiento de ancla sísmica para el mismo grupo de fase. Es utilizado para definir varios movimientos de restricciones en varios pisos del mismo edificio.
- Se agregaron nuevas funciones para el Editor de Modo de Operación pudiendo ahora desactivar factores de sobrecarga, así mismo se agrega un factor a cargas por peso.

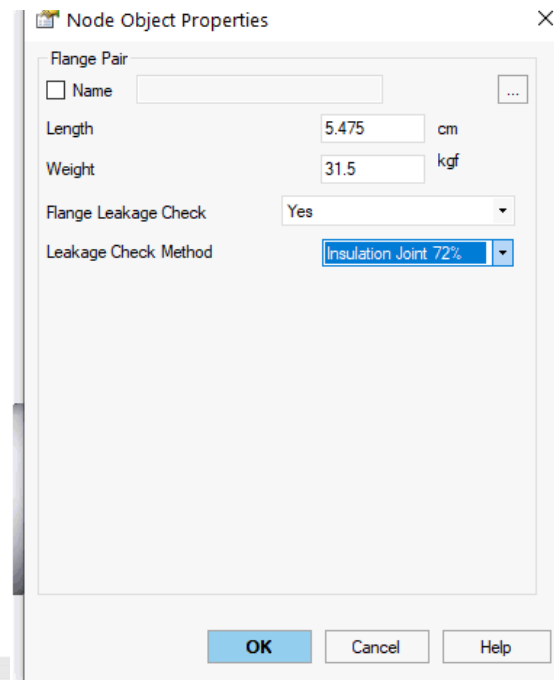
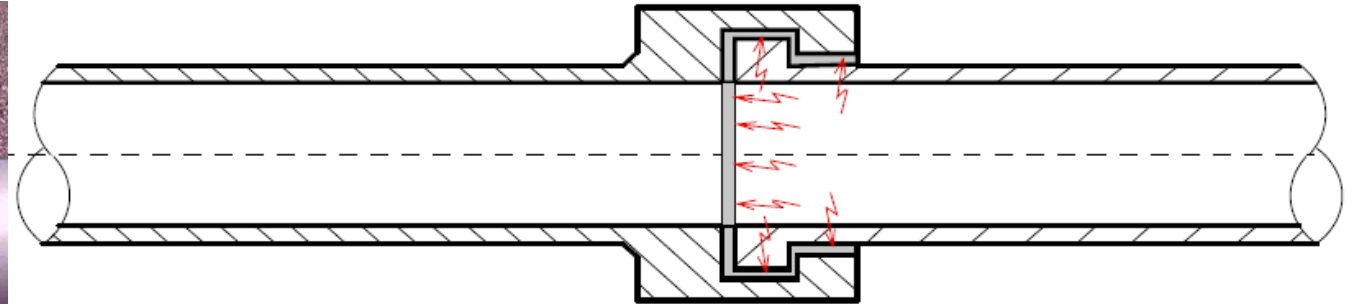


PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas Funciones

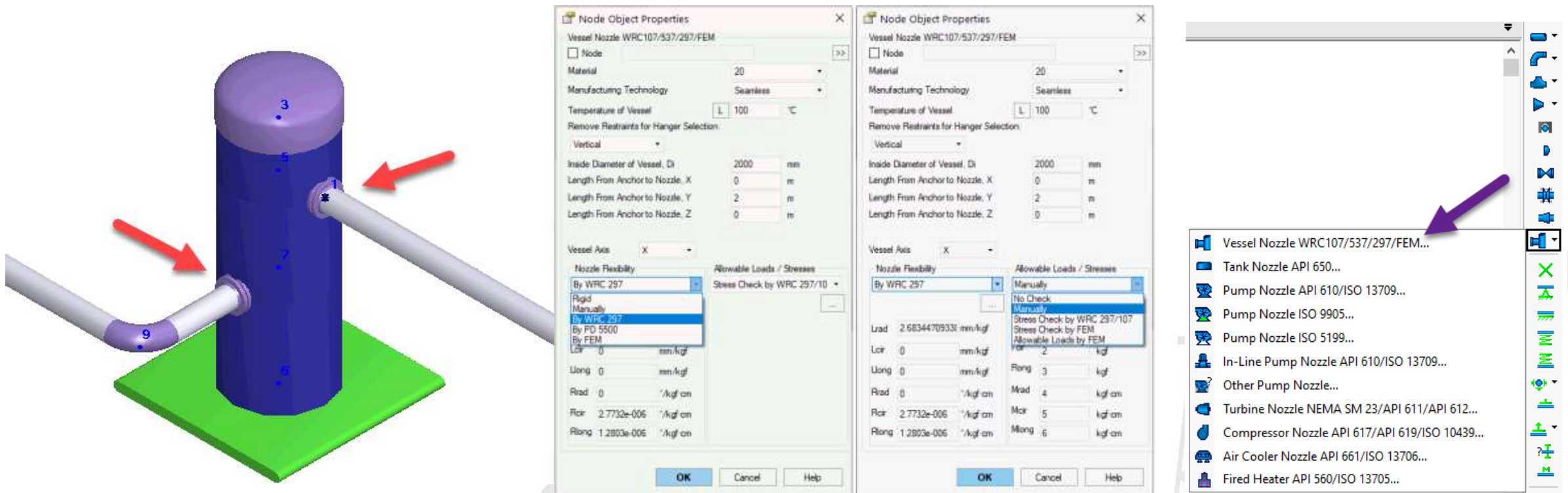
Se agregó el análisis de esfuerzos en la junta de aislamiento (kit de aislamiento). La tensión axial y la tensión del momento de torsión se verifican automáticamente.



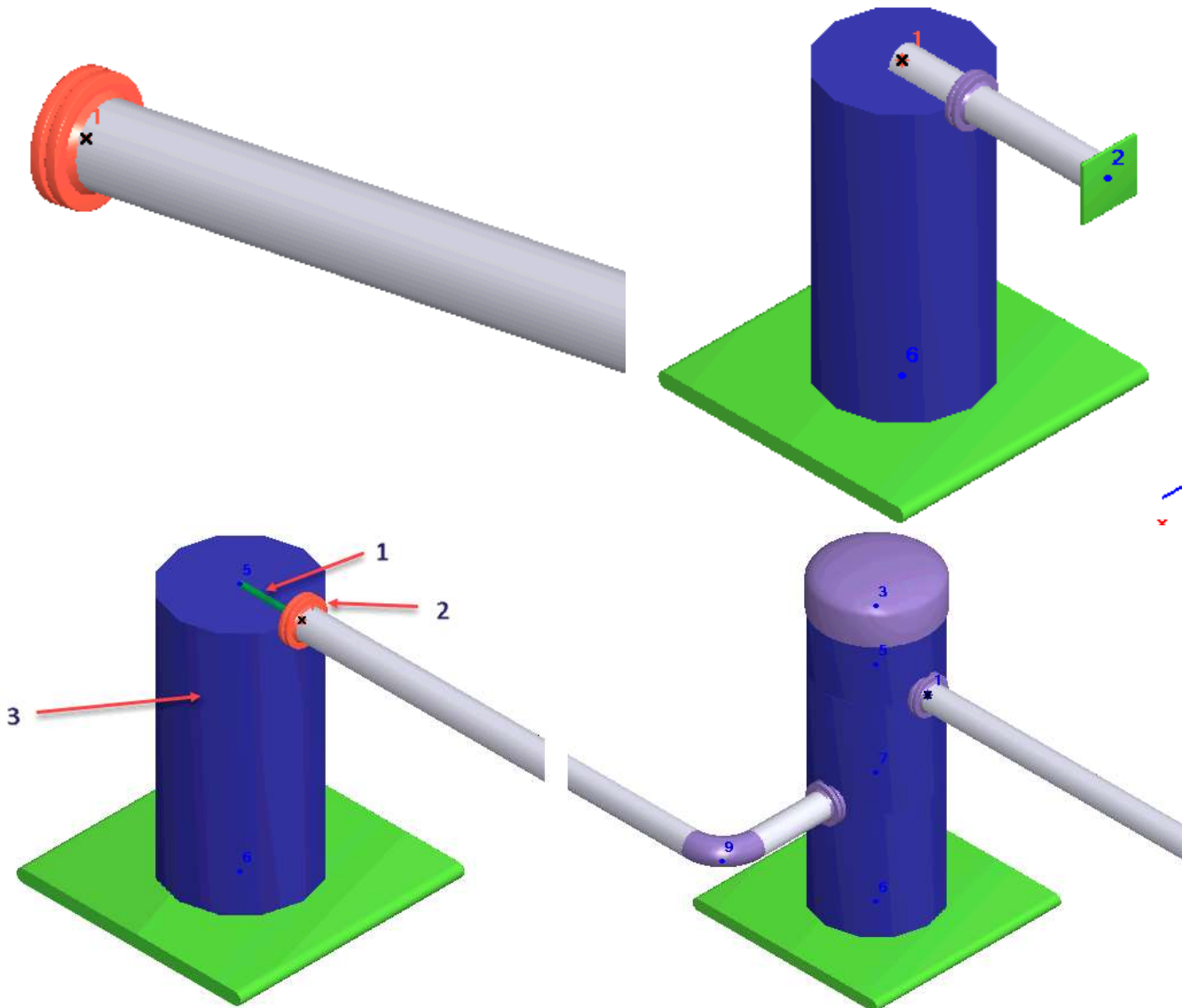
PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE

