UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

FACULTAD DE INGENIERÍA

"ANÁLISIS Y DISEÑO DE UNA TORRE AUTOSOPORTADA DE COMUNICACIÓN"

T E S I S :
QUE PARA OBTENER EL TÍTULO DE :

INGENIERO CIVIL

P R E S E N T A :

OSCAR GARCÍA SEGURA

D I R E C T O R D E T E S I S :

M.I. CARLOS MONTOYA BELTRÁN

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VERSIDAD NACIONAL AVENMA DE MEXICO

FACULTAD DE INGENIERIA
DIRECCION
FING/DCTG/SEAC/UTIT/076/01

Señor
OSCAR GARCIA SEGURA
Presente

En atención a su solicitud me es grato hacer de su conocimiento el tema que propuso el profesor **M.I. CARLOS MONTOYA BELTRAN**, que aprobó esta Dirección, para que lo desarrolle usted como tesis de su examen profesional de **INGENIERO CIVIL.**

"ANÁLISIS Y DISEÑO DE UNA TORRE AUTOSOPORTADA DE COMUNICACIÓN"

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Ruego a usted cumplir con la disposición de la Dirección General de la Administración Escolar en el sentido de que se imprima en lugar visible de cada ejemplar de la tesis el Título de ésta.

Asimismo le recuerdo que la Ley de Profesiones estipula que deberá prestar servicio social durante un tiempo mínimo de seis meses como requisito para sustentar Examen Profesional.

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EL DIRECTOR

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ING. CARLOS A. MONTOYA BELTRÁN
Presente.

El señor **OSCAR GARCIA SEGURA** de la carrera de **INGENIERO CIVIL**, me ha solicitado designar al profesor que le señale Tema de Tesis para su Examen Profesional.

En atención a esa solicitud ruego a usted se sirva formular el Tema solicitado y enviarlo a esta Dirección para comunicarlo oficialmente al interesado.

Doy a usted de antemano las más cumplidas gracias por su atención y le reitero las seguridades de mi consideración más distinguida.

Atentamente
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Dedicatoria.

Este trabajo representa la culminación del logro más valioso y trascendente de mi vida, es por esto que deseo dedicarlo:

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José de Jesús García Sandoval.

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“ANÁLISIS Y DISEÑO DE UNA TORRE AUTOSOPORTADA DE COMUNICACIÓN”.

ÍNDICE.

Introducción.

a) Objetivos.

En este trabajo se presentarán las bases y criterios de diseño estructural para una torre de comunicación de tipo autosoportada, el material de dicha estructura será acero, y su sección en planta será triangular. Esto se llevará a cabo, sin perder de vista que la estructura sea segura y también que resulte lo más económica posible, logrando su óptima funcionalidad.

b) Antecedentes.

Las torres de comunicación son estructuras diseñadas para soportar antenas emisoras y/o receptoras de señal, que sirven para la comunicación celular, telecomunicación, radiocomunicación, etc. Normalmente se localizan en zonas montañosas, aunque también es común encontrarlas dentro de las ciudades.

En cuanto a torres existen dos tipos:

a)Torres arriostradas. (Fig. a. 1.).
b)Torres autosoportadas. (Fig. b. 1.).

a)Torres arriostradas.

Las torres arriostradas son aquellas que como su nombre lo indica, se encuentran arriostradas en toda su longitud o altura, por cables de acero tensados y anclados a la superficie del terreno o estructuras existentes, esto es con el fin de que la torre tenga la rigidez necesaria que evite grandes deflexiones, que podrían ocasionar que esta se colapse, ya que son estructuras muy esbeltas comparadas con las torres autosoportadas.

Por otro lado, este tipo de estructuras son más económicas que las autosoportadas, aunque para su instalación se requiere de terrenos de mayor dimensión, esto provoca en ocasiones la necesidad de valorar el costo del terreno contra el costo de una torre autosoportada.

En cuanto a su mantenimiento las torres arriostradas son menos seguras que las torres autosoportadas, ya que cuando se realiza el cambio de algún elemento estructural, se deben tener los cuidados necesarios, o de lo contrario la torre podría venirse abajo. Además se requiere un mayor mantenimiento preventivo en el retensado de cables y sustitución de los mismos, así como la revisión periódica en cuanto a su verticalidad

Los tamaños comúnmente diseñados son de (12m), (24m), (30m), (36m), (42m) y (48m). Así mismo en cuanto a los diseños extraordinarios podemos encontrar alturas desde (72m) hasta en algunos casos de (300m). Estas alturas extraordinarias se pueden alcanzar debido a que este tipo de estructuras resultan ser de mayor economía.

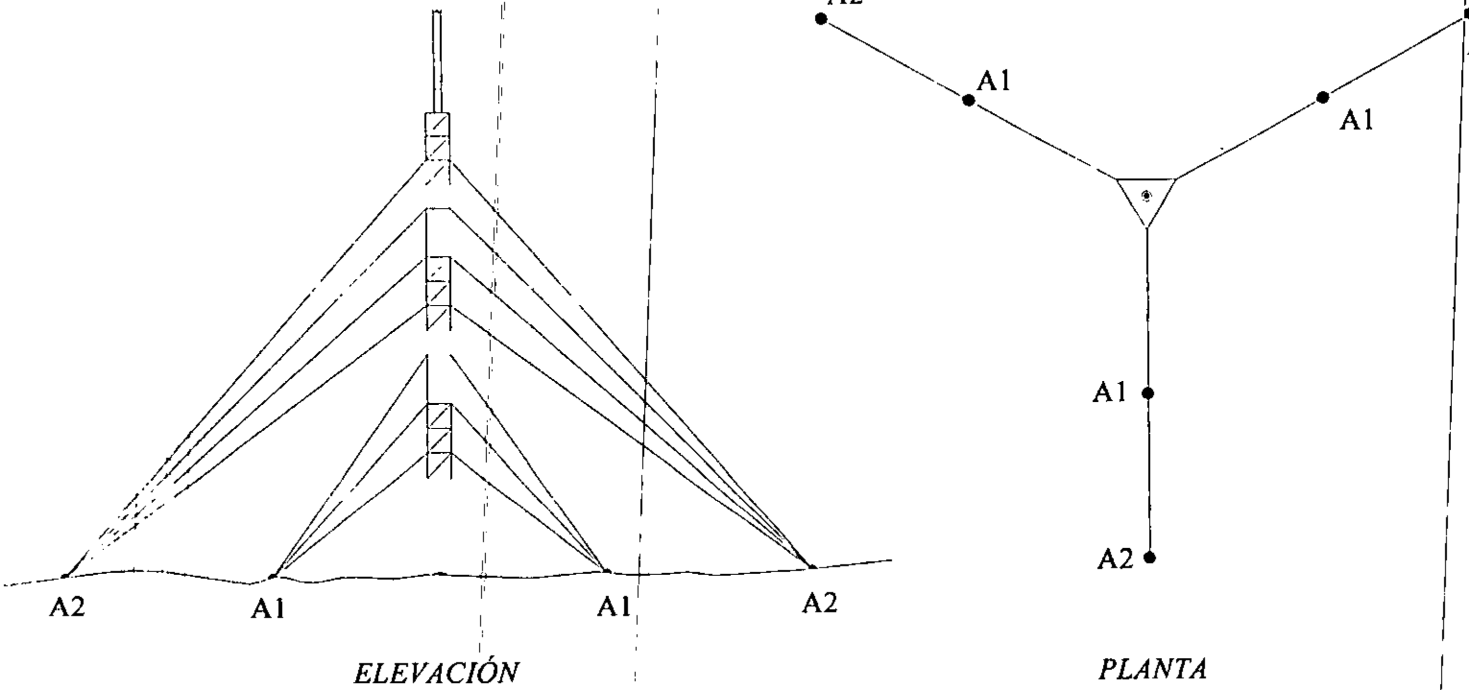


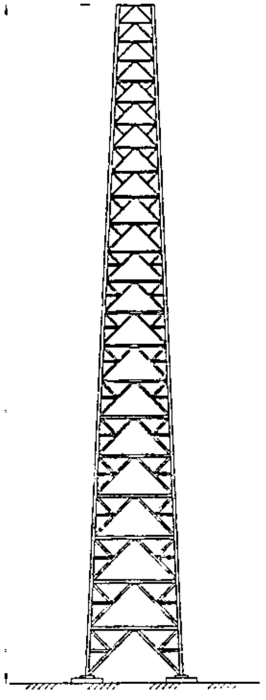
Fig. a. 1. Torre Arriostrada.

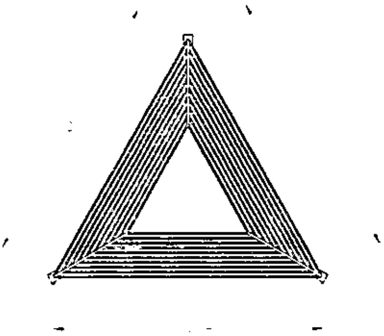
b)Torres autosoportadas.

Las torres autosoportadas son aquellas que como su nombre lo menciona, se soportan así mismas. Estas estructuras tienden a ser anchas en su parte inferior, pueden ser de sección variable, siendo delgadas en su parte superior o bien de sección recta.

Las torres autosoportadas resultan ser más costosas que las torres arriostradas debido a su conformación física y también a que están en posibilidades de soportar mayor carga.

Los tamaños comúnmente diseñados pueden variar desde (12m) hasta (72m). Así mismo en cuanto a los diseños extraordinarios podemos encontrar alturas desde (80m) hasta (150m).





PLANTA

ELEVACIÓN

Fig. b. 1. Torre Autosoportada.

c) Definiciones.

A continuación se ilustran los elementos estructurales de una torre autosoportada.

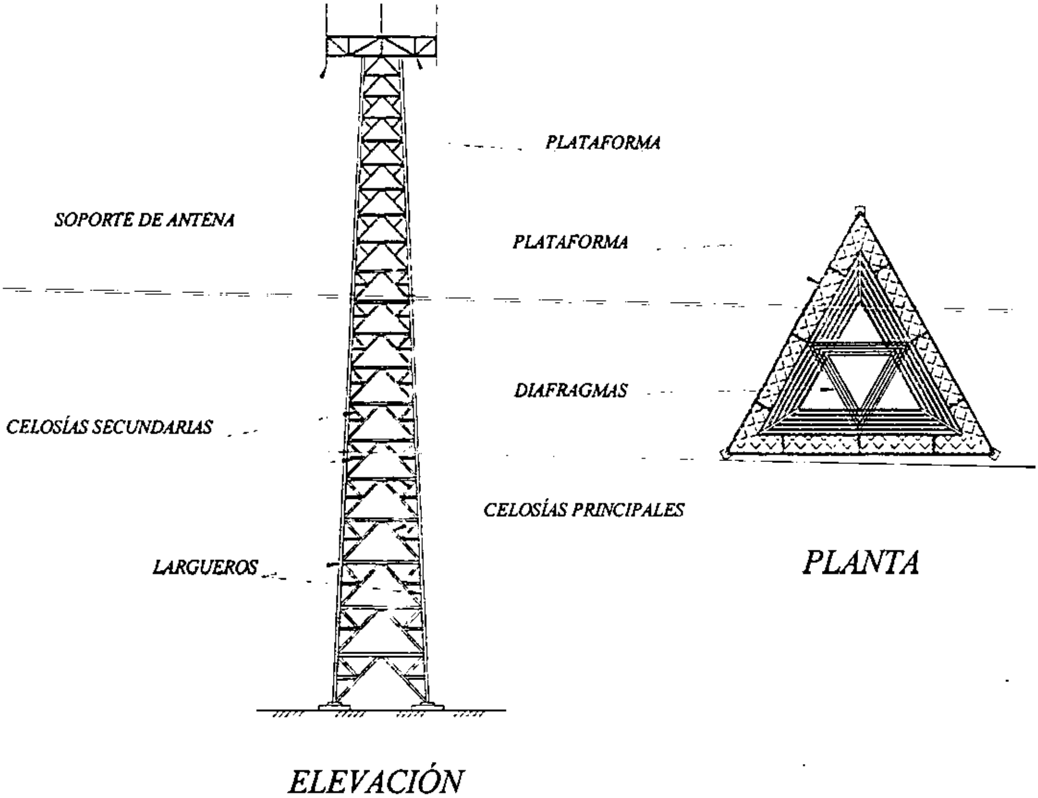


Fig. c. 1. Elementos de una torre autosoportada

Donde:

- Los largueros son los soportes principales de la estructura (columnas).
- Las celosías principales son los elementos que unen a los largueros y se encargan de dar rigidez a la torre.
- Las celosías secundarias dan refuerzo a los segmentos de largueros y a celosías principales, evitando que estos se pandeen.
- Las plataformas sirven para la instalación de equipo que generalmente es de comunicación celular.
- Los diafragmas contrarrestan los efectos de torsión en la estructura.

Las cargas sobre las torres pueden variar, dependiendo del uso o funcionamiento de las torres y del tipo de antena que se coloque en estas, esto debido a que existen varios tipos de antenas. En la siguiente figura se muestran algunas:

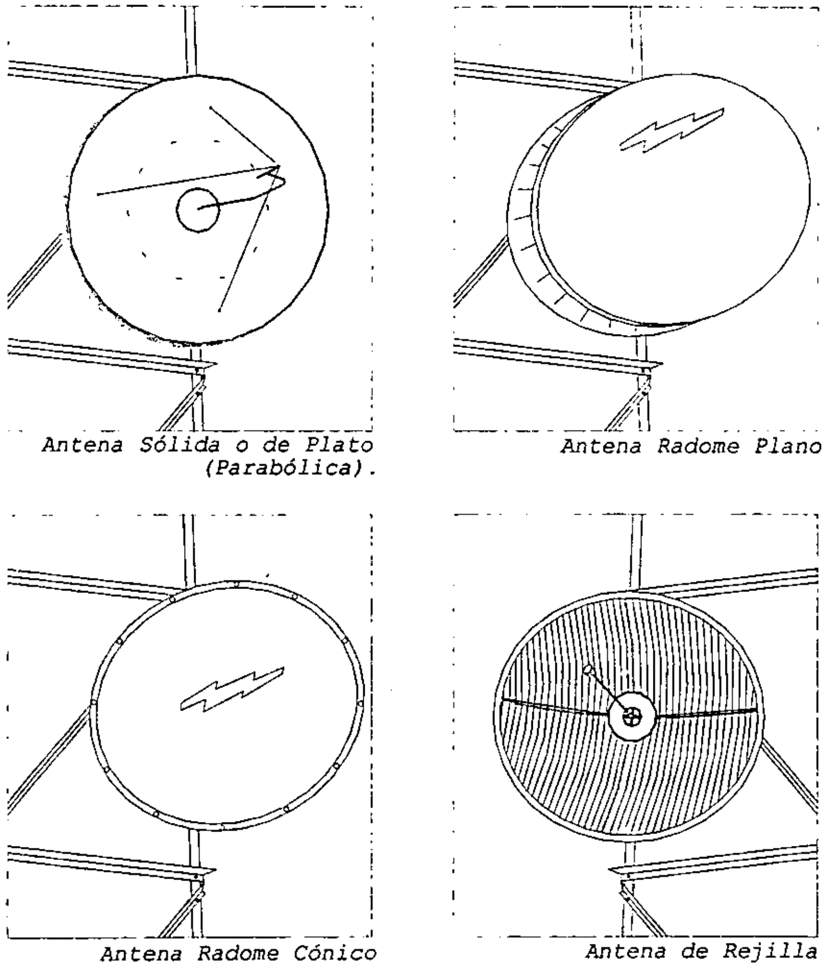


Fig. c. 2. Antenas.

Las antenas por su geometría, sufren un empuje debido al viento, siendo la *antena sólida o de plato* (antena parabólica) fig. c. 3, la que por su forma provoca mayores efectos sobre la torre. Los diámetros más comunes de esta son (0.6m), (1.20m), (2.40m), (3.20m) y (4.80m).

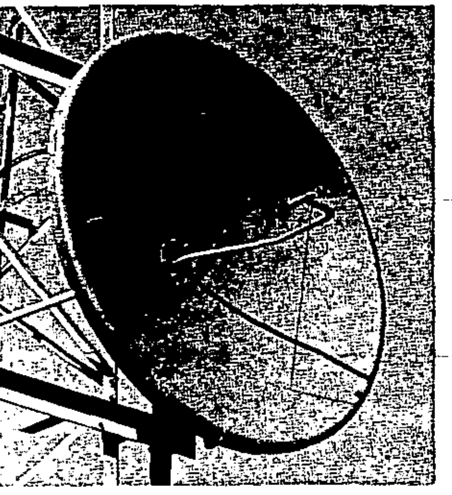


Fig. c. 3. Antena parabólica o de plato

Los efectos eólicos sobre las antenas son de diferentes magnitudes, dependiendo del tipo de antenas, por ejemplo: *antena sólida o de plato, radome plano, radome cónico y antena de rejilla.* Siendo la antena *sólida o de plato* la más afectada y la *antena de rejilla* la de menor impacto eólico.