PASS/Start-Prof | Nuevas Funciones

- Se adicionó un nuevo objeto "Cylindrical Shell", el cual puede ser usado para modelar calderas, recipientes a presión, columnas, recipientes horizontales
- Se agregó un nuevo objeto "Boquilla", para modelar automáticamente boquillas en calderas, recipientes a presión, y en columnas. Modela automáticamente las flexibilidades en la cubierta empleando WRC 297/PD 5500, valores personalizados o por método de elemento finito, FEM, movimientos debido a la expansión térmica del recipiente, verifica cargas permisibles, verifica automáticamente esfuerzos empleando WRC 107/537/297



PASS/Start-Prof | Nuevas Funciones



Input Equipment

Operating Mode: 1 Flawless peaxel (0) Load Case: Operating W-P-T Show Equations

Object	Start End node	Type	DN, mm	Frad, kgf	Fci, kgf	Flong kgf	FR, kgf	Mbad, kgf-cm	Mci, kgf-cm	Mlong, kgf-cm	MR, kgf-cm	Sum
Vessel Nozzle WRC107/537/297/FEM	Node (1)	calculated allowable	219	-186.30 38.30								0.00

NOZZLE-FEM 3.1.0.0 (c) 2006-2019 by NTP Truboprovod

STRESS ON CYLINDRICAL SH-HELL AS PER WRC 537(107)
(In the zone at the nozzle):

Location	AU	AL	BU	BL	CU	CL	DU	DL
Circ. Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Pi+Pb+Q	2.9	-1.2	3.1	-1.4	3.9	-2.3	3.9	-2.5
Long. Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Pi+Pb+Q	3.9	-2.5	4.0	-2.6	3.0	-1.3	3.0	-1.3
Shear Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pi+Pb+Q	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pi+Pb (TOTAL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pi+Pb+Q (TOTAL)	3.9	2.5	4.0	2.6	3.9	2.5	3.9	2.5

CONCLUSION:
Stress Int. Max S1 Allowable Result
MPa MPa
Pi+Pb (TOTAL) 0.0 165.3 Passed
Pi+Pb+Q (TOTAL) 4.0 330.9 Passed

STRESS ON NOZZLE JUNCTION ZONE AS PER WRC 297

Location	AU	AL	BU	BL	CU	CL	DU	DL
Circ. Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Circ. Pi+Pb+Q	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Long. Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long. Pi+Pb+Q	18.5	-17.6	19.2	-18.2	18.8	-17.9	18.8	-17.9
Shear Pi+Pb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Pi+Pb+Q	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	0.0
Pi+Pb (TOTAL)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pi+Pb+Q (TOTAL)	16.5	18.7	19.2	19.4	18.8	19.0	18.8	19.0

CONCLUSION:
Stress Int. Max S1 Allowable Result
MPa MPa
Pi+Pb (TOTAL) 0.0 165.3 Passed
Pi+Pb+Q (TOTAL) 19.4 330.9 Passed

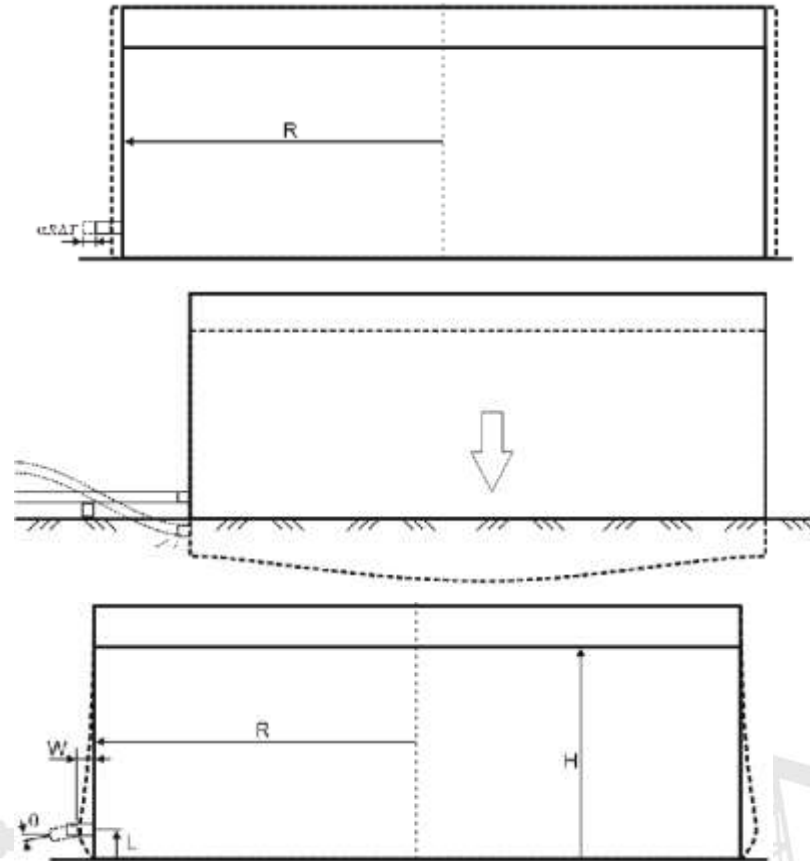
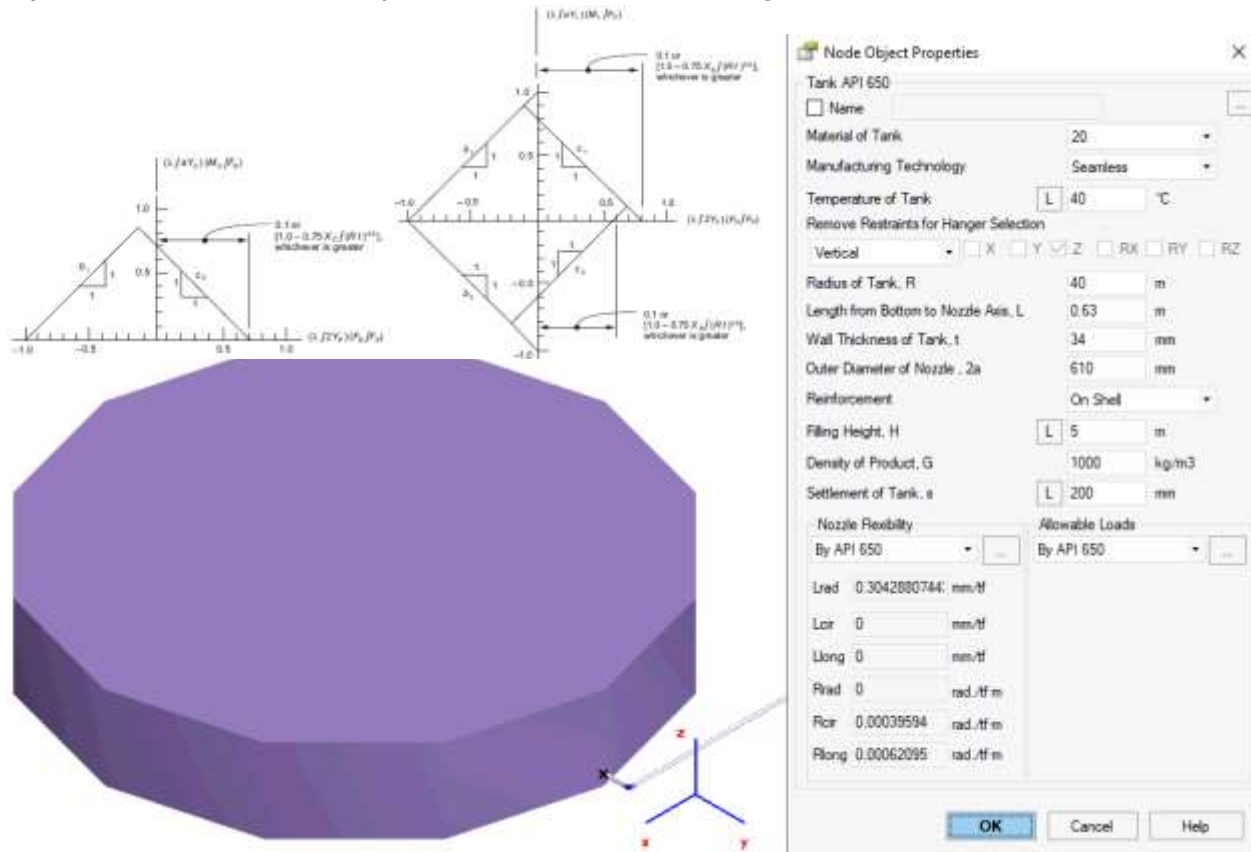
RESUME:
Maximum utilization factor (per) 5.9%
Strength conditions are satisfied

Nozzle-FEM 3.1.0.0 (c) 2006-2019 by NTP Truboprovod



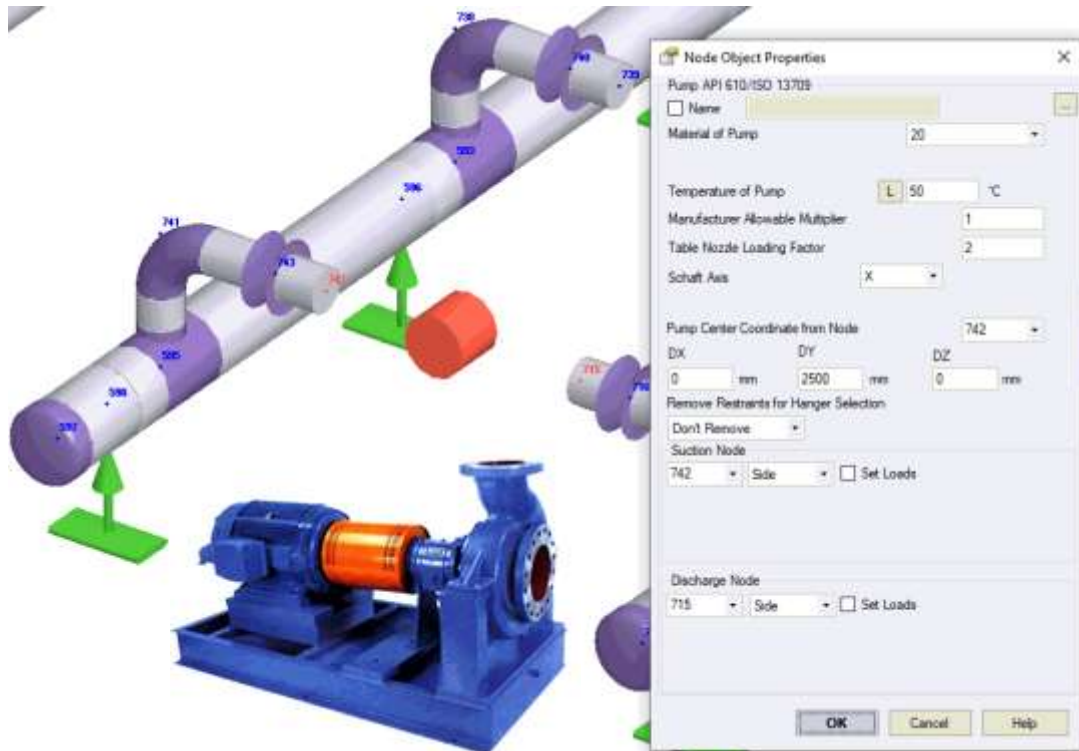
PASS/Start-Prof | Nuevas Funciones

Se adiciona un nuevo objeto "Tank Nozzle API 650", el cual permite modelar automáticamente boquillas en tanques de almacenamiento. Modela automáticamente flexibilidades empleando API 650, movimientos térmicos de la boquilla, movimientos y giros debido al efecto de abultamiento empleando API 650, es capaz de verificar los asentamientos y verificar automáticamente las cargas permisibles empleando API 650 y STO-SA 03-002-2009



PASS/Start-Prof | Nuevas Funciones

- Se agregó el nuevo objeto "Pump API 610 / ISO 13709", permite modelar automáticamente las bombas, considerar los movimientos térmicos de las boquillas, verificar las cargas permitidas utilizando API 610 e ISO 13709
- Se agregó el nuevo objeto "Pump ISO 9905"
- Se agregó el nuevo objeto "Pump ISO 5199"



- a) The individual component forces and moments acting on each pump nozzle flange shall not exceed the range specified in Table 5 (F.4) by a factor of more than 2.
- b) The resultant applied force (F_{RCA} , F_{RDA}) and the resultant applied moment (M_{RCA} , M_{RDA}) acting on each pump-nozzle flange shall satisfy the appropriate interaction equations as given in Equations (F.1) and (F.2):

$$\sqrt{F_{RCA}^2(1.5 \times F_{RCA})} + \sqrt{M_{RCA}^2(1.5 \times M_{RCA})} < 2 \quad (F.1)$$

$$\sqrt{F_{RDA}^2(1.5 \times F_{RDA})} + \sqrt{M_{RDA}^2(1.5 \times M_{RDA})} < 2 \quad (F.2)$$

- c) The applied component forces and moments acting on each pump nozzle flange shall be translated to the centre of the pump. The magnitude of the resultant applied force, F_{RCA} , the resultant applied moment, M_{RCA} , and the applied moment shall be limited by Equations (F.3) to (F.5). (The sign convention shown in Figures 21 through 25 and the right-hand rule should be used in evaluating these equations.)