I. Bases de diseño.

I. 1. Reglamentos y especificaciones.

Para el análisis por viento se tomó en cuenta el Manual de Diseño de Obras Civiles (Diseño por Viento), editado por la Comisión Federal de Electricidad (C. F. E.) en Octubre de 1993.

Así mismo para el análisis sísmico se consideró el Manual de Diseño de Obras Civiles (Diseño por Sismo), editado por la Comisión Federal de Electricidad (C. F. E.) en Octubre de 1993.

Para el estudio de fuerzas de viento sobre las antenas se consideraron las normas siguientes: Structural Standards for Steel Antenna Towers and Antenna Supporting Structures de junio de 1996, revisadas por la TIA (Telecommunications Industry Association) y EIA (Electronic Industries Association).

Para el diseño de la estructura, tanto de elementos principales como de conexiones se utilizó el American Institute of Steel Constructions (AISC, Novena Edición).

El proyecto se encuentra apegado al Reglamento de Construcciones del Departamento del Distrito Federal de 1987.

En tanto que para la cimentación se consideraron las Normas Técnicas Complementarias para Diseño y Construcción de Estructuras de Concreto así como las Normas Técnicas Complementarias para Diseño y Construcción de Cimentaciones.

I. 2. Materiales empleados.

Los materiales utilizados en este proyecto son:

Acero estructural A – 36 (36 000 lb/plg^2) con un esfuerzo de fluencia (fy) de 2530 kg/cm^2 y módulo de elasticidad (Es) de 2 100 000 kg/cm^2

Concreto de clase 1, con resistencia a la compresión (f'c) a los 28 días de edad de 350 Kg/cm^2

El módulo de elasticidad será igual a:

$$Ec = 14000 \sqrt{f'c} \quad kg/cm^2$$

$$Ec = 261916 \quad kg/cm^2$$

Acero de refuerzo con un esfuerzo de fluencia (fy) de 4200 kg/cm^2 y módulo de elasticidad (Es) de 2 100 000 kg/cm^2.

II. Cargas o acciones permanentes, variables y accidentales.

La torre se diseñará con base en las siguientes acciones:

1) Carga muerta (permanente): Es el peso propio de la estructura incluyendo además el peso de antenas y equipos instalados sobre la torre.

2) Carga viva (variable): Es el peso de las personas y herramientas que se encontrarán en la estructura; ya sea instalando antenas o dando mantenimiento a estas y/o a la estructura.

3) Acciones eólicas (accidentales): Son las fuerzas del viento incidentes sobre la estructura y antenas.

4) Acciones sísmicas (accidentales): Son las fuerzas provocadas por movimientos telúricos, a las cuales puede someterse la estructura.

5) Es importante mencionar que la torre puede estar sometida a grandes cambios de temperatura o cargas adicionales como granizo y nieve, esto dependerá principalmente de la ubicación de la estructura.

Figura: II. 1. Torre expuesta a las acciones de nieve.

II. 1. Análisis por viento.

Para determinar las acciones ejercidas por el viento, es necesario definir que tipo de análisis se requiere; este análisis puede ser estático o dinámico, dependiendo principalmente de la rigidez y geometría de la estructura, además de las características topográficas, regionales y locales del sitio.

Para la determinación de las acciones de diseño es necesario realizar las clasificaciones y pasos siguientes:

II. 1. 1. Clasificación de la estructura según su importancia.

La seguridad necesaria para que una construcción cumpla con las funciones a las cuales fue destinada puede establecerse por niveles, dichos niveles se asocian con velocidades del viento que tengan una probabilidad de ser excedidas y a partir de esta se clasifican a las estructuras atendiendo al grado de seguridad aconsejable de la siguiente manera:

Grupo A

Estructuras en las que se recomienda un grado de seguridad elevado. Aquellas cuyo funcionamiento es imprescindible y deben continuar operando después de la ocurrencia de vientos fuertes tales como huracanes y esas que en caso de fallar causarían la pérdida de un número importante de vidas, altos perjuicios económicos y culturales. Algunos ejemplos son los hospitales, escuelas, estadios, museos, torres y postes de transmisión principal, inmuebles de telecomunicaciones, estaciones de bomberos, etc.

Grupo B

Estructuras en las que se recomienda un grado de seguridad moderado. Aquellas que en caso de fallar representan un bajo riesgo de pérdidas humanas y ocasionarían daños materiales de magnitud intermedia. Este es el caso de las plantas industriales, bodegas ordinarias, gasolineras, comercios, restaurantes, casas para habitación, hoteles, oficinas, etc.

Grupo C

Estructuras en las que se recomienda un bajo grado de seguridad. Son aquellas cuya falla no implica graves consecuencias. Es el caso de bodegas provisionales, cimbras, carteles, muros aislados, bardas no mayores a 2.5 m de altura, etc.

II. 1. 2. Clasificación de la estructura según su respuesta.

De acuerdo con la sensibilidad de las construcciones ante los efectos de las ráfagas de viento y a su correspondiente respuesta dinámica, las estructuras se clasifican en cuatro tipos.

Tipo 1

Estructuras poco sensibles a las ráfagas y a los efectos dinámicos del viento. Son aquellas en que la relación de aspecto λ, (definida como el cociente entre la altura y la dimensión menor en planta), es menor o igual a cinco y cuyo período natural de vibración es menor o igual a un segundo. Pertenecen a este tipo, bodegas, naves industriales, teatros, auditorios, puentes cortos, viaductos, casas habitación, etc.

Tipo 2

Estructuras que por su alta relación de aspecto λ, o también por sus dimensiones reducidas en su sección transversal, son especialmente sensibles a las ráfagas de viento de corta duración (entre 1 y 5 segundos) y cuyos períodos naturales largos favorecen la ocurrencia de oscilaciones importantes en la dirección del viento. Dentro de este tipo se encuentran las estructuras con relación de aspecto λ, mayor que cinco o con período fundamental mayor que un segundo. Se incluyen las torres de celosía atirantadas y las autosoportadas para líneas de transmisión, chimeneas, tanques elevados, antenas, bardas, anuncios, etc.

Tipo 3

Estructuras que además de reunir las características del Tipo 2, presentan oscilaciones importantes transversales al flujo del viento provocadas por la aparición periódica de vórtices o remolinos. En este tipo se incluyen las construcciones cilíndricas o prismáticas esbeltas, como chimeneas, arbotantes para iluminación, tuberías exteriores o elevadas, etc.

Tipo 4

Estructuras que por su forma o por lo largo de sus períodos de vibración presentan problemas aerodinámicos especiales. Entre ellas se hallan las formas aerodinámicamente inestables como cables de línea de transmisión, tuberías colgantes, antenas parabólicas, grandes puentes, etc.

II. 1. 3. Clasificación del terreno según su rugosidad.

Para determinar la categoría del terreno, se tiene que clasificar conforme a su rugosidad.

Categoría	Descripción	Ejemplos	Limitaciones
1	Terreno abierto, prácticamente plano y sin obstrucciones. *(No rugoso).*	Franjas costeras planas, zonas de pantanos, campos aéreos, pastizales y tierras de cultivo sin setos o bardas alrededor. Superficies nevadas planas.	La longitud mínima de este tipo de terreno en la dirección del viento debe ser de (2000m) o 10 veces la altura de la construcción por diseñar, la que sea mayor.
2	Terreno plano u ondulado con pocas obstrucciones. *(Poco rugoso).*	Campos de cultivo o granjas con pocas obstrucciones tales como setos o bardas alrededor, árboles y construcciones dispersas.	Las obstrucciones tienen alturas de 1.5 a (10m), en una longitud mínima de (1500m).
3	Terreno cubierto por numerosas obstrucciones estrechamente espaciadas. *(Rugoso).*	Áreas urbanas, suburbanas y de bosque, o cualquier terreno con numerosas obstrucciones estrechamente espaciadas. El tamaño de las construcciones corresponde al de las casas y viviendas.	Las obstrucciones presentan alturas de 3 a (5m). La longitud mínima de este tipo de terreno en la dirección del viento debe ser de (500m) ó 10 veces la altura de la construcción, la que sea mayor.
4	Terreno con numerosas obstrucciones largas, altas y estrechamente espaciadas. *(Muy rugoso).*	Centros de grandes ciudades y complejos industriales bien desarrollados.	Por lo menos el 50% de los edificios tiene una altura mayor que (20m). Las obstrucciones miden de (10 a 30m) de altura. La longitud mínima de este tipo de terreno en la dirección del viento debe ser la mayor entre (400m) y 10 veces la altura de la construcción.

Tabla. II. 1. 1.

II. 1. 4. Clasificación de la estructura según su tamaño.

Clase A

Todo elemento de recubrimiento de fachadas, de ventanerías y de techumbres y sus respectivos sujetadores. Todo elemento estructural aislado, expuesto directamente a la acción del viento. Así mismo, todas las construcciones cuya mayor dimensión, ya sea horizontal o vertical, sea menor que 20m.

Clase B

Todas las construcciones cuya mayor dimensión, ya sea horizontal o vertical, varíe entre 20 y 50m.

Clase C

Todas las construcciones cuya mayor dimensión, ya sea horizontal o vertical, sea mayor que 50m.

II. 1. 5. Determinación de la velocidad de diseño.

$$V_D = F_T\, F_\alpha\, V_R \qquad (km/h)$$

En donde:

F_T es un factor que depende de la topografía del sitio, adimensional.(Tabla II. 1. 2.).

F_α es el factor que toma en cuenta el efecto combinado de las características de exposición locales, del tamaño de la construcción y de la variación de la velocidad con la altura, adimensional. (Tablas II. 1. 3. y II. 1. 4.).

V_R es la velocidad regional que le corresponde al sitio en donde se construirá la estructura, en km/h. (Tabla. II. 1. 5.).

- Factor de topografía, F_T

  Este factor toma en cuenta el efecto topográfico local del sitio en donde desplantará la estructura.

Sitios	Topografía	F_T
Protegidos	Base de promontorios y faldas de serranías del lado de sotavento	0.8
	Valles cerrados	0.9
Normales	Terreno prácticamente plano, campo abierto, ausencia de cambios topográficos importantes, con pendientes menores que 5%.	1.0
Expuestos	Terrenos inclinados con pendientes entre 5 y 10%, valles abiertos y litorales planos.	1.1
	Climas de promontorios, colinas o montañas, terrenos con pendientes mayores que 10%, cañadas cerradas y valles que formen un embudo o cañón, islas.	1.2

Tabla. II. 1. 2.

- Factor de exposición, F_α

$$F_\alpha = F_C \, F_{rz}$$

En donde:

F_C es el factor que determina la influencia del tamaño de la construcción, adimensional. (Tabla II. 1. 3.). Para aplicar la tabla véase el inciso II. 1. 4.

F_{rz} es el factor que establece la variación de la velocidad del viento con la altura Z en función de la rugosidad del terreno de los alrededores, adimensional.

- Factor de tamaño, F_C

El factor de tamaño, F_C, es el que toma en cuenta el tiempo en el que la ráfaga de viento actúa de manera efectiva sobre una construcción de dimensiones dadas.

Considerando la clasificación de las estructuras según su tamaño, se puede obtener el factor de tamaño.

Clase de estructura	F_C
A	**1.00**
B	**0.95**
C	**0.90**

Tabla. II. 1. 3.

- Factor de rugosidad y altura, F_{rz}

Este factor establece la variación de la velocidad del viento con la altura Z. Dicha variación está en función de la categoría del terreno y del tamaño de la construcción.

Se obtiene de acuerdo con las siguientes expresiones:

$$F_{rz} = 1.56\left[\frac{10}{\delta}\right]^{\alpha} \qquad si \quad Z \le 10$$

$$F_{rz} = 1.56\left[\frac{Z}{\delta}\right]^{\alpha} \qquad si \quad 10 < Z < \delta$$

$$F_{rz} = 1.56 \qquad si \quad Z \ge \delta$$

En donde:

δ es la altura medida a partir del nivel del terreno de desplante, por encima de la cual la variación de la velocidad del viento no es importante y se puede suponer constante; a esta altura se le conoce como altura gradiente; δ y Z están dadas en metros.

α es el exponente que determina la forma de la variación de la velocidad del viento con la altura y es adimensional.

Los coeficientes α y δ están en función de la rugosidad del terreno y del tamaño de la construcción. En la tabla II. 1. 4. se consignan los valores que se recomiendan para estos coeficientes.

Categoría del Terreno	α			δ (m)
	Clase de estructura			
	A	B	C	
1	0.099	0.101	0.105	245
2	0.128	0.131	0.138	315
3	0.156	0.160	0.171	390
4	0.170	0.177	0.193	455

Tabla. II. 1. 4.

- Velocidad Regional, V_R

La velocidad regional del viento, es la máxima velocidad media probable de presentarse con un cierto período de recurrencia (conocido como período de retorno) en una zona o región determinada del país.

La velocidad regional se determina tomando en consideración tanto la localización geográfica del sitio de desplante de la estructura como su destino.

A continuación se presenta una tabla con las principales ciudades del país y sus correspondientes velocidades regionales para diferentes períodos de retorno (V_{10}, V_{50} y V_{200} son los períodos de retorno de 10, 50 y 200 años respectivamente), alturas sobre el nivel del mar y temperaturas medias anuales.

Ciudad	Velocidades (km/h).			A.S.N.M. (m).	Temp. media anual (°C).
	V_{10}	V_{50}	V_{200}		
Acapulco, Gro.	129	162	181	28	27.5
Aguascalientes, Ags.	118	141	160	1908	18.2
Campeche, Camp.	98	132	159	5	26.1
Cd. Guzmán, Jal.	101	120	132	1507	21.5
Cd. Juárez, Chih.	116	144	158	1144	17.1
Cd. Obregón, Son.	147	169	186	100	26.1
Cd. Victoria, Tamps.	135	170	197	380	24.1
Coatzacoalcos, Ver.	117	130	145	14	26.0
Colima, Col.	105	128	147	494	24.8
Colotlán, Jal.	131	148	161	1589	21.4
Comitán, Chis.	72	99	124	1530	18.2
Cozumel, Q. Roo.	124	158	185	10	25.5
Cuernavaca. Mor.	93	108	120	1560	20.9
Culiacán, Sin.	94	118	140	84	24.9
Chapingo, Edo. Méx.	91	110	126	2250	15.0
Chetumal, Q. Roo.	119	150	180	3	26.0
Chihuahua, Chih.	122	136	147	1423	18.7
Chilpancingo, Gro.	109	120	131	1369	20.0
Durango, Dgo.	106	117	126	1889	17.5
Ensenada, B.C.	100	148	190	13	16.7
Guadalajara, Jal.	146	164	176	1589	19.1
Guanajuato, Gto.	127	140	148	2050	17.9
Guaymas, Son.	130	160	190	44	24.9
Hermosillo, Son.	122	151	179	237	25.2
Jalapa, Ver.	118	137	152	1427	17.9
La Paz, B.C.	135	171	200	10	24.0
Lagos de Moreno, Jal.	118	130	141	1942	18.1
León, Gto.	127	140	148	1885	19.2
Manzanillo, Col.	110	158	195	8	26.6
Mazatlán, Sin.	145	213	240	8	24.1
Mérida, Yuc.	122	156	186	9	25.9
Mexicali, B.C.	100	149	190	1	22.2
México, D.F.	98	115	129	2240	23.4
Monclova, Coah.	123	145	159	591	21.6
Monterrey, N.L.	123	143	158	538	22.1
Morelia, Mich.	79	92	102	1941	17.6
Nvo. Casas Gdes, Chih.	117	134	148	1550	17.6
Oaxaca, Oax.	104	114	122	1550	20.6
Orizaba, Ver.	126	153	172	1284	19.0
Pachuca, Hgo.	117	128	137	2426	14.2
Parral de Hgo., Chih.	121	141	157	1661	17.7
Piedras Negras, Coah.	137	155	168	220	21.6
Progreso, Yuc.	103	163	198	8	25.4
Puebla, Pue.	93	106	117	2150	17.3

Ciudad	Velocidades (km/h).			A.S.N.M. (m).	Temp. media anual (°C).
	V_{10}	V_{50}	V_{200}		
Puerto Cortés, B.C.	*129*	*155*	*172*	*5*	*21.4*
Puerto Vallarta, Jal.	108	146	171	2	26.2
Querétaro, Qro.	103	118	131	1842	18.7
Río Verde, SLP.	84	111	130	987	20.9
Salina Cruz, Oax.	109	126	146	6	26.0
Saltillo, Coah.	111	124	142	1609	17.7
S. C. de la Casas, Chis.	75	92	105	2276	14.8
San Luis Potosí, SLP.	126	141	153	1877	17.9
S. la Marina, Tamps.	130	167	204	25	24.1
Tampico, Tamps.	129	160	193	12	24.3
Tamuín, SLP.	121	138	155	140	24.7
Tapachula, Chis.	90	111	132	182	26.0
Tepic, Nay.	84	102	115	915	26.2
Tlaxcala, Tlax.	87	102	113	2252	16.2
Toluca, Edo. Méx.	81	93	102	2680	12.7
Torreón, Coah.	136	168	193	1013	20.5
Tulancingo, Hgo.	92	106	116	2222	14.9
Tuxpan, Ver.	122	151	172	14	24.2
Tuxtla Gutiérrez, Chis.	90	106	120	528	24.7
Valladolid, Yuc.	100	163	198	8	26.0
Veracruz, Ver.	150	175	194	16	25.2
Villahermosa, Tab.	114	127	138	10	26.8
Zacatecas, Zac.	110	122	131	2612	13.5

Tabla. II. 1. 5.