$$F_{RCA} < 1.5(F_{R1A} + F_{R2A}) \quad (F.3)$$

$$M_{RCA} < 2.0(M_{R1A} + M_{R2A}) \quad (F.4)$$

$$M_{RCA} < 1.5(M_{R1A} + M_{R2A}) \quad (F.5)$$

where

$$F_{RCA} = \sqrt{F_{XCA}^2 + F_{YCA}^2 + F_{ZCA}^2}$$

where

$$F_{XCA} = F_{X1A} + F_{X2A}$$

$$F_{YCA} = F_{Y1A} + F_{Y2A}$$

$$F_{ZCA} = F_{Z1A} + F_{Z2A}$$

$$M_{RCA} = \sqrt{M_{XCA}^2 + M_{YCA}^2 + M_{ZCA}^2}$$

where

$$M_{XCA} = M_{X1A} + M_{X2A} - [F_{Y1A}(X12) + (F_{Y2A})(X22) - (F_{Z1A})(Y12) - (F_{Z2A})(Y22)]/1000$$

$$M_{YCA} = M_{Y1A} + M_{Y2A} + [F_{X1A}(Y12) + (F_{X2A})(Y22) - (F_{Z1A})(X12) - (F_{Z2A})(X22)]/1000$$

$$M_{ZCA} = M_{Z1A} + M_{Z2A} - [F_{X1A}(X12) + (F_{X2A})(X22) - (F_{Y1A})(Y12) - (F_{Y2A})(Y22)]/1000$$

Object	Start End node	Type	DN, mm	Frad, N	Fcir, N	Flong, N	FR, N	Mrad, N-m	Mcir, N-m	Mlong, N-m	MR, N-m	Sum	Notes
Pump API 610/ISO 13709	Node (1)	Suction, Side	200	-7333	5887	-29592	31050	-2626.53	18306.88	4598.20	19057.39	2.84	1
				9780	6220	7560	6920	3520	5160	7060	4710		
	Node (3)	Discharge, Side	200	1440505	-173	0	1440505	0	28.89	28.89	69.39	1	
				9780	6220	7560	6920	3520	5160	7060	4710		
		Summary Loads		1433173	5714	-29592	1433480	-2626.53	33102.90	7657.21	34078.35	1	
						20760							

[My_sum]=2*(MradT1) + [MradT2]=2*(1760+1760)=7040 N-m

PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "In-line Pump", permite modelar automáticamente bombas verticales en línea, considera movimientos térmicos de las boquillas, verifica cargas permisibles de acuerdo con API 610 e ISO 13709

Node Object Properties

In-Line Pump API 610/ISO 13709

Code: API 610

Length: 400 m Weight: 50 N

Material of Pump: 20

Manufacturing Technology: Seamless

Temperature of Pump: L 100 °C

Factor for Temperature: 1

Nozzle Loading Factor: 2

Pump Center of Gravity Coordinate from Node: 3

DX: 0 mm DY: 500 mm DZ: 0 mm

Suction Node: 1

Discharge Node: 2

OK Cancel Help



For SI units, Equations (F.6) to (F.8) apply:

$$\sigma_p = (\sigma/2) + (\sigma^2/4 + r^2)^{0.5} < 41 \quad (F.6)$$

$$\alpha_1 = [1,27F_y/(D_o^2 - D_i^2)] + [10\,200D_o(M_x^2 + M_z^2)^{0.5}]/(D_o^4 - D_i^4) \quad (F.7)$$

$$r = [1,27(F_x^2 + F_z^2)^{0.5}]/(D_o^2 - D_i^2) + [5\,100D_o(M_y)]/(D_o^4 - D_i^4) \quad (F.8)$$

For USC units, Equations (F.9) to (F.11) apply:

$$\sigma_p = (\sigma/2) + (\sigma^2/4 + r^2)^{0.5} < 5\,950 \quad (F.9)$$

$$\alpha_1 = [1,27F_y/(D_o^2 - D_i^2)] + [122D_o(M_x^2 + M_z^2)^{0.5}]/(D_o^4 - D_i^4) \quad (F.10)$$

$$r = [1,27(F_x^2 + F_z^2)^{0.5}]/(D_o^2 - D_i^2) + [61D_o(M_y)]/(D_o^4 - D_i^4) \quad (F.11)$$

where

- σ_p is the principal stress, expressed in megapascals (pounds-force per square inch);
- α_1 is the longitudinal stress, expressed in megapascals (pounds-force per square inch);
- r is the shear stress, expressed in megapascals (pounds-force per square inch);
- F_x is the applied force on the X axis;
- F_y is the applied force on the Y axis;
- F_z is the applied force on the Z axis;

Input Equipment

Operating Mode: 1 'main mode' (0) Load Case: Operating W+P+T Show Equations ?

Object	Start End node	Type	DN, mm	Frad, N	Fcir, N	Flong, N	FR, N	Mrad, N-m	Mcir, N-m	Mlong, N-m	MR, N-m	Sum	Notes
In-Line Pump API 610/ISO 13709	Node (1)	Suction, Side	219	-1200421		-28			47.98			0.00	1
	Node (2)	Discharge, Side	219	-1200421	9780	6220		7060	3520	5160		0.00	1
				7560	9780	6220		7060	3520	5160			

PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "Turbine NEMA SM23/API 611/API 612", permite modelar automáticamente turbinas de vapor, considera movimientos térmicos de las boquillas, verifica cargas permisibles empleando NEMA SM23, API 611, API 612, ISO 10437

Node Object Properties

Turbine NEMA SM 23

Name

Material of Compressor: 20

Manufacturing Technology: Seamless

Temperature of Compressor: L 100 °C

Factor for Allowable Loads: 1

Shaft Axis: X

Center of Compressor Coordinate from Node: 3

DX: 0 mm DY: 500 mm DZ: 0 mm

Remove Restraints for Hanger Selection: Don't Remove

Suction Nozzle: 1 Set Manual Loads

Discharge Node: 3 Set Manual Loads

Additional Nozzle 1: 0 Set Manual Loads

Additional Nozzle 2: 0 Set Manual Loads

OK Cancel Help



PIPING AND EQUIPMENT
ANALYSIS & SIZING SUITE



PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "Other Pump", permite modelar automáticamente bombas, considera movimientos térmicos de las boquillas, verifica cargas permisibles

Node Object Properties

Other Pump

Name

Material of Pump: 20

Manufacturing Technology: Seamless

Temperature of Pump: L 100 °C

Shaft Axis: X X: 0 ° Y: 90 °

Pump Center Coordinates from Node: 3

DX: 0 mm DY: 500 mm DZ: 0 mm

Remove Restraints for Hanger Selection

Vertical X Y Z RX RY RZ

Suction Node					
3		FR	MR		
		N	Nm		
		1	1		
FX	FY	FZ	MX	MY	MZ
N	N	N	Nm	Nm	Nm
1	1	1	1	1	1

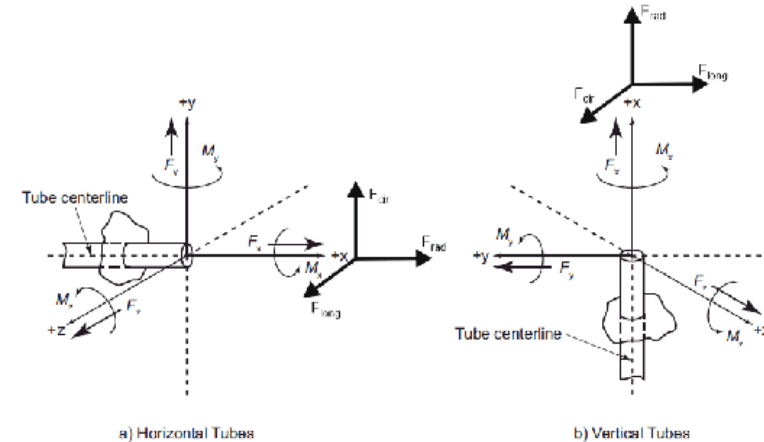
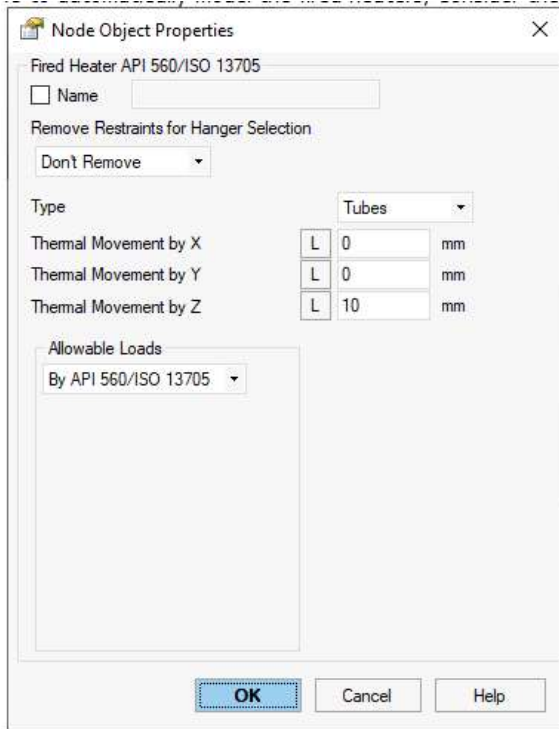
Discharge Node					
1		FR	MR		
		N	Nm		
		1	1		
FX	FY	FZ	MX	MY	MZ
N	N	N	Nm	Nm	Nm
1	1	1	1	1	1

OK Cancel Help



PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "Fired Heater API 560/ISO 13705", permite modelar automáticamente calentadores a fuego directo, considera movimientos en las boquillas, verifica cargas permisibles empleando API 560 e ISO 13705



displayed. In the second row the allowable values are displayed.

Object	Start End node	Type	DN, mm	Frad, kgf	Fcir, kgf	Flong, kgf	FR, kgf	Mrad, kgf-cm	Mcir, kgf-cm	Mlong, kgf-cm	MR, kgf-cm	Sum	Notes
Fired Heater API 560/ISO 13705	Node (1)	calculated	219	-96033.70		40605.70			-2029708.86				1
		allowable		133.40	266.90	266.90		11660	8810	8810			



PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "Air cooled Heat Exchanger API 661/ISO 13706", permite modelar automáticamente aero enfriadores, considera movimientos térmicos de la boquillas, verifica cargas permisibles empleando API 661 e ISO 13706

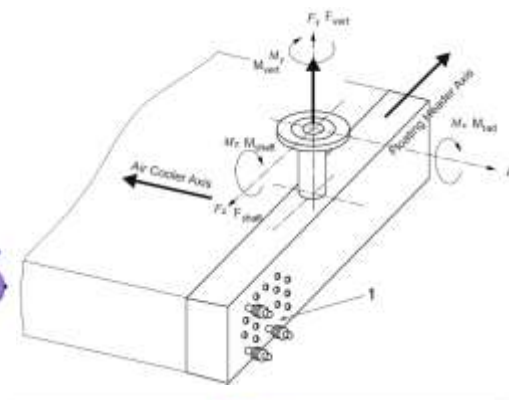
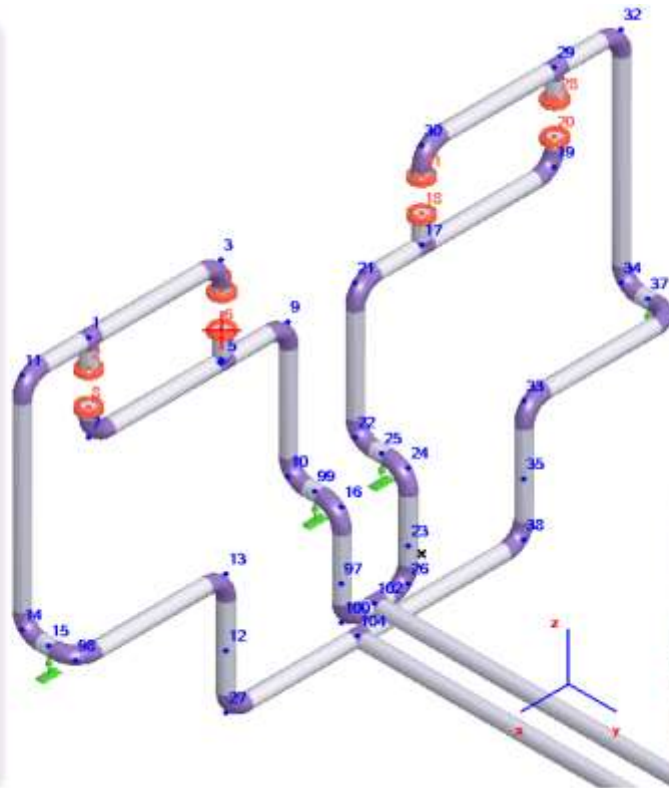
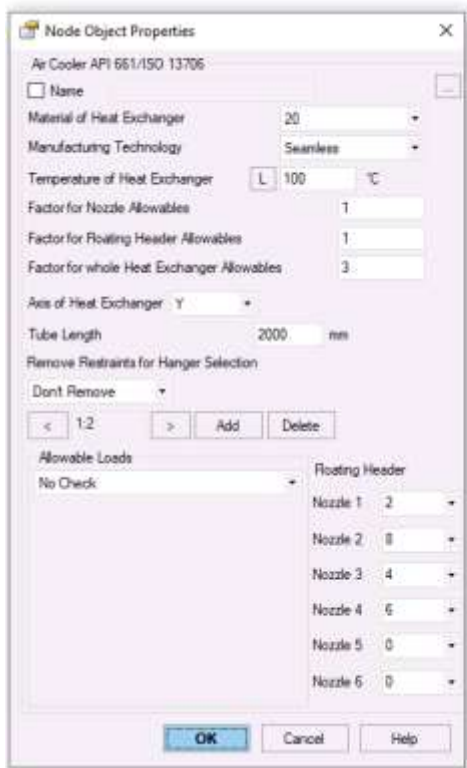


Table 4 — Maximum Allowable Nozzle Loads

Nozzle Size DN (NPS)	Moments N m (ft.lbf)			Forces N (lbf)		
	M_x	M_y	M_z	F_x	F_y	F_z
40 (1 1/2)	110 (80)	150 (110)	110 (80)	670 (150)	1020 (230)	670 (150)
50 (2)	150 (110)	240 (180)	150 (110)	1020 (230)	1330 (300)	1020 (230)
80 (3)	410 (300)	610 (450)	410 (300)	2000 (450)	1690 (380)	2000 (450)
100 (4)	610 (600)	1220 (900)	610 (600)	3340 (750)	2670 (600)	3340 (750)
150 (6)	2140 (1580)	3050 (2250)	1630 (1200)	4000 (900)	5030 (1130)	5030 (1130)
200 (8)	3050 (2250)	6100 (4500)	2240 (1650)	5690 (1280)	13,340 (3000)	8010 (1800)
250 (10)	4070 (3000)	6100 (4500)	2550 (1880)	6670 (1500)	13,340 (3000)	10,010 (2250)
300 (12)	5080 (3750)	6100 (4500)	3050 (2250)	8360 (1880)	13,340 (3000)	13,340 (3000)
350 (14)	6100 (4500)	7120 (5250)	3570 (2630)	10,010 (2250)	16,680 (3750)	16,680 (3750)

values from 7.1.10.2

7.1.10.2 The design of each fixed or floating header, the design of the connections of fixed headers to side frames, and the design of other support members shall ensure that the simultaneous application (sum) of all nozzle loadings on a single header does not cause any damage. The components of the nozzle loadings on a single header shall not exceed the following values:

- M_x 6100 N m (4500 ft.lbf)
- M_y 8130 N m (6000 ft.lbf)
- M_z 4070 N m (3000 ft.lbf)
- F_x 10,010 N (2250 lbf)
- F_y 20,020 (4500 lbf)
- F_z 16,680 (3750 lbf)

values from 7.1.10.2 multiplied by 3

7.1.10.3 The total of all nozzle loads on one multi-bundle bay shall not exceed three times that allowed for a single header.



PIPING AND EQUIPMENT
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Se agregó el nuevo objeto "Untied Expansion Joint" y base de datos de Juntas de Expansion sin tirantes, lo que permite especificar flexibilidad axial, rotacional, cortante y torsión también verifica automáticamente las deformaciones tanto individuales como combinadas. No necesita más modelar manualmente empleando junta de expansión no-estándar.