II. 1. 6. Presión dinámica de base, q_Z.

Cuando el viento actúa sobre un obstáculo, genera presiones sobre su superficie que varían según la intensidad de la velocidad y la dirección del viento. La presión que ejerce el flujo del viento sobre una superficie plana perpendicular a él se denomina comúnmente *presión dinámica de base* y se determina con la siguiente ecuación:

$$q_z = 0.0048\, G\, V_D^{\,2}$$

en donde:

G es el factor de corrección por temperatura y por altura con respecto al nivel del mar, adimensional.

V_D es la velocidad de diseño, en km/h, definida en el inciso II. 1. 5.

q_Z es la presión dinámica de base a una altura Z sobre el nivel del terreno, en kg/m².

El factor de 0.0048 corresponde a un medio de la densidad del aire.

El valor de G se obtiene de la expresión:

$$G = \frac{0.392\,\Omega}{273 + \tau}$$

en donde:

Ω es la presión barométrica, en mm de Hg.

τ es la temperatura ambiental en °C.

En la tabla siguiente se presenta la relación entre los valores de la altitud (h_m) , en metros sobre el nivel del mar (msnm), y la presión barométrica (Ω).

Altitud (msnm).	**Presión barométrica (mm de Hg).**
0	760
500	720
1000	675
1500	635
2000	600
2500	565
3000	530
3500	495

Tabla II. 1. 6. Relación entre altitud y presión barométrica.
Podrá interpolarse en valores intermedios de altitud

- Análisis Estático

Los empujes medios que se evalúan con este procedimiento son aplicables al diseño de las estructuras pertenecientes al Tipo 1.

El método estático sólo puede usarse para diseñar estructuras o elementos estructurales poco sensibles a la acción turbulenta del viento. Esto se satisface cuando:

a) La relación H / D ≤ 5, en donde H es la altura y D la dimensión mínima de la base.

b) El período fundamental de la estructura es menor o igual que un segundo.

Los empujes dinámicos correspondientes a las estructuras Tipo 2 y 3 se determinan conforme al análisis dinámico.

- Análisis Dinámico.

Este procedimiento permite evaluar los empujes ocasionados por la interacción dinámica entre el flujo del viento y las estructuras, principalmente las pertenecientes a los Tipos 2 y 3 definidos en el inciso II. 1. 2.

En particular, este método deberá emplearse en el diseño de las estructuras que cumplan con alguna de las siguientes condiciones:

a) La relación H / D > 5, en donde H es la altura de la construcción y D la dimensión mínima de la base.

b) El período fundamental de la estructura es mayor que 1 segundo.

- Velocidad de diseño, V_D.

La velocidad de diseño se calculará como fue explicado en el inciso II. 1. 5. Sin embargo, para el análisis dinámico, el factor que considera el tamaño de la estructura Fc, y del cual es función el factor de exposición F_α, se tomará igual a uno.

- Presiones en la dirección del viento.

La presión total en la dirección del viento se calculará con la siguiente ecuación:

$$P_z = F_g \, C_a \, q_z$$

en donde:

F_g es el factor de respuesta dinámica debida a ráfagas, adimensional.

C_a es el coeficiente de arrastre que depende de la forma de la estructura, adimensional.

q_z es la presión dinámica de base en la dirección del viento, en kg/m², a una altura Z, en m, sobre el nivel del terreno.

- Fuerzas en la dirección del viento.

Las fuerzas generadas en la dirección del viento sobre las estructuras prismáticas de los Tipos 2 y 3, se calcularán multiplicando la presión P_z por el área A_z, en m².

La fuerza total F sobre la estructura, en kg, resultará de sumar cada una de las fuerzas que actúan sobre el área expuesta de la estructura o parte de ella, a una altura z dada.

$$F = \sum F_z = \sum P_z \; A_z$$

El momento de volteo máximo de diseño se determinará mediante la suma de los momentos producidos por cada una de las fuerzas F_z.

- Factor de respuesta dinámica debida a ráfagas.

A fin de calcular la fuerza de diseño en la dirección del viento, para las estructuras Tipos 2 y 3 se considerarán dos componentes: uno llamado medio debido a la acción media del viento asociada a un lapso de promediación de 3 segundos, y otro dinámico, caracterizado por el valor pico de la acción del viento. Estos dos componentes se toman en cuenta implícitamente en el factor de respuesta dinámica debida a ráfagas.

En el diseño de construcciones del Tipo 2 y 3 se tomarán en cuenta los efectos dinámicos debidos a la turbulencia en la dirección del viento, utilizando el factor F_g, el cual se obtiene con la siguiente ecuación:

$$F_g = \frac{1}{g^2}\left[1 + g_P\left(\frac{\sigma}{\mu}\right)\right]$$

en donde:

g es un factor de ráfaga, variable con la altura Z, adimensional.

g_P es el factor pico o de efecto máximo de la carga por viento, adimensional.

σ/μ es la relación entre la desviación estándar (raíz cuadrada del valor cuadrático medio) de la carga por viento y el valor medio de la carga por viento, adimensional.

La variación del factor de ráfaga con la altura Z se calcula con las siguientes expresiones:

$$g = k'\left[\frac{10}{\delta}\right]^{\eta} \quad \text{si} \quad Z \le 10$$

$$g = k'\left[\frac{Z}{\delta}\right]^{\eta} \quad \text{si} \quad 10 < Z < \delta$$

$$g = k' \quad \text{si} \quad Z \ge \delta$$

En donde las variables k' y η, adimensionales, dependen de la rugosidad del sitio de desplante, y δ es la altura gradiente en m. Estas variables están definidas en la siguiente tabla:

Categoría	1	2	3	4
k'	1.224	1.288	1.369	1.457
η	-0.032	-0.054	-0.096	-0.151
δ	245	315	390	455

Tabla: II. 1. 7.

La relación σ / μ, que representa la variación de la carga debida a la turbulencia del viento, se calculará con:

$$\frac{\sigma}{\mu} = \sqrt{\frac{k_r}{C_{\alpha'}}\left(B + \frac{SE}{\zeta}\right)}$$

en donde:

k_r es un factor relacionado con la rugosidad del terreno:
Para terrenos con:

Categoría 1 = 0.06
Categoría 2 = 0.08
Categoría 3 = 0.10
Categoría 4 = 0.14

ζ es el coeficiente de amortiguamiento crítico:

Para construcciones formadas por:

Armaduras = 0.005
Marcos de acero = 0.01
Marcos de concreto = 0.02

B es el factor de excitación de fondo.

S es el factor de reducción por tamaño.

E es el factor que representa la relación de la energía de ráfaga con la frecuencia natural de la estructura.

$C_{\alpha'}$ es un factor que se define con las siguientes expresiones:

$$C_{\alpha'} = 3.46(F_T)^2\left[\frac{10}{\delta}\right]^{2\alpha'} \quad \text{si} \quad H \le 10$$

$$C_{\alpha'} = 3.46(F_T)^2\left[\frac{H}{\delta}\right]^{2\alpha'} \quad \text{si} \quad 10 < H < \delta$$

$$C_{\alpha'} = 3.46(F_T)^2 \quad \text{si} \quad H \ge \delta$$

en donde:

F_T es el factor de topografía.

δ es la altura gradiente, en m. (Tabla: II. 1. 7.).

H es la altura total de la construcción, en m.

α' es igual a 0.13, 0.18, 0.245 ó 0.31 para la categoría del terreno 1, 2, 3 ó 4, respectivamente.

Todas las variables que intervienen en la ecuación de σ/μ son adimensionales.

Los parámetros B, S, E y g_P, pueden calcularse con ayuda de las gráficas siguientes:

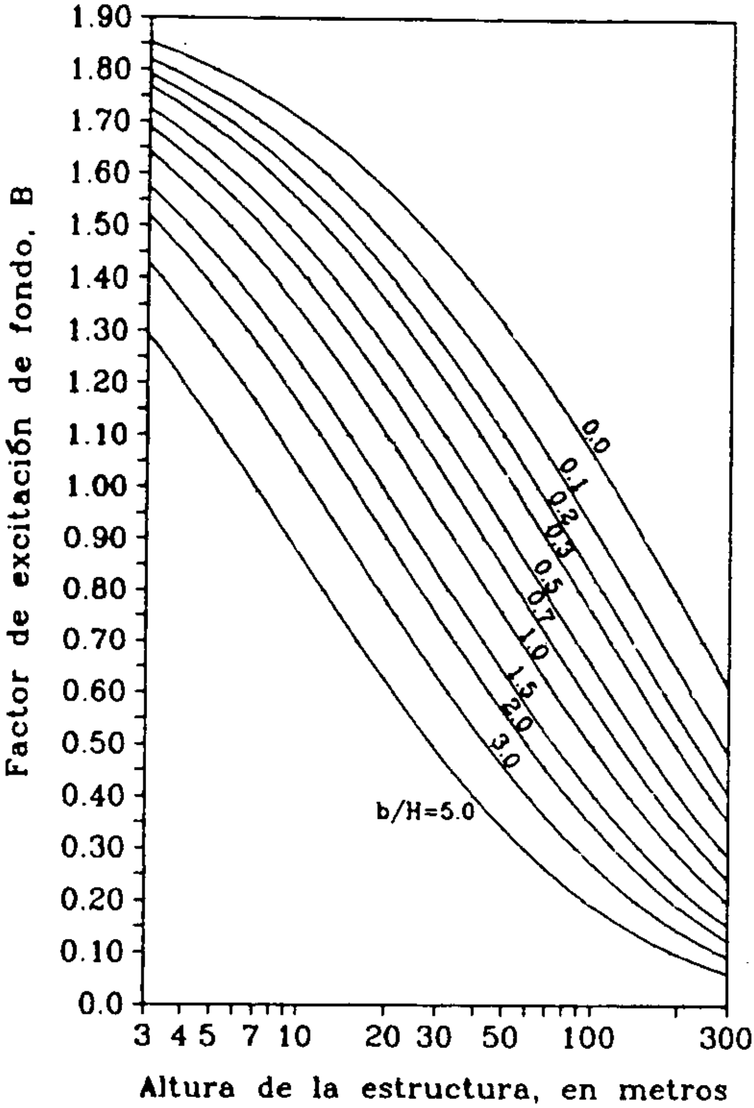


Figura: II. 1. 8. a. Parámetros que sirven
para calcular el factor de respuesta dinámica

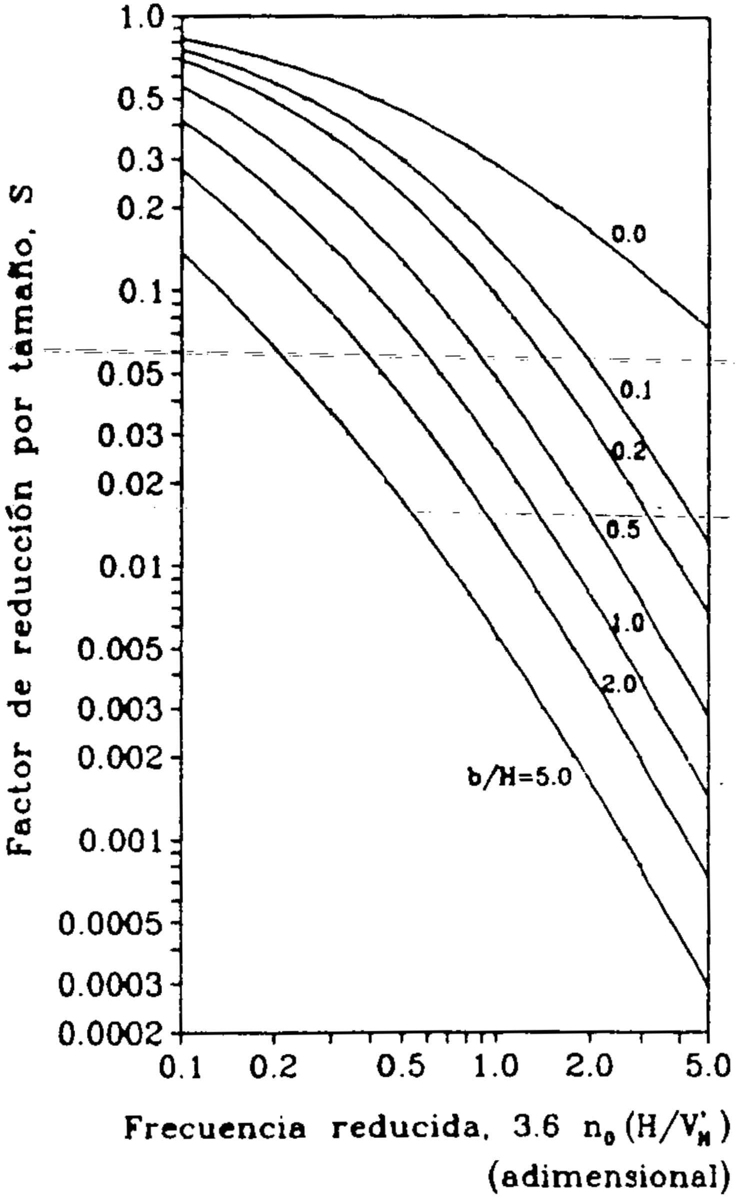


Figura: II. 1. 8. b. Parámetros que sirven para calcular el factor de respuesta dinámica

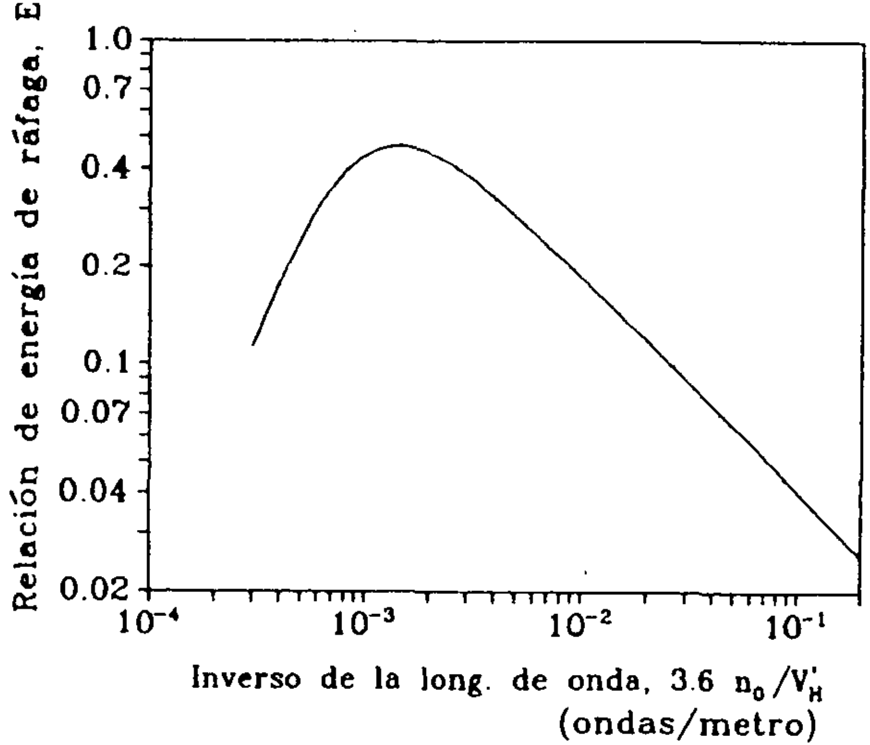


Figura: II. 1. 8. c. Parámetros que sirven para calcular el factor de respuesta dinámica

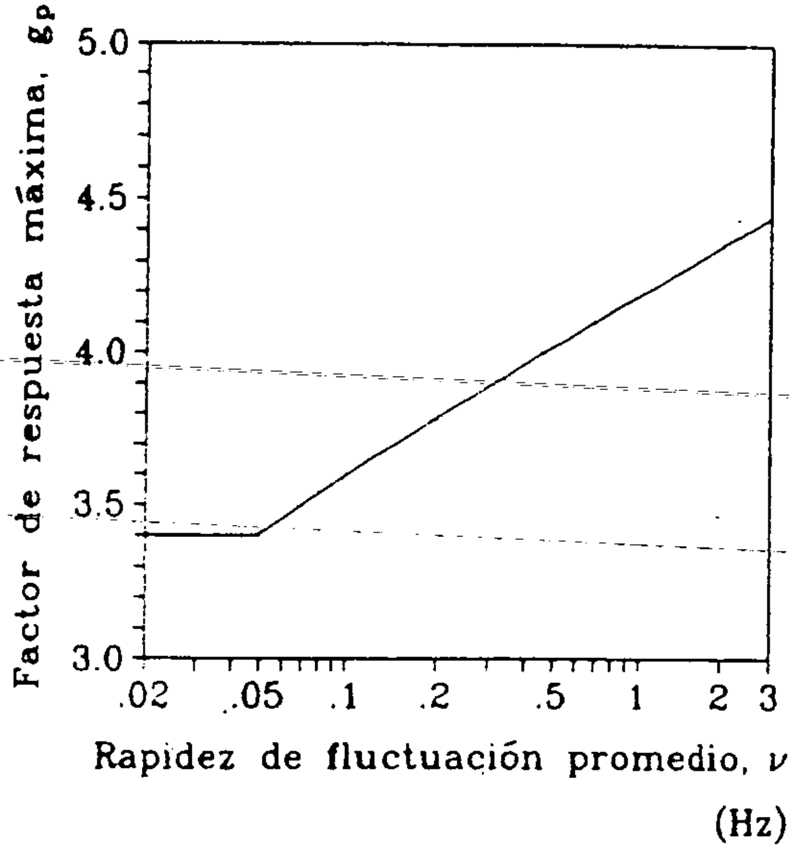


Figura: II. 1. 8. d. Parámetros que sirven para calcular el factor de respuesta dinámica

De las gráficas anteriores (II. 1. 8. a, b, c y d):

b/H es la relación entre el ancho b, y la altura H, de la construcción, ambos en metros y corresponden al lado de barlovento.