Node Object Properties

Universal Expansion Joint

Name

Thrust Area: 241234 sq.mm

Axial Flexibility: 0.00452 mm/N

Allowable Axial Movement: 40 mm

Rotational Flexibility: 0.33405 °/f.m

Allowable Rotation: 10 °

Lateral Flexibility: 0.0044 mm/N

Allowable Lateral Movement: 5 mm

Use Torsion Flexibility

Torsion Flexibility: 0.34332 °/f.m

Allowable Torsion Rotation: 1 °

OK Cancel Help



Output Window Help

- Piping Stress
- Insulation Stress
- Seismic Stress (Aboveground)
- Flaw Stress
- Load and Displacement in Restraints
- Restraint Loads
- Nozzle and Equipment Loads
- Displacements
- Expansion Joint Deformations
- Internal Forces & Moments
- Selected Springs
- Selected Constant Effort Springs
- Buckling Check of Pipe Wall
- Flange Leakage Check
- Output 3D View
- Error & Warning Messages

Ctrl+H

$$\frac{|\lambda_p|}{[\lambda_p]} + \frac{|\lambda_\theta|}{[\lambda_\theta]} + \frac{|\lambda_\Delta|}{[\lambda_\Delta]} \leq 1.$$

Node Number	Type	Local axis	Axial, (mm)	Allowable, (mm)	Shear, (mm)	Allowable, (mm)	Angular, (°)	Allowable, (°)	Torsion, (°)	Allowable, (°)	Summary	Notes
12	Untied Expansion Joint	Pipe 3 - 12	2.41	50	1.22	15	9.59131	10	-2.05119	No	1.09	1
13	Torsion Expansion Joint	Pipe 5 - 13	0	No	0	No	0	No	13.9229	51.5662	0.27	
15	Torsion Expansion Joint	Pipe 7 - 15	0	No	0	No	0	No	10.1299	51.5662	0.20	
21	Torsion Expansion Joint	Pipe 19 - 21	0	No	0	No	0	No	-4.36021	51.5662	0.08	



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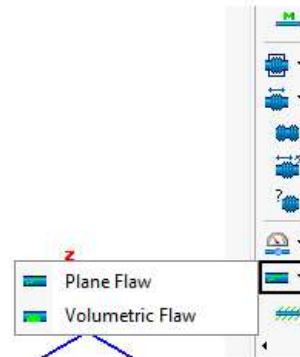
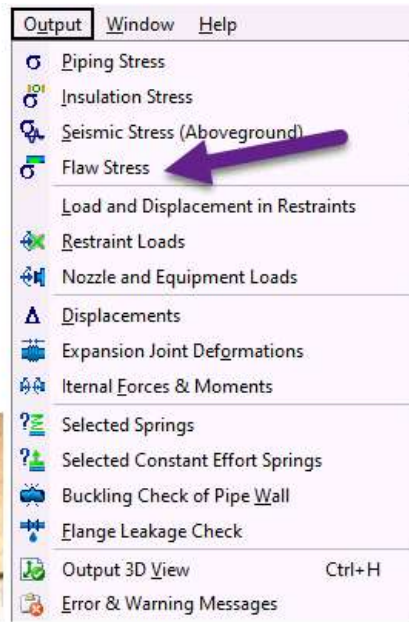
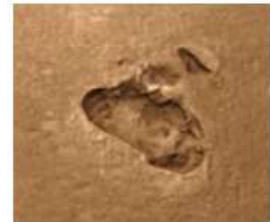
PASS/Start-Prof | Nuevas Funciones

Se agregó el nuevo objeto "Torsion Expansion Joint" y base de datos de juntas de expansión y torsión, modela automáticamente fricción por torsión (momento de torsión) y verifica el ángulo permisible de rotación.

The image displays a software interface for defining joint properties. On the left, a photograph shows a large, curved pipe with a slip-type expansion joint. Below it, a 'Node Object Properties' dialog box is open for a 'Torsion Expansion Joint'. The 'Friction Moment' field is highlighted with a red box and contains the value '0' with units 'kgf·cm'. The 'Allowable Rotation' field also contains '0'. To the right, a 3D model of a blue slip joint is shown with a purple arrow pointing to the 'Angular Torsion...' option in a menu. Further right, a cross-sectional diagram of a 'SLIP-TYPE EXPANSION JOINT' shows 'Pipe 1 slides in pipe 2' with 'Packing' and 'Flange bolts'. It includes the formula $F = \mu A + rM$ and labels for 'Pressure + moment'. On the bottom right, another 'Node Object Properties' dialog box is open for a 'Slip Joint'. The 'Friction Force' field is highlighted with a red box and contains the value '0' with units 'kgf'. The 'Allowable Axial Expansion' field contains '0' with units 'mm'. The 'Pressure Balanced' checkbox is unchecked. At the bottom left, the PASS logo is displayed with the text 'PIPING AND EQUIPMENT ANALYSIS & SIZING SUITE'.

PASS/Start-Prof | Nueva Funciones

Se agregaron nuevas habilidades para-servicio: "Plane Flaw" y objeto "Volumetric flaw", permiten modelar falla en un tubo, dobléz o tee y verifica el esfuerzo que se presenta en las fallas



Input Defect Stress

Operating Mode: 1 'Main mode' (0) Show Equations

Node	Object	Flaw Type	Defect Stress, (MPa)		%	Result	Notes
			calculated	allowable			
3	Above ground pipe	Plane Flaw	32.55	7.19	452.78	FAILED	1
4	Above ground pipe	Volumetric Flaw	0.030	0.44	6.85	PASS	
5	Forged Elbow	Volumetric Flaw	0.046	0.44	10.40	PASS	
6	Welding Tee	Volumetric Flaw	0.051	0.44	11.51	PASS	
8	Above ground pipe	Volumetric Flaw	pr=2 MPa Ri=103.5 mm Ro=109.5 mm T=6 mm F=6730.7029 kgf M=387.37067 kgf-cm a=1.170411 c=0.333333 b=0.061509 σs=221 MPa σb=200 MPa σ'=(σs+σb)/2=210.5 MPa PI0=2/(3)^0.5*σ'*log(Ro/Ri)=1369.739628 MI0=4σ'*(Ro^3-Ri^3)/3=5.731620 Ac=c*(min(3,a)*b*c)^1/3=0.096146 pls=0.95-(0.85+0.013a/b)*Ac=0.844493 Pls=pls*PI0=1156.734923 mls=cos(π/2 *cb)-c/2*sin(πb)=0.967475 Mls=mls*MI0=5.545201 pr^2/pls^2+M^2/Mls^2=0.029895				



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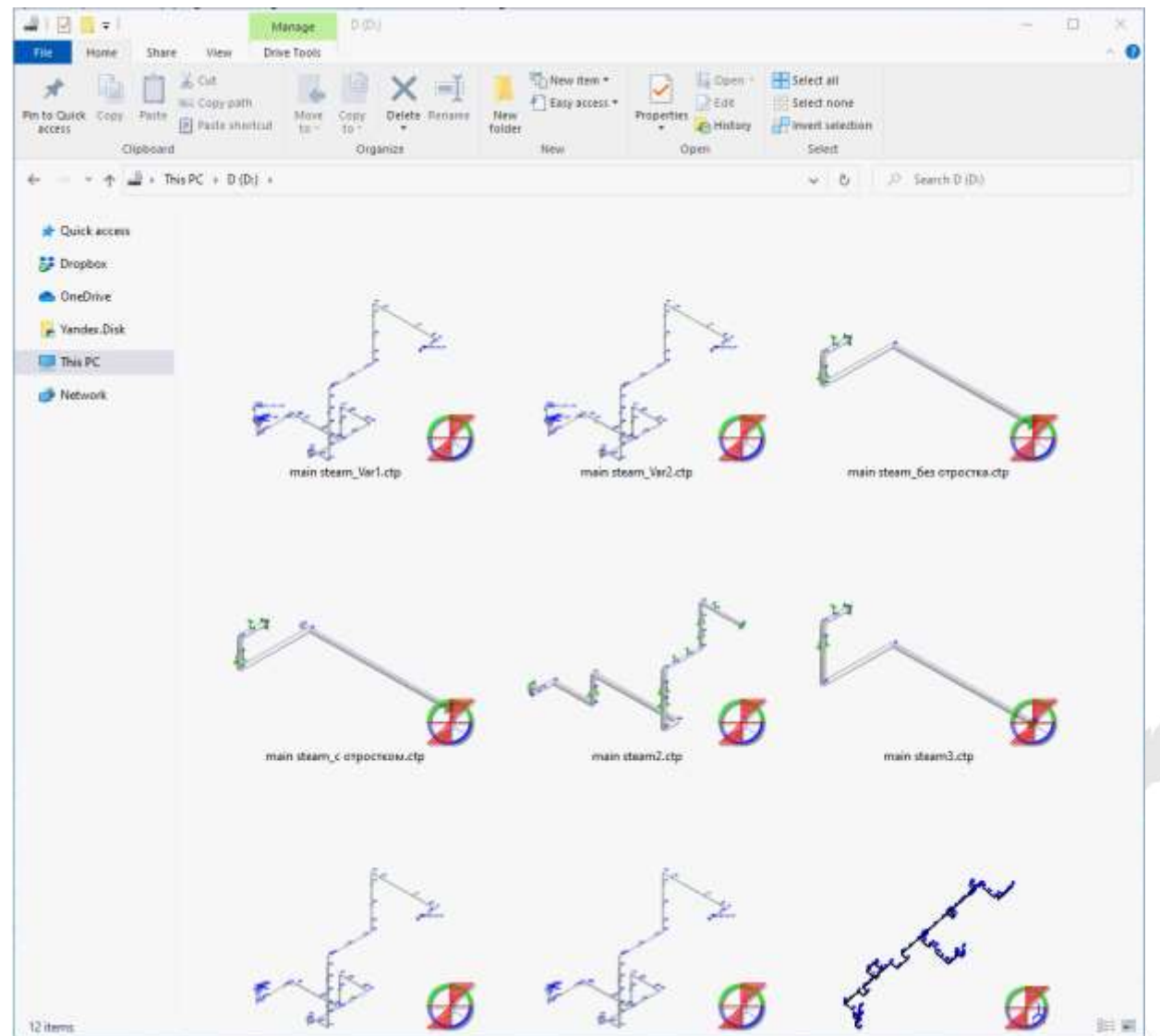
Se agrego la habilidad de especificar aislamiento, recubrimiento, y densidad lineal de las capas y espesor en las propiedades del tubo. La habilidad de escoger el peso del aislamiento desde la base de datos continua existiendo.

The screenshot displays the software's configuration window for pipe properties. It includes a 'Test Pressure' field set to 0 MPa and a 'Uniform Weight' section with a checked option for 'Calculate Pipe Weight Automatically'. Below this, several properties are listed with their values and units: Pipe (179.98 kgf/m), Insulation (49.31 kgf/m), Fluid (14.74 kgf/m), and Fluid Density (1000 kg/m³). A secondary panel on the right allows for specifying insulation and cladding details: Insulation Thickness (50 mm), Insulation Density (800 kg/m³), Cladding Thickness (10 mm), Cladding Density (1500 kg/m³), Lining Thickness (0 mm), and Lining Density (0 kg/m³). To the right of these panels is a cross-sectional diagram of a pipe with diameter 'D'. The diagram shows four distinct layers: 1 (innermost), 2, 3, and 4 (outermost). Labels 'ti', 'tc', 't', and 'tl' indicate the thicknesses of the insulation, cladding, and lining layers, respectively.



PASS/Start-Prof | Nuevas Funciones

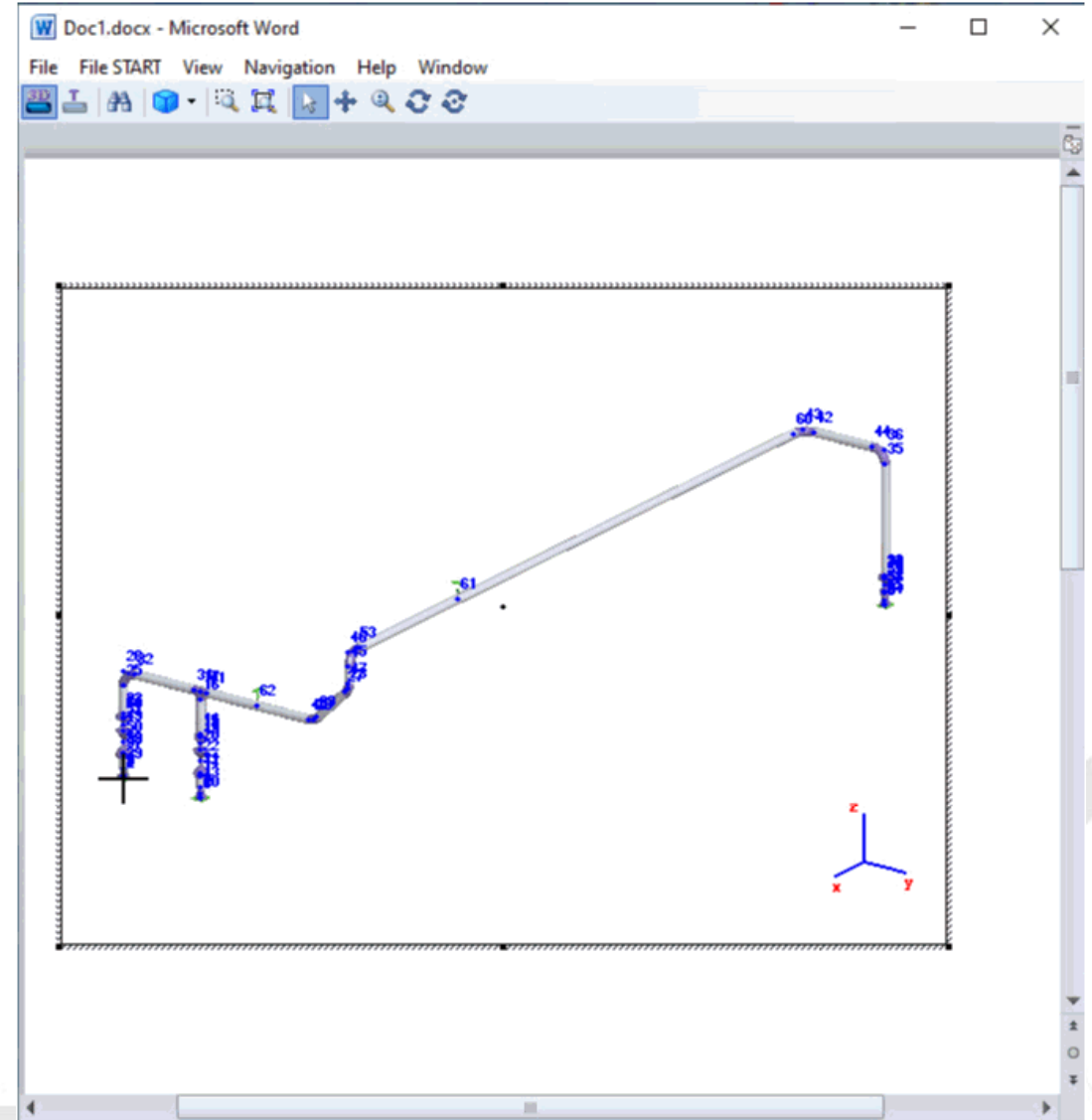
Se agregó la capacidad de ver en miniaturas el modelo dentro del Explorador de Windows. Ahora se pueden ver todos los modelos antes de abrir el archivo.



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Agregada función "Copy Whole Model". Permite copiar todo el modelo de tubería como un objeto al portapapeles. Después puede insertar este modelo interactivo en otro software como MS WORD, EXCEL etc. Usted puede girar, desplazar, acercar el modelo dentro de MS Word. Usted puede agregar interacción al reporte en MS Word y enviar a su cliente para revisión.