La relación (3.6 n_o H)/V'_H es la frecuencia reducida, adimensional.

en donde:

n_o es la frecuencia natural de vibración de la estructura, en Hz.

V'_H es la velocidad media de diseño del viento, en km/h. Dicha velocidad se calcula para la altura más elevada de la estructura, H, en m, y se determina mediante la ecuación siguiente:

$$V'_H = \frac{1}{g_H} V_H$$

en donde:

g_H es el factor de ráfaga y se calcula para Z = H.

V_H es la velocidad de diseño (V_D), para Z = H, en km/h.

Así mismo, en la figura II. 1. 8. c. aparece el número de ondas $(3.6\ n_o)/V'_H$, en ondas/metro, en donde n_o está en Hz. y V'_H en km/h, determinados en el párrafo anterior.

El factor de pico, g_P, figura (II. 1. 8. d), se obtiene en función del coeficiente de rapidez de fluctuación promedio ν, en Hz, el cual se define mediante:

$$\nu = n_o \sqrt{\frac{SE}{SE + \zeta B}}$$

Los términos que aparecen en esta fórmula, ya se establecieron con anterioridad.

- Fuerza de arrastre de diseño.

Para el viento que actúa sobre cualquier cara de la torre, la fuerza de arrastre de diseño deberá calcularse por medio de la ecuación siguiente:

$$F_a = C_a\ A_z\ q_z$$

en donde:

F_a es la fuerza de arrastre, en kg, que actúa paralelamente a la dirección del viento y es variable con la altura.

C_a es el coeficiente de arrastre en la dirección del flujo del viento, adimensional.

A_z es el área de los miembros de la cara frontal, a una altura Z, proyectada perpendicularmente a la dirección del viento, en m^2.

q_z es la presión dinámica de base del viento a la altura Z, en kg/m².

Los valores del coeficiente de arrastre C_a, para torres de celosía con diferentes arreglos se presentan en las siguientes tablas:

Solidez de la cara frontal (ϕ)	Coeficiente de arrastre (C_a)	
	Torres de sección cuadrada.	Torres de sección triangular equilátera.
0.1	3.5	3.1
0.2	2.8	2.7
0.3	2.5	2.3
0.4	2.1	2.1
≥0.5	1.8	1.9

Tabla: II. 1. 9. Coeficiente de arrastre C_a, para torres de celosía con sección transversal cuadrada o triangular equilátera con miembros de lados planos.

Solidez de la cara frontal (ϕ)	Coeficiente de arrastre (C_a)	
	Partes de la torre dentro del flujo subcrítico. $bV_D < 3m^2/s$ (Cualquier dirección del viento).	Partes de la torre dentro del flujo supercrítico. $bV_D \geq 6m^2/s$ (Cualquier dirección del viento).
0.05	1.8	1.1
0.1	1.7	1.1
0.2	1.6	1.1
0.3	1.5	1.1
0.4	1.5	1.1
≥0.5	1.4	1.2

Tabla: II. 1. 10. Coeficiente de arrastre C_a, para torres de celosía con sección transversal triangular equilátera con miembros de sección transversal circular.

Nota: En las tablas II. 1. 9. y II. 1. 10.

ϕ es la relación de solidez definida como el cociente entre el área sólida y el área total encerrada por la cara frontal.

b es el diámetro promedio de los elementos de sección circular, en metros.

V_D es la velocidad de diseño del viento, convertida a m/s.

Para valores intermedios de bV_D se permite la interpolación lineal.

II. 1. 7. Viento sobre antenas.

Las fuerzas que actúan sobre una antena parabólica son las siguientes:

La fuerza axial (F_A), actúa a lo largo del eje de la antena. La fuerza lateral (F_S), actúa perpendicularmente al eje de la antena en el plano del eje de la antena y el vector del viento. El momento torsionante (M), actúa en el plano que contiene a F_A y F_S.

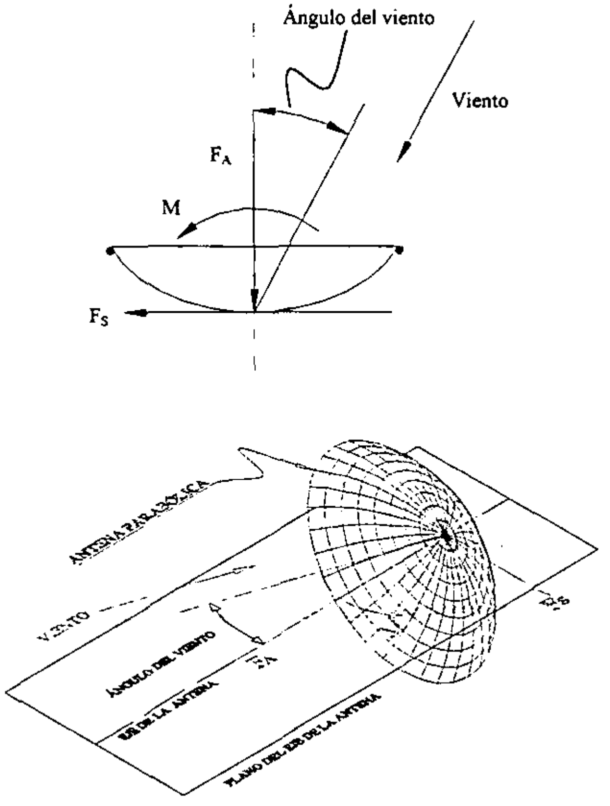


Fig. II. 1. 11. Fuerzas de viento sobre una antena parabólica, (vista en planta y 3D).

Las magnitudes F_A, F_S y M dependen de la presión dinámica del viento, el área de la proyección frontal de la antena y las características aerodinámicas de la propia antena. Las características aerodinámicas varían con el ángulo del viento. Los valores de F_A, F_S y M deberán calcularse con las siguientes ecuaciones:

$$F_A = C_A\ A\ K_Z\ G_H\ V^2 \quad \text{(lb)}$$

$$F_S = C_S\ A\ K_Z\ G_H\ V^2 \quad (lb)$$

$$M = C_M\ A\ D\ K_Z\ G_H\ V^2 \quad (ft\text{-}lb)$$

donde:

G_H es el factor de ráfaga.

Para estructuras de celosía, el factor de ráfaga deberá ser calculado de la siguiente manera:

$$G_H = 0.65 + \frac{0.60}{\left(\frac{h}{10}\right)^{1/7}} \quad \text{para h en metros}$$

$$G_H = 0.65 + \frac{0.60}{\left(\frac{h}{33}\right)^{1/7}} \quad \text{para h en pies}$$

$$1.00 \leq G_H \leq 1.25$$

h es la altura total de la estructura. (m ó ft).

A es el área de la parábola, (m^2 ó ft^2).

D es el diámetro de la parábola, (m ó ft).

V es la velocidad regional, (m/s ó mph).

K_Z es el factor de exposición con z igual a la altura deseada a partir del origen.

$$K_Z = \left(\frac{z}{10}\right)^{2/7} \quad \text{para z en metros}$$

$$K_Z = \left(\frac{z}{33}\right)^{2/7} \quad \text{para z en pies}$$

$$1.00 \leq K_Z \leq 2.58$$

z es la altura desde el nivel del piso hasta el punto medio de la sección deseada, (m ó ft).

C_A, C_S y C_M son coeficientes que a continuación se presentan:

Wind Force Coefficients for Typical Paraboloid Without Radome

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00397	0.00000	0.000000
10	0.00394	-0.00012	-0.000065
20	0.00396	-0.00013	-0.000097
30	0.00398	-0.00008	-0.000108
40	0.00408	0.00002	-0.000137
50	0.00426	0.00023	-0.000177
60	0.00422	0.00062	-0.000223
70	0.00350	0.00117	-0.000020
80	0.00195	0.00097	0.000256
90	-0.00003	0.00088	0.000336
100	-0.00103	0.00098	0.000338
110	-0.00118	0.00106	0.000343
120	-0.00117	0.00117	0.000366
130	-0.00120	0.00120	0.000374
140	-0.00147	0.00114	0.000338
150	-0.00198	0.00100	0.000278
160	-0.00222	0.00075	0.000214
170	-0.00242	0.00037	0.000130
180	-0.00270	0.00000	0.000000
190	-0.00242	-0.00037	-0.000130
200	-0.00222	-0.00075	-0.000214
210	-0.00198	-0.00100	-0.000278
220	-0.00147	-0.00114	-0.000338
230	-0.00120	-0.00120	-0.000374
240	-0.00117	-0.00117	-0.000366
250	-0.00118	-0.00106	-0.000343
260	-0.00103	-0.00098	-0.000338
270	-0.00003	-0.00088	-0.000336
280	0.00195	-0.00097	-0.000256
290	0.00350	-0.00117	0.000020
300	0.00422	-0.00062	0.000223
310	0.00426	-0.00023	0.000177
320	0.00408	-0.00002	0.000137
330	0.00398	0.00008	0.000108
340	0.00396	0.00013	0.000097
350	0.00394	0.00012	0.000065

Wind Force Coefficients for Typical Paraboloid With Radome

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00221	0.00000	0.000000
10	0.00220	0.00038	-0.000204
20	0.00210	0.00076	-0.000285
30	0.00195	0.00105	-0.000277
40	0.00170	0.00125	-0.000205
50	0.00140	0.00136	-0.000114
60	0.00107	0.00128	-0.000002
70	0.00080	0.00118	0.000130
80	0.00058	0.00112	0.000268
90	0.00034	0.00104	0.000390
100	0.00008	0.00100	0.000434
110	-0.00017	0.00095	0.000422
120	-0.00042	0.00089	0.000404
130	-0.00075	0.00082	0.000357
140	-0.00105	0.00078	0.000232
150	-0.00133	0.00070	0.000132
160	-0.00154	0.00058	0.000063
170	-0.00168	0.00038	0.000022
180	-0.00177	0.00000	0.000000
190	-0.00168	-0.00038	-0.000022
200	-0.00154	-0.00058	-0.000063
210	-0.00133	-0.00070	-0.000132
220	-0.00105	-0.00078	-0.000232
230	-0.00075	-0.00082	-0.000357
240	-0.00042	-0.00089	-0.000404
250	-0.00017	-0.00095	-0.000422
260	0.00008	-0.00100	-0.000434
270	0.00034	-0.00104	-0.000390
280	0.00058	-0.00112	-0.000268
290	0.00080	-0.00118	-0.000130
300	0.00107	-0.00128	0.000002
310	0.00140	-0.00136	0.000114
320	0.00170	-0.00125	0.000205
330	0.00195	-0.00105	0.000277
340	0.00210	-0.00076	0.000285
350	0.00220	-0.00038	0.000204

Wind Force Coefficients for Typical Paraboloid With Cylindrical Shroud

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00323	0.00000	0.000000
10	0.00323	0.00025	-0.000072
20	0.00320	0.00045	-0.000116
30	0.00310	0.00060	-0.000133
40	0.00296	0.00072	-0.000125
50	0.00278	0.00078	-0.000083
60	0.00242	0.00094	-0.000022
70	0.00172	0.00122	0.000058
80	0.00070	0.00149	0.000178
90	-0.00028	0.00160	0.000251
100	-0.00088	0.00154	0.000288
110	-0.00138	0.00136	0.000292
120	-0.00182	0.00112	0.000266
130	-0.00220	0.00080	0.000237
140	-0.00239	0.00059	0.000199
150	-0.00245	0.00045	0.000158
160	-0.00249	0.00038	0.000112
170	-0.00255	0.00025	0.000059
180	-0.00260	0.00000	0.000000
190	-0.00255	-0.00025	-0.000059
200	-0.00249	-0.00038	-0.000112
210	-0.00245	-0.00045	-0.000158
220	-0.00239	-0.00059	-0.000199
230	-0.00220	-0.00080	-0.000237
240	-0.00182	-0.00112	-0.000266
250	-0.00138	-0.00136	-0.000292
260	-0.00088	-0.00154	-0.000288
270	-0.00028	-0.00160	-0.000251
280	0.00070	-0.00149	-0.000178
290	0.00172	-0.00122	-0.000058
300	0.00242	-0.00094	0.000022
310	0.00278	-0.00078	0.000083
320	0.00296	-0.00072	0.000125
330	0.00310	-0.00060	0.000133
340	0.00320	-0.00045	0.000116
350	0.00323	-0.00025	0.000072

Wind Force Coefficients for Typical Grid Antenna Without Ice

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00137	0.00000	0.000000
10	0.00134	0.00026	0.000043
20	0.00130	0.00046	0.000074
30	0.00118	0.00059	0.000098
40	0.00104	0.00067	0.000115
50	0.00088	0.00070	0.000127
60	0.00060	0.00072	0.000135
70	0.00033	0.00070	0.000142
80	0.00010	0.00064	0.000126
90	-0.00013	0.00062	0.000111
100	-0.00030	0.00070	0.000120
110	-0.00048	0.00073	0.000129
120	-0.00068	0.00071	0.000131
130	-0.00086	0.00067	0.000127
140	-0.00104	0.00060	0.000114
150	-0.00122	0.00052	0.000095
160	-0.00140	0.00040	0.000070
170	-0.00150	0.00022	0.000038
180	-0.00152	0.00000	0.000000
190	-0.00150	-0.00022	-0.000038
200	-0.00140	-0.00040	-0.000070
210	-0.00122	-0.00052	-0.000095
220	-0.00104	-0.00060	-0.000114
230	-0.00086	-0.00067	-0.000127
240	-0.00068	-0.00071	-0.000131
250	-0.00048	-0.00073	-0.000129
260	-0.00030	-0.00070	-0.000120
270	-0.00013	-0.00062	-0.000111
280	0.00010	-0.00064	-0.000126
290	0.00033	-0.00070	-0.000142
300	0.00060	-0.00072	-0.000135
310	0.00088	-0.00070	-0.000127
320	0.00104	-0.00067	-0.000115
330	0.00118	-0.00059	-0.000098
340	0.00130	-0.00046	-0.000074
350	0.00134	-0.00026	-0.000043