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- Se agregó la capacidad de exportar al software EHS para el dimensionamiento de soporte. START-PROF puede crear el archivo cad8.dat
- Se agregó la función para respaldar copia del archivo antes de cada corrida con fecha y hora estampadas. Disponible en los ajustes generales.
- Se agregó la compactación automática de los archivos del modelo de tubería START-PROF (.ctp). Los archivos ahora son 10 veces más pequeños.
- Se mejoró significativamente la velocidad al abrir y/o guardar modelos grandes.
- Se agregaron nuevos tópicos en la Guía de Aplicación.



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Manual completo de verificación y validación. Se agregaron muchos ejemplos de verificación, y se compararon con cálculos manuales así como con otro software

START-PROF model 1848

START-PROF model - 320571

1.6 ASME B31.3 Appendix S (S302)
ASME B31.3-2018 Appendix S [S302] Model
Figure S302.1 Liffert Model

12.2 m (40 ft) 3.05 m (10 ft) 9.15 m (30 ft) 9.15 m (30 ft) 3.05 m (10 ft) 12.2 m (40 ft)

6.1 m (20 ft)

START-PROF model

START-PROF model NRG1

START-PROF model NRG4-1

CAESAR II model 1848

CAESAR II model - 320571

CAESAR II model

PASS
START-PROF
Pipe Stress Analysis Software
VERIFICATION AND VALIDATION MANUAL
Version 4.04
July 2020



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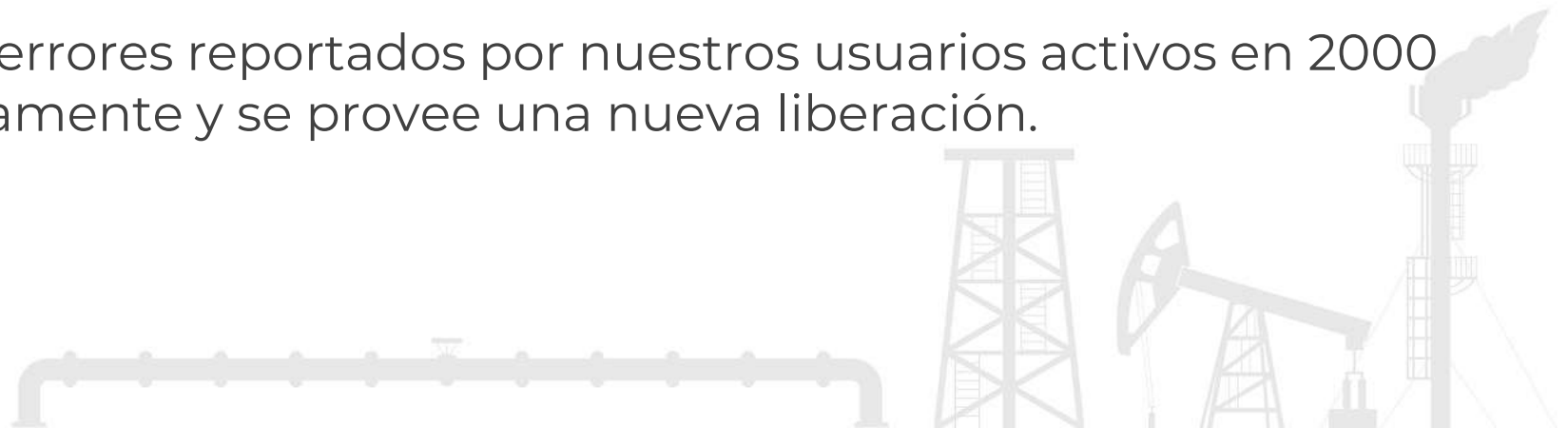
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Cada nueva versión de PASS/START-PROF es

- Verificada automáticamente en más de 300 ejemplos con versiones previas (Sistema de aseguramiento de Calidad)
- Verificada manualmente por un grupo de expertos en análisis de esfuerzos en la tubería (testers)
- Cada versión pasa por 1 a 3 entrenamientos de análisis de esfuerzos en la tubería con 10 a 20 estudiantes antes de su liberación oficial.
- Tras la liberación, todos los errores reportados por nuestros usuarios activos en 2000 empresas se reparan rápidamente y se provee una nueva liberación.



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PASS/Start-Prof | Nuevas Funciones

Suscríbese al canal de YouTube, encontrará muchos vídeos de entrenamiento en PASS/START-PROF

www.youtube.com/passuite

The screenshot shows the YouTube channel page for PASS, which has 716 subscribers. The page is organized into a grid of video uploads. The navigation bar includes links for HOME, VIDEOS, PLAYLISTS, CHANNELS, DISCUSSION, and ABOUT. The video thumbnails are arranged in four rows of six. Each thumbnail includes a video preview, a title, and view/viewer information. The videos cover various topics related to piping and equipment analysis, such as overview webinars, import tutorials, and specific analysis techniques.

Video Title	Views	Time Ago
PASS/EQUIP Overview Webinar: Comprehensive...	124 views	4 days ago
PASS/START-PROF Overview Webinar: Your software for...	334 views	2 months ago
PASS/Equip Nozzle-FEM Overview Webinar: Powerful...	135 views	2 months ago
How to Import piping model from CADWorx to START-...	193 views	2 months ago
How to Import piping model from CADWorx to START-...	119 views	2 months ago
PASS/HYDROSYSTEM Overview Webinar...	239 views	3 months ago
PASS/START-PROF was used for 2022 Winter Olympic...	162 views	4 months ago
Beijing Universal Amusement Park Buried Hot Water Pipin...	261 views	4 months ago
PASS/START-PROF Overview Webinar: Your software for...	196 views	5 months ago
New START-PROF option: Import from Autodesk Revit	370 views	6 months ago
18 How to calculate the 'sturry' flow in Hydrosystem	111 views	9 months ago
17 How to calculate the gas liquid liquid flow in...	134 views	9 months ago
How to import PCF file to START PROF	366 views	1 year ago
How to run PASS/START PROF Trial	1.3K views	1 year ago
Pipe Stress Analysis From Water Hammer Loads	2.2K views	1 year ago
Creating a Simple Piping Model Tutorial in START-...	1K views	1 year ago
CAESAR II Convergence Issue (2019 training) Piping...	5K views	1 year ago
Big Piping Model Analysis Tutorial with PASS/START-...	1.4K views	1 year ago
GRP / GRE / FRP Piping Stress Analysis Tutorial usl...		
HDPE Piping Stress Analysis Tutorial With PASS/START-...		
HDPE Piping Stress Analysis With PASS/START-PROF...		
Two-way integration between PASS/Start-Prof Pipe Stress...		
16 Interface between Hydrosystem and START-...		
Buried Piping/Pipelines Stress Analysis with...		



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Configurations Comparison

Code	Complete Advanced	Process Advanced	Power Advanced	Complete Standard (40% discount)	Process Standard (40% discount)	Power Standard (40% discount)	HDPE+FRP (40% discount)
ISO 14692	✓	✓	✓				✓
HDPE Piping	✓	✓	✓				✓
ASME B31.1	✓		✓	✓		✓	
ASME B31.3	✓	✓		✓	✓		
ASME B31.4	✓	✓		✓	✓		
ASME B31.5	✓	✓	✓	✓	✓	✓	
ASME B31.8	✓	✓		✓	✓		
ASME B31.9	✓	✓	✓	✓	✓	✓	
EN 13480	✓	✓	✓	✓	✓	✓	
GB 50316	✓	✓	✓	✓	✓		
GB/T 20801	✓	✓		✓	✓		
GB 50251	✓	✓		✓	✓		
GB 50253	✓	✓		✓	✓		
DL/T 5366	✓		✓	✓		✓	
CJJ/T 81	✓		✓				
RD 10-249-98	✓		✓				
GOST R 55596	✓		✓				
GOST 32388	✓	✓					
SNIP 2.05.06-85	✓	✓					
SP 36.13330	✓	✓					



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