Wind Force Coefficients for Typical Conical Horn Reflector Antenna

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00338	0.00000	0.00000
10	0.00355	0.00004	-0.00005
20	0.00354	0.00025	-0.00007
30	0.00345	0.00077	-0.00001
40	0.00335	0.00142	0.00009
50	0.00299	0.00181	0.00023
60	0.00235	0.00208	0.00035
70	0.00154	0.00237	0.00044
80	0.00059	0.00248	0.00046
90	-0.00020	0.00245	0.00040
100	-0.00062	0.00240	0.00032
110	-0.00088	0.00235	0.00030
120	-0.00147	0.00225	0.00032
130	-0.00225	0.00201	0.00027
140	-0.00289	0.00167	0.00021
150	-0.00323	0.00113	0.00014
160	-0.00367	0.00052	0.00007
170	-0.00375	0.00010	0.00003
180	-0.00356	0.00000	0.00000
190	-0.00375	-0.00010	-0.00003
200	-0.00367	-0.00052	-0.00007
210	-0.00323	-0.00113	-0.00014
220	-0.00289	-0.00167	-0.00021
230	-0.00225	-0.00201	-0.00027
240	-0.00147	-0.00225	-0.00032
250	-0.00088	-0.00235	-0.00030
260	-0.00062	-0.00240	-0.00032
270	-0.00020	-0.00245	-0.00040
280	0.00059	-0.00248	-0.00046
290	0.00154	-0.00237	-0.00044
300	0.00235	-0.00208	-0.00035
310	0.00299	-0.00181	-0.00023
320	0.00335	-0.00142	-0.00009
330	0.00345	-0.00077	0.00001
340	0.00354	-0.00025	0.00007
350	0.00355	-0.00004	0.00005

Wind Force Coefficients for Typical Passive Reflector

Wind Angle Θ (Deg)	C_A	C_S	C_M
0	0.00351	0.00000	0.000000
10	0.00348	0.00003	-0.000070
20	0.00341	0.00008	-0.000134
30	0.00329	0.00010	-0.000180
40	0.00309	0.00013	-0.000198
50	0.00300	0.00018	-0.000208
60	0.00282	0.00021	-0.000262
70	0.00178	0.00023	-0.000225
80	0.00071	0.00027	-0.000129
90	-0.00010	0.00030	0.000030
100	-0.00108	0.00035	0.000180
110	-0.00235	0.00039	0.000225
120	-0.00348	0.00036	0.000210
130	-0.00348	0.00029	0.000148
140	-0.00360	0.00023	0.000126
150	-0.00376	0.00019	0.000109
160	-0.00390	0.00012	0.000080
170	-0.00400	0.00008	0.000042
180	-0.00403	0.00000	0.000000
190	-0.00400	-0.00008	-0.000042
200	-0.00390	-0.00012	-0.000080
210	-0.00376	-0.00019	-0.000109
220	-0.00360	-0.00023	-0.000126
230	-0.00348	-0.00029	-0.000148
240	-0.00348	-0.00036	-0.000210
250	-0.00235	-0.00039	-0.000225
260	-0.00108	-0.00035	-0.000180
270	-0.00010	-0.00030	-0.000030
280	0.00071	-0.00027	0.000129
290	0.00178	-0.00023	0.000225
300	0.00282	-0.00021	0.000262
310	0.00300	-0.00018	0.000208
320	0.00309	-0.00013	0.000198
330	0.00329	-0.00010	0.000180
340	0.00341	-0.00008	0.000134
350	0.00348	-0.00003	0.000077

Tabla II. 1. 12. Coeficientes de fuerza de viento.

II. 2. Análisis sísmico.

Para llevar a cabo el análisis sísmico, es necesario tomar en cuenta las siguientes clasificaciones:

II. 2. 1. Clasificación de Construcciones según su destino.

Grupo A

Estructuras en que se requiere un grado de seguridad alto. Construcciones cuya falla estructural causaría la pérdida de un número elevado de vidas o pérdidas económicas o culturales de magnitud excepcionalmente alta. Algunos ejemplos son los hospitales, escuelas, estadios, museos, centrales telefónicas, estaciones de bomberos, sistemas de abastecimiento de agua potable, etc.

Grupo B

Estructuras en que se requiere un grado de seguridad intermedio. Construcciones cuya falla estructural ocasionaría pérdidas de magnitud intermedia. Este es el caso de naves industriales, estructuras comunes destinadas a vivienda u oficinas, hoteles, etc.

Grupo C

Estructuras en que es admisible un grado de seguridad bajo. Construcciones cuya falla estructural ocasionaría pérdidas de magnitud sumamente pequeñas y sin pérdida de vidas. Se incluyen bodegas provisionales y bardas con altura o mayor de 2.5 m.

II. 2. 2. Clasificación de Construcciones según su estructuración.

Atendiendo a las características estructurales que influyen en la respuesta sísmica de la estructura, las construcciones se clasifican según su estructuración:

Tipo 1

Estructuras de edificios: Estructuras comunes tales como edificios urbanos, naves industriales típicas, salas de espectáculos y estructuras semejantes, en que las fuerzas laterales se resisten en cada nivel por marcos continuos contraventeados o no, por diafragmas o muros o por combinación de diversos sistemas como los mencionados.

Tipo 2

Péndulos invertidos y apéndices: Péndulos invertidos o estructuras en que el 50% o más de su masa se halle en el extremo superior y tenga un solo elemento resistente en la dirección de análisis o una sola hilera de columnas perpendicular a esta. Estructuras tales como tanques, parapetos, pretiles, anuncios, ventanales, muros y revestimientos entre otros.

Tipo 3

Muros de retención.

Tipo 4

Chimeneas, silos y similares: Chimeneas y silos, o estructuras semejantes en que la masa y rigidez se encuentran distribuidas continuamente a lo largo de su altura y donde dominen las deformaciones por flexión.

Tipo 5

Tanques, depósitos y similares: Tanques elevados y depósitos superficiales, o estructuras semejantes destinadas al almacenamiento de líquidos que originan importantes fuerzas hidrodinámicas sobre el recipiente.

Tipo 6

Estructuras industriales: Estructuras fabriles en las que se requieren grandes áreas libres de columnas, dejando grandes claros libres entre sus ejes.

Tipo 7

Puentes.

Tipo 8

Tuberías.

Tipo 9

Presas.

Tipo 10

Otras estructuras.

II. 2. 3. Factor de comportamiento sísmico.

En la actualidad, la forma mas adecuada de caracterizar a las estructuras en función de su ductilidad consiste en el empleo del factor del comportamiento sísmico Q, el cual en realidad no sólo está asociado a la ductilidad estructural, sino también a la estructuración misma, al deterioro o efecto que puede llegar a contrarrestar gran parte de la capacidad extra en resistencia que suministra la ductilidad y a reservas de capacidad ante carga sísmica que los métodos convencionales de diseño no consideran.

Para el tipo de estructura manejada, el factor de comportamiento sísmico según el Manual de la C.F.E. (Diseño por Sismo) 1993, será:

$$Q = 2.$$

II. 2. 4. Factor reductivo por ductilidad.

Para diseñar se necesita considerar el comportamiento inelástico de la estructura, aunque sea de manera aproximada. Para ello las ordenadas espectrales se podrán reducir dividiéndolas entre el factor reductivo Q' a fin de obtener las fuerzas sísmicas reducidas por ductilidad. Para cualquier tipo de estructura el factor reductivo se calcula como sigue:

$$Q' = 1 + (Q - 1)\frac{T}{T_a}\ ; \quad \text{si} \quad T < T_a$$

$$Q' = Q \quad ; \quad \text{si} \quad T > T_a$$

donde:

T se tomará igual al período fundamental de vibración cuando se emplee en análisis estático e igual al período natural de vibración del modo que se considere cuando se emplee el análisis modal espectral.

T_a es el primer período característico del espectro de diseño.

II. 2. 5. Regionalización sísmica de la República Mexicana.

Con base en estudios de riesgo sísmico, se encontró que para fines de diseño sísmico, la República Mexicana se considera dividida en cuatro zonas.

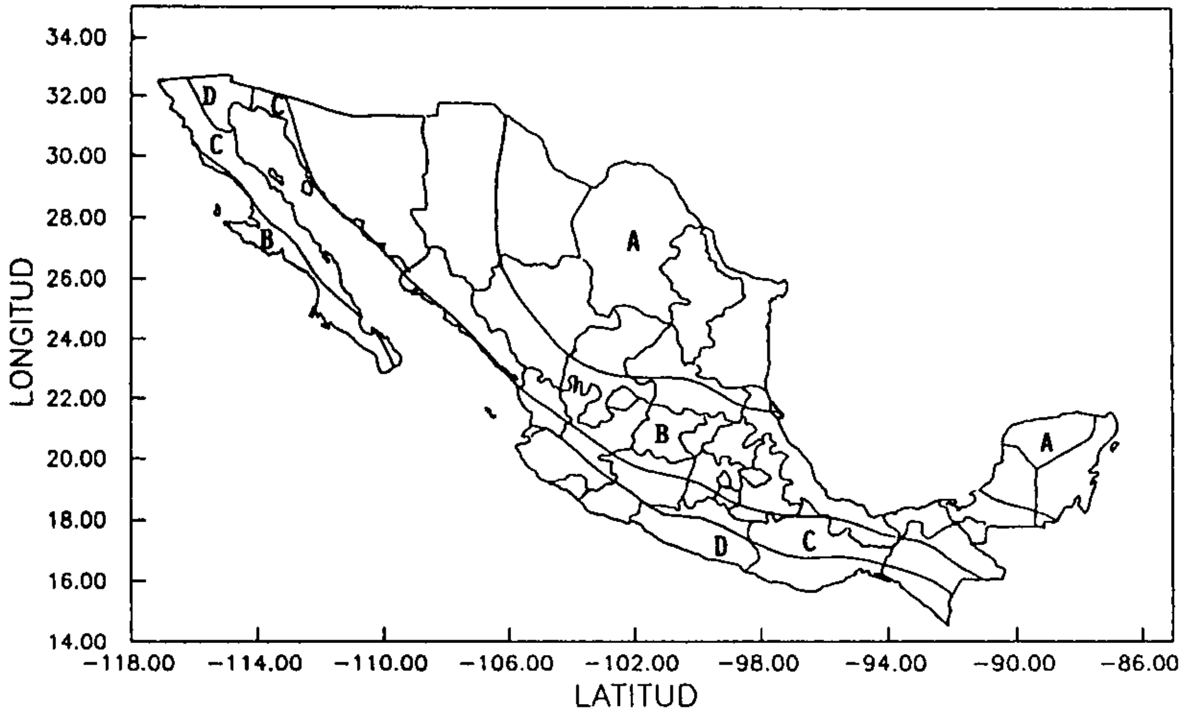


Fig. II. 2. 5. 1. Regionalización sísmica de la República Mexicana.

La República Mexicana está dividida en cuatro zonas A, B, C y D, la zona A es la de menor intensidad sísmica, mientras que la mayor es la zona D.

II. 2. 6. Espectros para Diseño Sísmico.

Las ordenadas del espectro de aceleraciones para diseño sísmico, "a", expresadas como fracción de la aceleración de la gravedad, están dadas por las siguientes expresiones:

$$a = a_o + (c - a_o)\frac{T}{T_a} \quad ; \quad \text{si } T < T_a$$

$$a = c \quad ; \quad \text{si } T_a \leq T \leq T_b$$

$$a = c\left[\frac{T_b}{T}\right]^r \quad ; \quad \text{si } T > T_b$$

donde:

a_o es el coeficiente de aceleración del terreno.
c es el coeficiente sísmico.
T es el período natural de interés.
T_a y T_b son dos períodos característicos que delimitan la meseta.
r es un exponente que define la parte curva del espectro de diseño.

Los valores de estos parámetros se encuentran en la tabla II. 2. 6. 1. para cada una de las zonas sísmicas y los distintos tipos de terreno de cimentación.

Zona Sísmica	Tipo de Suelo	a_o	c	T_a(s)	T_b(s)	r
A	I	0.02	0.08	0.2	0.6	½
	II	0.04	0.16	0.3	1.5	2/3
	III	0.05	0.20	0.6	2.9	1
B	I	0.04	0.14	0.2	0.6	½
	II	0.08	0.30	0.3	1.5	2/3
	III	0.10	0.36	0.6	2.9	1
C	I	0.36	0.36	0.0	0.6	½
	II	0.64	0.64	0.0	1.4	2/3
	III	0.64	0.64	0.0	1.9	1
D	I	0.50	0.50	0.0	0.6	½
	II	0.86	0.86	0.0	1.2	2/3
	III	0.86	0.86	0.0	1.7	1

Tabla II. 2. 6. 1. Espectros de diseño para estructuras del grupo B

Los espectros de diseño especificados son aplicables a estructuras del grupo B. Para estructuras del grupo A, los valores de las ordenadas espectrales deberán multiplicarse por "1.5" a fin de tener en cuenta la importancia de la estructura.

II. 2. 7. Tipos de Análisis.

Para el análisis sísmico de estructuras tales como torres, se puede recurrir a dos métodos:

a)Análisis Estático.

Es aplicable a estructuras que no pasen de 60 m. de altura. Para el análisis estático de torres, los efectos dinámicos inducidos por el sismo se simularán mediante una fuerza lateral equivalente, distribuida a lo largo de la altura de la estructura y actuando en dirección del movimiento del terreno. La magnitud de la resultante de la fuerza lateral distribuida verticalmente será igual a la fuerza cortante basal determinada de acuerdo con lo dispuesto para estructuras de edificios, pero amplificada por un factor de incremento por el que se aumentan las ordenadas espectrales con objeto de tener en cuenta que el amortiguamiento en torres es menor que en estructuras de edificios.

La distribución vertical de la fuerza cortante basal amplificada se llevará a cabo dividiendo la estructura en "N" segmentos de igual altura como se muestra en la figura II. 2. 7. 1. En el centro de masa del n-ésimo segmento se aplicará una fuerza horizontal que se define dependiendo del período característico T_b de las siguientes formas:

$$P_n = 0.85\ W_n h_n \frac{\sum_{n=1}^{N} W_n}{\sum_{n=1}^{N} W_n h_n} \frac{a}{Q'} \xi \quad ; \quad \text{si } T_e < T_b$$

$$P_n = 0.85\ W_n \left(\alpha_1 h_n + \alpha_2 h_n^2\right) \frac{a}{Q} \xi \quad ; \quad \text{si } T_e > T_b$$

donde:

W_n es el peso del n-ésimo segmento.

h_n es la altura de su centro de gravedad medida desde el desplante.

a es la ordenada espectral correspondiente al período fundamental T_e de la estructura.

T_e es el período fundamental de la estructura.

T_b es el segundo período característico del espectro de diseño.

Q es el factor de comportamiento sísmico.

Q' es el factor reductivo por ductilidad.

α_1 y α_2 son los coeficientes de proporcionalidad que se especifican para estructuras de edificios.

ξ es el factor de incremento, este factor se podrá tomar como $\xi=1.25$ para estructuras de concreto ó $\xi=1.45$ para estructuras de acero. Estos valores son permitidos solo en terrenos tipo I.

Para tener en cuenta los efectos de los modos superiores de vibración, en el N-ésimo segmento se aplicará adicionalmente una fuerza horizontal que se define como:

$$P_s = 0.15\ W \frac{a}{Q'} \xi \quad ; \quad \text{si } T_e < T_b$$

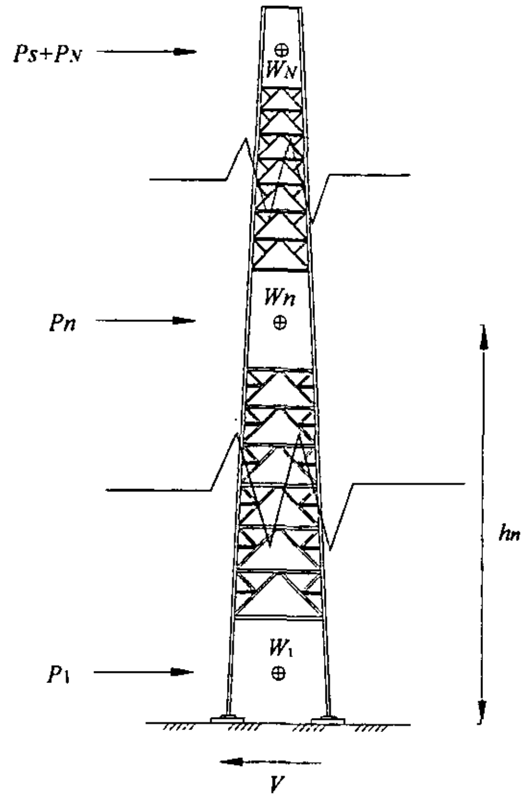
$$P_s = 0.15\ W \left(1 + 0.5\, r - 0.5\, r\, q \right) \frac{a}{Q}\ \xi \quad ; \quad \text{si } T_e > T_b$$

donde:

$$q = \left(\frac{T_b}{T_e} \right)^r$$

W es el peso de la estructura.

r es el exponente de la parte curva del espectro de diseño.



II. 2. 7. 1. Fuerzas sísmicas en una torre

b)Análisis Dinámico.

Para el análisis dinámico de esta torre autosoportada, se empleará el análisis modal espectral que se aplica a estructuras cuyas alturas son superiores a 60 m, junto con las disposiciones correspondientes estipuladas para estructuras de edificios, teniendo en cuenta las siguientes recomendaciones:

1. Los parámetros dinámicos de una torre se determinarán suponiendo que la estructura posee modos clásicos de vibración, por lo que las frecuencias y los modos naturales de vibrar se obtendrán considerando nulo el amortiguamiento. Bastará con tener en cuenta las tres primeras formas modales para calcular las respuestas de diseño.

2. Al determinar las respuestas modales se aumentarán las ordenadas espectrales por un factor de incremento, "ξ", (ya explicado en el análisis estático), con objeto de tomar en cuenta que el amortiguamiento de torres puede ser menor que en estructuras de edificios.

3. Las respuestas de diseño se obtendrán mediante la combinación de las respuestas modales máximas, de acuerdo con la expresión:

$$R = \sqrt{\sum_{n=1}^{3} Rn^2}$$

la cual representa la raíz cuadrada de la suma de los cuadrados de las respuestas modales R_n que pueden ser los desplazamientos, las fuerzas cortantes o los momentos de volteo.

4. En ninguna situación se permitirá que la fuerza cortante basal calculada dinámicamente sea menor que 75 por ciento de la calculada estáticamente con la opción que toma en cuenta el valor aproximado del período fundamental de la estructura. Cuando $V_d / V_e < 0.75$, las respuestas de diseño se incrementaran en $0.75\ V_e / V_d$, siendo V_e y V_d las fuerzas cortantes basales calculadas estáticamente y dinámicamente, respectivamente.

5. Los momentos de volteo no serán reducidos. En el análisis de torres que no sean muy esbeltas, se podrán despreciar los efectos de segundo orden (P-delta), es decir, las fuerzas cortantes y los momentos flexionantes adicionales provocados por las cargas verticales actuando sobre la estructura deformada, así como por la influencia de la carga axial en la rigidez del fuste de la estructura.

Para los efectos combinados de los movimientos del terreno, se analizará ante la acción de dos componentes horizontales ortogonales del movimiento del terreno. En estructuras que no sean demasiado esbeltas se podrá despreciar la acción del componente vertical. Las fuerzas internas se combinarán sumando vectorialmente las gravitacionales, las del componente del movimiento del terreno paralelo a la dirección de análisis y 0.3 de las del otro componente con el signo que para cada concepto resulte más desfavorable. La elección de las direcciones ortogonales para las cuales se efectuará el análisis se hará atendiendo las direcciones más desfavorables que estarán definidas por la menor resistencia de la estructura, tanto a flexocompresión como a fuerza cortante.

III. Análisis de la estructura ante las acciones permanentes y eventuales.

III. 1. Datos de diseño.

A continuación se mencionan las principales caracteristicas del proyecto, que son indispensables para la realización de este:

a)Ubicación.

La estructura se encontrará ubicada en la ciudad de Monterrey Nuevo León.

b)Parámetros de diseño.

- Velocidad Regional $V_R = 158$ km/h, con un periodo de retorno de 200 años.
- La temperatura media anual es 22.1°C.
- La estructura se encuentra clasificada dentro del Grupo A.
- Es una estructura que se considera del Tipo 2.
- La categoría del terreno, (C.T.), es 2.
- El factor de topografía es FT = 1.1
- Debido a sus dimensiones la estructura se clasifica como Clase C.
- Altura Sobre el Nivel del Mar, A.S.N.M.= 538 m.
- Monterrey se localiza en la región sísmica A de la Rep. Mexicana.
- El tipo de terreno es: Tipo II.
- La estructura se clasifica según su destino como del Tipo 4
- La capacidad de carga admisible es: $\sigma_{adm.} = 16$ Ton/m².
- El peso volumétrico del suelo es: $\gamma = 1600$ kg/m³.
- El nivel de aguas freáticas es: N.A.F.= 12 m.
- Profundidad de desplante Df = 2.5 m.

III. 2. Geometría de la estructura.

En la figura siguiente se presentan las características geométricas de la estructura que será analizada:

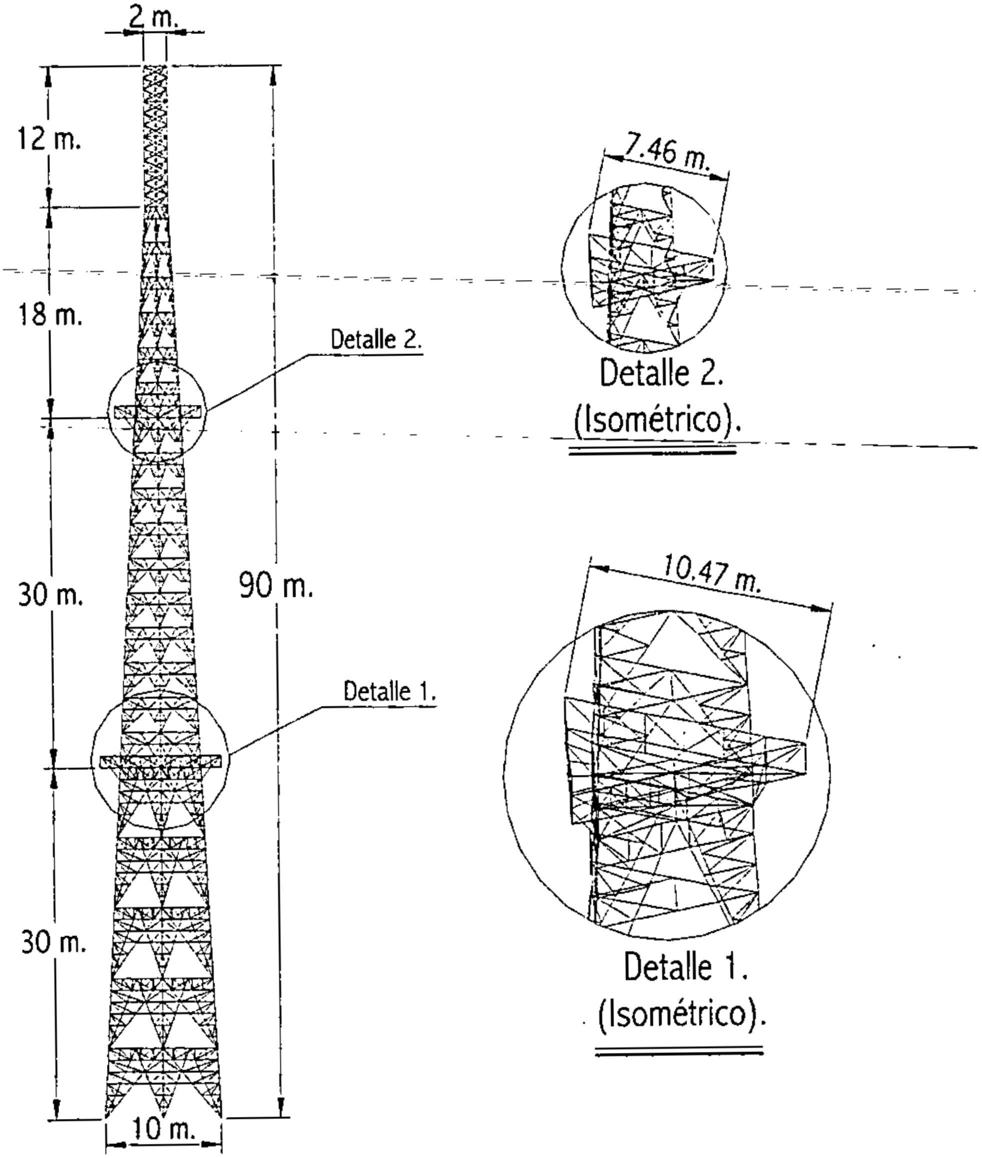


Fig. III. 2. 1. Torre Autosoportada

Figura: III. 2. 2. Torre en Perspectiva.

III. 3. Obtención de cargas permanentes, variables y accidentales.

III. 3. 1. Cargas permanentes.

La obtención de cargas permanentes se resume en el cálculo del peso de la estructura y de las antenas parabólicas. Para llevar a cabo el cálculo de las cargas, es necesario considerar el volumen de cada uno de los elementos y el peso volumétrico del acero empleado, con lo cual se obtiene el peso del material.

$$W = (V)(\gamma)$$

donde:

W es el peso del material, kg.
V es el volumen del material, m^3.
γ es el peso volumétrico del material, kg/m^3.

El peso de la estructura obtenido es de: 129 843 kg.

De la misma manera, se puede obtener el peso de las antenas parabólicas, aunque es recomendable considerar el valor del peso proporcionado por el fabricante.

El peso total considerado de las antenas parabólicas es de:

(9 parabólicas)(200 kg) = 1 800 kg

De esta manera sabemos que el total de carga permanente es de:

<u>131 643 kg.</u>

III. 3. 2. Cargas variables.

Para cargas variables se propusieron tres cargas puntuales de 100 kg en cada una de las dos plataformas, (una carga en cada vértice de las plataformas), simulando la presencia de tres personas en cada plataforma.

III. 3. 3. Viento.

Las cargas de viento en estructura y líneas de conducción se obtuvieron siguiendo las recomendaciones del Manual de Diseño por Viento (C.F.E. 93). En tanto que las cargas de viento sobre las antenas parabólicas se obtuvieron con ayuda de las TIA / EIA standard.

Debido a que la estructura tiene una relación de aspecto mayor a cinco, se llevará a cabo un análisis dinámico.

$$\lambda = \frac{\text{Altura}}{\text{Dim. menor en planta}} = \frac{90}{10} = 9$$

Por lo tanto: $9 > 5$

- Determinación de la velocidad de diseño.

$$V_D = F_T \; F_\alpha \; V_R$$

- Factor topográfico, F_T

Este factor es obtenido de la tabla II. 1. 2., resultando ser: $F_T = 1.1$

- Factor de exposición, F_α

$$F_\alpha = F_c \; F_{rz}$$

- Factor de tamaño, Fc.

Debido a que es un análisis dinámico, se considera al factor: Fc = 1

- Factor de rugosidad y altura, Frz

De la tabla II. 1. 4. se obtiene que:

$$\alpha = 0.138$$
$$\delta = 315 \text{ m.}$$

Como: 10<Z<315 m. entonces:

$$Frz = 1.56\left[\frac{Z}{\delta}\right]^{\alpha}$$

$$Frz = 1.56\left[\frac{Z}{315}\right]^{0.138}$$

$$\boxed{Frz = 0.7053(Z)^{0.138}}$$

Sustituyendo Frz y Fc en:

$$F_{\alpha} = F_c\ F_{rz}$$

Tenemos que:

$$F_{\alpha} = (1)\ (0.7053)\ (Z)^{0.138}$$

$$\boxed{F_{\alpha} = (0.7053)\ (Z)^{0.138}}$$

Por lo tanto la velocidad de diseño es:

$$V_D = (1.1)(\ (0.7053)\ (Z)^{0.138})(158)$$

$$\boxed{V_D = 122.57(Z)^{0.138}}$$

- Presión dinámica de base, q_Z.

$$q_z = 0.0048\ G\ V_D^{\ 2}$$

$$G = \frac{0.392\,\Omega}{273 + \tau}$$

Sabiendo que A.S.N.M.= 538 m. obtenemos de la tabla II. 1. 6. que la presión barométrica es 716.58 mm de Hg. Además, conocida la temperatura ambiental (22.1 °C), sustituimos:

$$G = \frac{0.392\,(716.58)}{273 + 22.1}$$

$$\boxed{G = 0.9519}$$

Por lo tanto:

$$q_z = 0.0048\,G\,V_D{}^2$$

$$\boxed{q_z = 68.6437(Z)^{0.276}}$$

- Factor de respuesta dinámica debida a ráfagas.

$$F_g = \frac{1}{g^2}\left[1 + g_P\left(\frac{\sigma}{\mu}\right)\right]$$

Sabiendo que la C.T.= 2, entonces de la tabla II. 1. 7., obtenemos:

k'= 1.288
η = -0.054
δ = 315 m.

Como 10<Z<315 m. entonces:

$$g = k'\left[\frac{Z}{\delta}\right]^{\eta} \quad \text{si} \quad 10 < Z < \delta$$

Sustituyendo valores:

$$\boxed{g = 1.7572\,(Z)^{-0.054}}$$

Por otro lado:

$$\frac{\sigma}{\mu} = \sqrt{\frac{k_{r}}{C_{\alpha'}}\left(B + \frac{SE}{\zeta}\right)}$$

Por ser un terreno con categoría igual a 2, entonces $k_r = 0.08$

$$C_{\alpha'} = 3.46\left(F_T\right)^2\left[\frac{H}{\delta}\right]^{2\alpha'} \quad \text{si} \quad 10 < H < \delta$$

$$C_{\alpha'} = 3.46\left(1.1\right)^2\left[\frac{90}{315}\right]^{2(0.18)}$$

$$\boxed{C_{\alpha'} = 2.6668}$$

El coeficiente de amortiguamiento crítico para este tipo de estructuras es: $\zeta = 0.005$

Para obtener el factor de excitación de fondo (B), entramos a la gráfica II. 1. 8. a. con H = 90m y b/H = (10m / 90m) = 0.11. y obtenemos que el factor es igual a B = 0.94.

$$V_H' = \frac{1}{g_H} V_H$$

$$g_H = k'\left[\frac{H}{\delta}\right]^{\eta}$$

Sustituyendo:

$$V_H' = \frac{1}{k'\left[\frac{H}{\delta}\right]^{\eta}} V_H$$

$$V'_H = \frac{1}{1.288\left[\frac{90}{315}\right]^{-0.054}}(122.57)(90^{0.138})$$

$$\boxed{V'_H = 165.49 \text{ km/h}}$$

Los valores de la estructura S, E y g_p se obtendrán conjuntamente con los de las líneas de conducción y parábolas, esto se realizará de manera iterativa, proponiendo una frecuencia natural de n_o = 2 Hz, con lo cual al final obtendré las fuerzas de diseño tanto para la estructura como para las plataformas, líneas y parábolas.

Para la obtención estos parámetros, primero he calculado las áreas totales y expuestas (para cada sección de seis metros), que son indispensables para la obtención de la relación de solidez.

Áreas Totales en dirección Z-Z			
Elev. (m)	Secc. (m).	Tramo (m).	Área Total (m²).
6	1-6	6	58.127
12	6-12	6	54.532
18	12-18	6	50.936
24	18-24	6	47.341
30	24-30	6	43.745
36	30-36	6	40.150
42	36-42	6	36.554
48	42-48	6	32.959
54	48-54	6	29.363
60	54-60	6	25.768
66	60-66	6	21.965
72	66-72	6	17.969
78	72-78	6	13.976
84	78-84	6	12.000
90	84-90	6	12.000

Áreas Totales en dirección X-X			
Elev. (m)	Secc. (m).	Tramo (m).	Área Total (m²).
6	1-6	6	50.359
12	6-12	6	47.240
18	12-18	6	44.125
24	18-24	6	41.010
30	24-30	6	37.894
36	30-36	6	34.779
42	36-42	6	31.664
48	42-48	6	28.548
54	48-54	6	25.433
60	54-60	6	22.318
66	60-66	6	19.027
72	66-72	6	15.568
78	72-78	6	12.110
84	78-84	6	10.393
90	84-90	6	10.393

Áreas Expuestas en dirección Z-Z																	
Elev. (m)	Secc.	Tramo (m).	Largueros				Celosía Principal y Diafragmas				Celosía Secundaria				Área Expuesta	% Tub	% Ang
			Long. (m).	Tubo (plg)	Long Exp. (m).	A (m²)	Long. (m).	Ángulo (plg).	Long Exp. (m).	A (m²)	Long. (m).	Ángulo (plg).	Long Exp. (m).	A (m²)			
6	1-6	6	12	18	0.457	5.486	39.51	4x4x10/16	0.102	4.014	45.97	3x3x8/16	0.076	3.503	13.003	42	58
12	6-12	6	12	18	0.457	5.486	37.63	4x4x10/16	0.102	3.823	43.65	3x3x8/16	0.076	3.326	12.636	43	57
18	12-18	6	12	18	0.457	5.486	35.77	4x4x10/16	0.102	3.634	41.37	3x3x8/16	0.076	3.152	12.273	45	55
24	18-24	6	12	18	0.457	5.486	33.93	4x4x10/16	0.102	3.447	39.09	3x3x8/16	0.076	2.978	11.912	46	54
30	24-30	6	12	18	0.457	5.486	32.09	4x4x10/16	0.102	3.261	36.83	3x3x8/16	0.076	2.806	11.553	47	53
36	30-36	6	12	14	0.356	4.267	31.31	3x3x8/16	0.076	2.386	28.3	3x3x7/16	0.076	2.156	8.809	48	52
42	36-42	6	12	14	0.356	4.267	29.22	3x3x8/16	0.076	2.226	26.1	3x3x7/16	0.076	1.989	8.483	50	50
48	42-48	6	12	14	0.356	4.267	27.17	3x3x8/16	0.076	2.071	23.93	3x3x7/16	0.076	1.823	8.161	52	48
54	48-54	6	12	14	0.356	4.267	25.18	3x3x8/16	0.076	1.918	21.8	3x3x7/16	0.076	1.661	7.847	54	46
60	54-60	6	12	14	0.356	4.267	23.23	3x3x8/16	0.076	1.770	19.72	3x3x7/16	0.076	1.503	7.540	57	43
66	60-66	6	12	10	0.254	3.048	21.23	3x3x7/16	0.076	1.618	17.5	3x3x6/16	0.076	1.334	5.999	51	49
72	66-72	6	12	10	0.254	3.048	19.22	3x3x7/16	0.076	1.465	15.34	3x3x6/16	0.076	1.169	5.682	54	46
78	72-78	6	12	10	0.254	3.048	17.32	3x3x7/16	0.076	1.320	13.32	3x3x6/16	0.076	1.015	5.383	57	43
84	78-84	6	12	8	0.203	2.438	4	3x3x6/16	0.076	0.305	26.83	3x3x5/16	0.076	2.045	4.788	51	49
90	84-90	6	12	8	0.203	2.438	4	3x3x6/16	0.076	0.305	26.83	3x3x5/16	0.076	2.045	4.788	51	49

Áreas Expuestas en dirección X-X																
			Largueros				Celosía Principal y Diafragmas				Celosía Secundaria					
Elev. (m)	Secc.	Tramo (m).	Long. (m).	Tubo (plg)	Long Exp. (m).	A (m²)	Long. (m).	Ángulo (plg).	Long Exp. (m).	A (m²)	Long. (m).	Ángulo (plg).	Long Exp. (m).	A (m²)	Área Expuesta	% Tub	% Ang
6	1-6	6	12	18	0.457	5.486	35.49	4x4x10/16	0.102	3.606	41.19	3x3x8/16	0.076	3.139	12.231	45	55
12	6-12	6	12	18	0.457	5.486	33.89	4x4x10/16	0.102	3.443	39.15	3x3x8/16	0.076	2.983	11.913	46	54
18	12-18	6	12	18	0.457	5.486	32.31	4x4x10/16	0.102	3.282	37.27	3x3x8/16	0.076	2.840	11.609	47	53
24	18-24	6	12	18	0.457	5.486	30.73	4x4x10/16	0.102	3.123	35.38	3x3x8/16	0.076	2.696	11.305	49	51
30	24-30	6	12	18	0.457	5.486	29.18	4x4x10/16	0.102	2.964	33.44	3x3x8/16	0.076	2.548	10.999	50	50
36	30-36	6	12	14	0.356	4.267	28.21	3x3x8/16	0.076	2.150	25.13	3x3x7/16	0.076	1.915	8.332	51	49
42	36-42	6	12	14	0.356	4.267	26.46	3x3x8/16	0.076	2.016	23.26	3x3x7/16	0.076	1.773	8.056	53	47
48	42-48	6	12	14	0.356	4.267	24.74	3x3x8/16	0.076	1.885	21.42	3x3x7/16	0.076	1.632	7.785	55	45
54	48-54	6	12	14	0.356	4.267	23.07	3x3x8/16	0.076	1.758	19.62	3x3x7/16	0.076	1.495	7.520	57	43
60	54-60	6	12	14	0.356	4.267	21.44	3x3x8/16	0.076	1.634	17.87	3x3x7/16	0.076	1.361	7.262	59	41
66	60-66	6	12	10	0.254	3.048	19.77	3x3x7/16	0.076	1.506	16	3x3x6/16	0.076	1.220	5.774	53	47
72	66-72	6	12	10	0.254	3.048	18.09	3x3x7/16	0.076	1.378	14.2	3x3x6/16	0.076	1.082	5.509	55	45
78	72-78	6	12	10	0.254	3.048	16.5	3x3x7/16	0.076	1.257	12.5	3x3x6/16	0.076	0.953	5.258	58	42
84	78-84	6	12	8	0.203	2.438	3.464	3x3x6/16	0.076	0.264	24	3x3x5/16	0.076	1.829	4.531	54	46
90	84-90	6	12	8	0.203	2.438	3.464	3x3x6/16	0.076	0.264	24	3x3x5/16	0.076	1.829	4.531	54	46

Para la obtención de presiones y fuerzas sobre las líneas de conducción, se consideraron nueve líneas (una por antena), de 1 5/8" de diámetro. Nueve líneas suben hasta la primera plataforma, seis suben hasta la segunda plataforma y tres suben hasta la punta de la torre.

Presiones y Fuerzas sobre la Estructura en dirección Z-Z.

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	A_T (m²).	Solidez ϕ	bV_D	Ca	g
1	90	1.31	1.31	228.07	237.67	4.7879	12	0.40	12.87	1.59	1.38
2	89	1.31	1.31	227.72	236.94	4.7879	12	0.40	12.85	1.59	1.38
3	88	1.31	1.31	227.36	236.20	4.7879	12	0.40	12.83	1.59	1.38
4	87	1.31	1.31	227.01	235.46	4.7879	12	0.40	12.81	1.59	1.38
5	86	1.30	1.30	226.64	234.71	4.7879	12	0.40	12.79	1.59	1.38
6	85	1.30	1.30	226.28	233.95	4.7879	12	0.40	12.77	1.59	1.38
7	84	1.30	1.30	225.91	233.19	4.7879	12	0.40	12.75	1.59	1.38
8	83	1.30	1.30	225.54	232.42	4.7879	12	0.40	12.73	1.59	1.38
9	82	1.30	1.30	225.16	231.64	4.7879	12	0.40	12.71	1.59	1.39
10	81	1.29	1.29	224.78	230.86	4.7879	12	0.40	12.68	1.59	1.39
11	80	1.29	1.29	224.39	230.07	4.7879	12	0.40	12.66	1.59	1.39
12	79	1.29	1.29	224.00	229.27	4.7879	12	0.40	12.64	1.59	1.39
13	78	1.29	1.29	223.61	228.46	5.383	13.9764	0.39	15.77	1.54	1.39
14	77	1.28	1.28	223.21	227.65	5.383	13.9764	0.39	15.74	1.54	1.39
15	76	1.28	1.28	222.81	226.83	5.383	13.9764	0.39	15.72	1.54	1.39
16	75	1.28	1.28	222.40	226.00	5.383	13.9764	0.39	15.69	1.54	1.39
17	74	1.28	1.28	221.99	225.17	5.383	13.9764	0.39	15.66	1.54	1.39
18	73	1.28	1.28	221.58	224.33	5.383	13.9764	0.39	15.63	1.54	1.39
19	72	1.27	1.27	221.15	223.47	5.6818	17.9692	0.32	15.60	1.63	1.39
20	71	1.27	1.27	220.73	222.61	5.6818	17.9692	0.32	15.57	1.63	1.40
21	70	1.27	1.27	220.30	221.74	5.6818	17.9692	0.32	15.54	1.63	1.40
22	69	1.27	1.27	219.86	220.86	5.6818	17.9692	0.32	15.51	1.63	1.40
23	68	1.26	1.26	219.42	219.98	5.6818	17.9692	0.32	15.48	1.63	1.40
24	67	1.26	1.26	218.97	219.08	5.6818	17.9692	0.32	15.45	1.63	1.40
25	66	1.26	1.26	218.51	218.17	5.9991	21.965	0.27	15.41	1.75	1.40
26	65	1.25	1.25	218.06	217.25	5.9991	21.965	0.27	15.38	1.75	1.40
27	64	1.25	1.25	217.59	216.32	5.9991	21.965	0.27	15.35	1.75	1.40
28	63	1.25	1.25	217.12	215.39	5.9991	21.965	0.27	15.31	1.75	1.40
29	62	1.25	1.25	216.64	214.44	5.9991	21.965	0.27	15.28	1.75	1.41
30	61	1.24	1.24	216.15	213.48	5.9991	21.965	0.27	15.25	1.75	1.41
31	60	1.24	1.24	215.66	212.51	7.5398	25.7677	0.29	21.30	1.63	1.41
32	59	1.24	1.24	215.16	211.52	7.5398	25.7677	0.29	21.25	1.63	1.41
33	58	1.24	1.24	214.65	210.53	7.5398	25.7677	0.29	21.20	1.63	1.41
34	57	1.23	1.23	214.14	209.52	7.5398	25.7677	0.29	21.15	1.63	1.41
35	56	1.23	1.23	213.62	208.50	7.5398	25.7677	0.29	21.09	1.63	1.41
36	55	1.23	1.23	213.09	207.46	7.5398	25.7677	0.29	21.04	1.63	1.42
37	54	1.22	1.22	212.55	206.42	7.8471	29.3632	0.27	20.99	1.71	1.42
38	53	1.22	1.22	212.00	205.35	7.8471	29.3632	0.27	20.93	1.71	1.42
39	52	1.22	1.22	211.44	204.28	7.8471	29.3632	0.27	20.88	1.71	1.42
40	51	1.21	1.21	210.88	203.18	7.8471	29.3632	0.27	20.82	1.71	1.42
41	50	1.21	1.21	210.30	202.08	7.8471	29.3632	0.27	20.77	1.71	1.42
42	49	1.21	1.21	209.72	200.95	7.8471	29.3632	0.27	20.71	1.71	1.42
43	48	1.20	1.20	209.12	199.81	8.1612	32.9587	0.25	20.65	1.77	1.43
44	47	1.20	1.20	208.51	198.66	8.1612	32.9587	0.25	20.59	1.77	1.43
45	46	1.20	1.20	207.90	197.48	8.1612	32.9587	0.25	20.53	1.77	1.43
46	45	1.19	1.19	207.27	196.29	8.1612	32.9587	0.25	20.47	1.77	1.43
47	44	1.19	1.19	206.62	195.07	8.1612	32.9587	0.25	20.40	1.77	1.43

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	A_T (m²).	Solidez ϕ	bV_D	Ca	g
48	43	1.19	1.19	205.97	193.84	8.1612	32.9587	0.25	20.34	1.77	1.43
49	42	1.18	1.18	205.30	192.58	8.4825	36.5542	0.23	20.27	1.84	1.44
50	41	1.18	1.18	204.62	191.31	8.4825	36.5542	0.23	20.21	1.84	1.44
51	40	1.17	1.17	203.92	190.01	8.4825	36.5542	0.23	20.14	1.84	1.44
52	39	1.17	1.17	203.21	188.68	8.4825	36.5542	0.23	20.07	1.84	1.44
53	38	1.17	1.17	202.49	187.34	8.4825	36.5542	0.23	20.00	1.84	1.44
54	37	1.16	1.16	201.74	185.96	8.4825	36.5542	0.23	19.92	1.84	1.45
55	36	1.16	1.16	200.98	184.56	8.8091	40.1497	0.22	19.85	1.89	1.45
56	35	1.15	1.15	200.20	183.13	8.8091	40.1497	0.22	19.77	1.89	1.45
57	34	1.15	1.15	199.40	181.67	8.8091	40.1497	0.22	19.69	1.89	1.45
58	33	1.14	1.14	198.58	180.18	8.8091	40.1497	0.22	19.61	1.89	1.45
59	32	1.14	1.14	197.74	178.66	8.8091	40.1497	0.22	19.53	1.89	1.46
60	31	1.13	1.13	196.88	177.10	8.8091	40.1497	0.22	19.44	1.89	1.46
61	30	1.13	1.13	195.99	175.50	11.5534	43.7452	0.26	24.88	1.82	1.46
62	29	1.12	1.12	195.07	173.87	11.5534	43.7452	0.26	24.77	1.82	1.47
63	28	1.12	1.12	194.13	172.19	11.5534	43.7452	0.26	24.65	1.82	1.47
64	27	1.11	1.11	193.16	170.47	11.5534	43.7452	0.26	24.52	1.82	1.47
65	26	1.11	1.11	192.15	168.71	11.5534	43.7452	0.26	24.40	1.82	1.47
66	25	1.10	1.10	191.12	166.89	11.5534	43.7452	0.26	24.27	1.82	1.48
67	24	1.09	1.09	190.04	165.02	11.9114	47.3407	0.25	24.13	1.86	1.48
68	23	1.09	1.09	188.93	163.09	11.9114	47.3407	0.25	23.99	1.86	1.48
69	22	1.08	1.08	187.78	161.11	11.9114	47.3407	0.25	23.84	1.86	1.49
70	21	1.07	1.07	186.57	159.05	11.9114	47.3407	0.25	23.69	1.86	1.49
71	20	1.07	1.07	185.32	156.92	11.9114	47.3407	0.25	23.53	1.86	1.49
72	19	1.06	1.06	184.01	154.72	11.9114	47.3407	0.25	23.36	1.86	1.50
73	18	1.05	1.05	182.65	152.42	12.2725	50.9362	0.24	23.19	1.89	1.50
74	17	1.04	1.04	181.21	150.04	12.2725	50.9362	0.24	23.01	1.89	1.51
75	16	1.03	1.03	179.70	147.55	12.2725	50.9362	0.24	22.82	1.89	1.51
76	15	1.02	1.02	178.11	144.94	12.2725	50.9362	0.24	22.61	1.89	1.52
77	14	1.02	1.02	176.42	142.21	12.2725	50.9362	0.24	22.40	1.89	1.52
78	13	1.00	1.00	174.63	139.33	12.2725	50.9362	0.24	22.17	1.89	1.53
79	12	0.99	0.99	172.71	136.29	12.6356	54.5317	0.23	21.93	1.94	1.54
80	11	0.98	0.98	170.65	133.05	12.6356	54.5317	0.23	21.67	1.94	1.54
81	10	0.97	0.97	168.42	129.60	12.6356	54.5317	0.23	21.38	1.94	1.55
82	9	0.96	0.96	165.99	125.88	12.6356	54.5317	0.23	21.07	1.94	1.56
83	8	0.94	0.94	163.31	121.86	12.6356	54.5317	0.23	20.73	1.94	1.57
84	7	0.92	0.92	160.33	117.45	12.6356	54.5317	0.23	20.36	1.94	1.58
85	6	0.90	0.90	156.95	112.56	13.0035	58.1272	0.22	19.93	1.98	1.60
86	5	0.88	0.88	153.05	107.03	13.0035	58.1272	0.22	19.43	1.98	1.61
87	4	0.85	0.85	148.41	100.64	13.0035	58.1272	0.22	18.84	1.98	1.63
88	3	0.82	0.82	142.64	92.96	13.0035	58.1272	0.22	18.11	1.98	1.66
89	2	0.78	0.78	134.87	83.12	13.0035	58.1272	0.22	17.12	1.98	1.69
90	1	0.71	0.71	122.57	68.64	13.0035	58.1272	0.22	15.56	1.98	1.76

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
Valor propuesto							
2.00	3.92	0.019	0.04	0.075	0.96	4.18	0.19

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.9484	358.40	301.55	286.00	2	953 954 FZ	143.00
0.9473	356.87	300.62	284.77	2	998 1000 FZ	142.39
0.9461	355.32	299.69	283.54	2	997 999 FZ	141.77
0.9450	353.77	298.74	282.30	2	950 951 FZ	141.15
0.9438	352.20	297.79	281.05	2	994 996 FZ	140.52
0.9426	350.62	296.83	279.79	2	993 995 FZ	139.89
0.9414	349.03	295.86	278.52	2	947 948 FZ	139.26
0.9402	347.43	294.89	277.24	2	990 992 FZ	138.62
0.9389	345.82	293.90	275.96	2	989 991 FZ	137.98
0.9377	344.19	292.91	274.66	2	944 945 FZ	137.33
0.9364	342.55	291.91	273.35	2	977 979 FZ	136.68
0.9352	340.90	290.90	272.03	2	976 978 FZ	136.02
0.9339	328.27	315.37	294.51	3	752 754 826 FZ	98.17
0.9326	326.65	314.25	293.06	4	773 807 864 867 FZ	73.26
0.9313	325.01	313.12	291.59	4	774 808 865 866 FZ	72.90
0.9299	323.37	311.97	290.11	3	775 809 828 FZ	96.70
0.9286	321.70	310.82	288.62	4	776 810 868 871 FZ	72.16
0.9272	320.03	309.65	287.12	4	777 811 869 870 FZ	71.78
0.9258	337.99	345.70	320.07	3	778 812 860 FZ	106.69
0.9244	336.18	344.37	318.35	4	779 813 872 875 FZ	79.59
0.9230	334.35	343.03	316.62	4	780 814 873 874 FZ	79.16
0.9216	332.51	341.67	314.88	3	781 815 861 FZ	104.96
0.9201	330.65	340.29	313.12	4	782 816 877 878 FZ	78.28
0.9187	328.78	338.91	311.34	4	783 817 876 879 FZ	77.84
0.9172	349.54	381.04	349.48	3	784 818 862 FZ	116.49
0.9157	347.49	379.44	347.44	4	785 819 880 883 FZ	86.86
0.9141	345.43	377.82	345.38	4	786 820 881 882 FZ	86.34
0.9126	343.35	376.18	343.30	3	787 821 863 FZ	114.43
0.9110	341.24	374.52	341.19	4	788 822 884 887 FZ	85.30
0.9094	339.12	372.85	339.07	4	789 823 885 886 FZ	84.77
0.9078	315.06	436.13	395.92	3	512 514 630 FZ	131.97
0.9061	313.03	434.11	393.37	4	544 601 633 634 FZ	98.34
0.9045	310.99	432.07	390.79	4	545 600 632 635 FZ	97.70
0.9028	308.92	430.00	388.19	3	546 599 627 FZ	129.40
0.9010	306.82	427.91	385.56	4	547 598 637 638 FZ	96.39
0.8993	304.71	425.78	382.91	4	548 597 636 639 FZ	95.73
0.8975	316.28	460.88	413.64	3	549 596 624 FZ	137.88
0.8957	314.02	458.50	410.68	4	550 595 641 642 FZ	102.67
0.8939	311.73	456.10	407.69	4	551 594 640 643 FZ	101.92
0.8920	309.41	453.66	404.66	3	552 593 621 FZ	134.89
0.8901	307.07	451.19	401.60	4	553 592 644 647 FZ	100.40
0.8881	304.69	448.68	398.49	4	554 591 645 646 FZ	99.62
0.8862	313.76	481.60	426.78	3	555 590 618 FZ	142.26

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.8842	311.24	478.81	423.35	4	556 589 649 650 FZ	105.84
0.8821	308.68	475.98	419.86	4	557 588 648 651 FZ	104.97
0.8800	306.08	473.10	416.34	3	558 587 615 FZ	138.78
0.8779	303.45	470.18	412.76	4	559 586 653 654 FZ	103.19
0.8757	300.79	467.20	409.13	4	560 585 652 655 FZ	102.28
0.8735	309.52	500.97	437.58	3	561 584 612 FZ	145.86
0.8712	306.67	497.65	433.55	4	562 583 656 659 FZ	108.39
0.8689	303.78	494.27	429.46	4	563 582 657 658 FZ	107.37
0.8665	300.84	490.82	425.31	3	564 581 609 FZ	141.77
0.8641	297.85	487.32	421.09	4	565 580 661 662 FZ	105.27
0.8616	294.82	483.74	416.80	4	566 579 660 663 FZ	104.20
0.8591	299.72	512.24	440.05	3	567 578 606 FZ	146.68
0.8565	296.50	508.27	435.31	4	568 577 665 666 FZ	108.83
0.8538	293.21	504.22	430.49	4	569 576 664 667 FZ	107.62
0.8510	289.87	500.09	425.59	3	570 575 603 FZ	141.86
0.8482	286.47	495.86	420.59	4	571 574 669 670 FZ	105.15
0.8453	283.00	491.53	415.49	4	572 573 668 671 FZ	103.87
0.8423	269.17	615.33	518.30	7	4 6 372 443 444 446 447 FZ	74.04
0.8392	265.69	609.60	511.59	6	383 388 393 394 449 451 FZ	85.27
0.8361	262.13	603.72	504.75	4	382 387 392 395 FZ	126.19
0.8328	258.49	597.69	497.75	4	381 386 391 396 FZ	124.44
0.8294	254.77	591.50	490.59	4	380 385 390 397 FZ	122.65
0.8259	250.97	585.13	483.25	4	379 384 389 398 FZ	120.81
0.8223	251.84	608.04	499.96	7	14 18 302 360 361 363 364 FZ	71.42
0.8185	247.76	600.93	491.86	6	295 300 318 319 367 369 FZ	81.98
0.8146	243.56	593.61	483.53	4	294 299 317 320 FZ	120.88
0.8105	239.25	586.03	474.97	4	293 298 316 321 FZ	118.74
0.8062	234.81	578.20	466.15	4	292 297 315 322 FZ	116.54
0.8018	230.23	570.07	457.06	4	291 296 314 323 FZ	114.27
0.7971	229.87	589.87	470.19	7	13 17 205 277 278 280 281 FZ	67.17
0.7922	224.88	580.64	459.98	6	216 221 265 274 283 285 FZ	76.66
0.7870	219.71	571.01	449.40	4	215 220 266 273 FZ	112.35
0.7816	214.33	560.93	438.40	4	214 219 267 272 FZ	109.60
0.7758	208.73	550.35	426.93	4	213 218 268 271 FZ	106.73
0.7696	202.87	539.20	414.96	4	212 217 269 270 FZ	103.74
0.7629	202.10	557.84	425.60	7	12 16 111 144 145 147 148 FZ	60.80
0.7558	195.45	544.60	411.61	6	116 121 126 127 150 152 FZ	68.60
0.7481	188.43	530.46	396.82	4	115 120 125 128 FZ	99.21
0.7396	180.96	515.26	381.09	4	114 119 124 129 FZ	95.27
0.7303	172.96	498.78	364.24	4	113 118 123 130 FZ	91.06
0.7198	164.31	480.73	346.03	4	112 117 122 131 FZ	86.51
0.7079	157.90	483.39	342.20	7	11 15 20 68 69 71 72 FZ	48.89
0.6941	147.22	459.67	319.06	6	31 36 51 52 74 76 FZ	53.18
0.6776	135.13	432.21	292.86	4	30 35 50 53 FZ	73.22
0.6569	121.00	399.22	262.23	4	29 34 49 54 FZ	65.56
0.6287	103.55	356.95	224.42	4	28 33 48 55 FZ	56.11
0.5834	79.35	294.80	171.98	4	27 32 47 56 FZ	42.99

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
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0.92276	1.81	0.066	0.020	0.13	0.74	4.12	0.28

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.14	430.36	301.55	343.42	2	953 954 FZ	171.71
1.14	428.52	300.62	341.95	2	998 1000 FZ	170.97
1.14	426.66	299.69	340.47	2	997 999 FZ	170.23
1.13	424.79	298.74	338.98	2	950 951 FZ	169.49
1.13	422.91	297.79	337.48	2	994 996 FZ	168.74
1.13	421.02	296.83	335.96	2	993 995 FZ	167.98
1.13	419.11	295.86	334.44	2	947 948 FZ	167.22
1.13	417.18	294.89	332.91	2	990 992 FZ	166.45
1.13	415.25	293.90	331.36	2	989 991 FZ	165.68
1.13	413.30	292.91	329.80	2	944 945 FZ	164.90
1.12	411.33	291.91	328.23	2	977 979 FZ	164.12
1.12	409.35	290.90	326.65	2	976 978 FZ	163.33
1.12	394.18	315.37	353.65	3	752 754 826 FZ	117.88
1.12	392.23	314.25	351.90	4	773 807 864 867 FZ	87.97
1.12	390.27	313.12	350.14	4	774 808 865 866 FZ	87.53
1.12	388.29	311.97	348.36	3	775 809 828 FZ	116.12
1.12	386.29	310.82	346.57	4	776 810 868 871 FZ	86.64
1.11	384.28	309.65	344.76	4	777 811 869 870 FZ	86.19
1.11	405.85	345.70	384.33	3	778 812 860 FZ	128.11
1.11	403.68	344.37	382.27	4	779 813 872 875 FZ	95.57
1.11	401.48	343.03	380.19	4	780 814 873 874 FZ	95.05
1.11	399.27	341.67	378.10	3	781 815 861 FZ	126.03
1.10	397.04	340.29	375.98	4	782 816 877 878 FZ	94.00
1.10	394.79	338.91	373.85	4	783 817 876 879 FZ	93.46
1.10	419.71	381.04	419.65	3	784 818 862 FZ	139.88
1.10	417.26	379.44	417.20	4	785 819 880 883 FZ	104.30
1.10	414.78	377.82	414.72	4	786 820 881 882 FZ	103.68
1.10	412.28	376.18	412.22	3	787 821 863 FZ	137.41
1.09	409.76	374.52	409.70	4	788 822 884 887 FZ	102.42
1.09	407.21	372.85	407.15	4	789 823 885 886 FZ	101.79
1.09	378.32	436.13	475.40	3	512 514 630 FZ	158.47
1.09	375.88	434.11	472.35	4	544 601 633 634 FZ	118.09
1.09	373.42	432.07	469.26	4	545 600 632 635 FZ	117.31
1.08	370.94	430.00	466.13	3	546 599 627 FZ	155.38
1.08	368.42	427.91	462.97	4	547 598 637 638 FZ	115.74
1.08	365.88	425.78	459.78	4	548 597 636 639 FZ	114.95
1.08	379.78	460.88	496.69	3	549 596 624 FZ	165.56
1.08	377.06	458.50	493.14	4	550 595 641 642 FZ	123.28
1.07	374.31	456.10	489.55	4	551 594 640 643 FZ	122.39
1.07	371.53	453.66	485.91	3	552 593 621 FZ	161.97
1.07	368.72	451.19	482.23	4	553 592 644 647 FZ	120.56
1.07	365.87	448.68	478.50	4	554 591 645 646 FZ	119.63
1.06	376.76	481.60	512.47	3	555 590 618 FZ	170.82

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.06	373.73	478.81	508.34	4	556 589 649 650 FZ	127.09
1.06	370.65	475.98	504.16	4	557 588 648 651 FZ	126.04
1.06	367.54	473.10	499.93	3	558 587 615 FZ	166.64
1.05	364.38	470.18	495.63	4	559 586 653 654 FZ	123.91
1.05	361.18	467.20	491.27	4	560 585 652 655 FZ	122.82
1.05	371.66	500.97	525.44	3	561 584 612 FZ	175.15
1.05	368.24	497.65	520.60	4	562 583 656 659 FZ	130.15
1.04	364.77	494.27	515.69	4	563 582 657 658 FZ	128.92
1.04	361.24	490.82	510.70	3	564 581 609 FZ	170.23
1.04	357.65	487.32	505.63	4	565 580 661 662 FZ	126.41
1.03	354.01	483.74	500.48	4	566 579 660 663 FZ	125.12
1.03	359.90	512.24	528.40	3	567 578 606 FZ	176.13
1.03	356.03	508.27	522.71	4	568 577 665 666 FZ	130.68
1.03	352.08	504.22	516.92	4	569 576 664 667 FZ	129.23
1.02	348.07	500.09	511.03	3	570 575 603 FZ	170.34
1.02	343.98	495.86	505.03	4	571 574 669 670 FZ	126.26
1.02	339.81	491.53	498.91	4	572 573 668 671 FZ	124.73
1.01	323.21	615.33	622.36	7	4 6 372 443 444 446 447 FZ	88.91
1.01	319.03	609.60	614.31	6	383 388 393 394 449 451 FZ	102.38
1.00	314.76	603.72	606.09	4	382 387 392 395 FZ	151.52
1.00	310.39	597.69	597.68	4	381 386 391 396 FZ	149.42
1.00	305.93	591.50	589.08	4	380 385 390 397 FZ	147.27
0.99	301.35	585.13	580.28	4	379 384 389 398 FZ	145.07
0.99	302.40	608.04	600.34	7	14 18 302 360 361 363 364 FZ	85.76
0.98	297.50	600.93	590.61	6	295 300 318 319 367 369 FZ	98.43
0.98	292.46	593.61	580.61	4	294 299 317 320 FZ	145.15
0.97	287.29	586.03	570.33	4	293 298 316 321 FZ	142.58
0.97	281.95	578.20	559.74	4	292 297 315 322 FZ	139.94
0.96	276.45	570.07	548.83	4	291 296 314 323 FZ	137.21
0.96	276.03	589.87	564.59	7	13 17 205 277 278 280 281 FZ	80.66
0.95	270.03	580.64	552.33	6	216 221 265 274 283 285 FZ	92.06
0.95	263.82	571.01	539.62	4	215 220 266 273 FZ	134.91
0.94	257.36	560.93	526.41	4	214 219 267 272 FZ	131.60
0.93	250.63	550.35	512.65	4	213 218 268 271 FZ	128.16
0.92	243.60	539.20	498.27	4	212 217 269 270 FZ	124.57
0.92	242.67	557.84	511.05	7	12 16 111 144 145 147 148 FZ	73.01
0.91	234.70	544.60	494.26	6	116 121 126 127 150 152 FZ	82.38
0.90	226.26	530.46	476.49	4	115 120 125 128 FZ	119.12
0.89	217.29	515.26	457.60	4	114 119 124 129 FZ	114.40
0.88	207.68	498.78	437.36	4	113 118 123 130 FZ	109.34
0.86	197.30	480.73	415.50	4	112 117 122 131 FZ	103.88
0.85	189.60	483.39	410.90	7	11 15 20 68 69 71 72 FZ	58.70
0.83	176.78	459.67	383.12	6	31 36 51 52 74 76 FZ	63.85
0.81	162.26	432.21	351.66	4	30 35 50 53 FZ	87.91
0.79	145.29	399.22	314.88	4	29 34 49 54 FZ	78.72
0.75	124.34	356.95	269.48	4	28 33 48 55 FZ	67.37
0.70	95.28	294.80	206.50	4	27 32 47 56 FZ	51.63

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
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0.89166	1.75	0.07	0.019	0.138	0.73	4.11	0.29

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.16	439.0	301.55	350.3	2	953 954 FZ	175.16
1.16	437.1	300.62	348.8	2	998 1000 FZ	174.41
1.16	435.2	299.69	347.3	2	997 999 FZ	173.65
1.16	433.3	298.74	345.8	2	950 951 FZ	172.89
1.16	431.4	297.79	344.3	2	994 996 FZ	172.13
1.15	429.5	296.83	342.7	2	993 995 FZ	171.35
1.15	427.5	295.86	341.2	2	947 948 FZ	170.58
1.15	425.6	294.89	339.6	2	990 992 FZ	169.80
1.15	423.6	293.90	338.0	2	989 991 FZ	169.01
1.15	421.6	292.91	336.4	2	944 945 FZ	168.21
1.15	419.6	291.91	334.8	2	977 979 FZ	167.41
1.15	417.6	290.90	333.2	2	976 978 FZ	166.61
1.14	402.1	315.37	360.7	3	752 754 826 FZ	120.25
1.14	400.1	314.25	359.0	4	773 807 864 867 FZ	89.74
1.14	398.1	313.12	357.2	4	774 808 865 866 FZ	89.29
1.14	396.1	311.97	355.4	3	775 809 828 FZ	118.45
1.14	394.0	310.82	353.5	4	776 810 868 871 FZ	88.38
1.14	392.0	309.65	351.7	4	777 811 869 870 FZ	87.92
1.13	414.0	345.70	392.0	3	778 812 860 FZ	130.68
1.13	411.8	344.37	389.9	4	779 813 872 875 FZ	97.49
1.13	409.5	343.03	387.8	4	780 814 873 874 FZ	96.96
1.13	407.3	341.67	385.7	3	781 815 861 FZ	128.56
1.13	405.0	340.29	383.5	4	782 816 877 878 FZ	95.88
1.13	402.7	338.91	381.4	4	783 817 876 879 FZ	95.34
1.12	428.1	381.04	428.1	3	784 818 862 FZ	142.69
1.12	425.6	379.44	425.6	4	785 819 880 883 FZ	106.39
1.12	423.1	377.82	423.0	4	786 820 881 882 FZ	105.76
1.12	420.6	376.18	420.5	3	787 821 863 FZ	140.17
1.12	418.0	374.52	417.9	4	788 822 884 887 FZ	104.48
1.11	415.4	372.85	415.3	4	789 823 885 886 FZ	103.83
1.11	385.9	436.13	484.9	3	512 514 630 FZ	161.65
1.11	383.4	434.11	481.8	4	544 601 633 634 FZ	120.46
1.11	380.9	432.07	478.7	4	545 600 632 635 FZ	119.67
1.11	378.4	430.00	475.5	3	546 599 627 FZ	158.50
1.10	375.8	427.91	472.3	4	547 598 637 638 FZ	118.07
1.10	373.2	425.78	469.0	4	548 597 636 639 FZ	117.25
1.10	387.4	460.88	506.7	3	549 596 624 FZ	168.89
1.10	384.6	458.50	503.0	4	550 595 641 642 FZ	125.76
1.09	381.8	456.10	499.4	4	551 594 640 643 FZ	124.84
1.09	379.0	453.66	495.7	3	552 593 621 FZ	165.22
1.09	376.1	451.19	491.9	4	553 592 644 647 FZ	122.98
1.09	373.2	448.68	488.1	4	554 591 645 646 FZ	122.03
1.09	384.3	481.60	522.8	3	555 590 618 FZ	174.25

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.08	381.2	478.81	518.6	4	556 589 649 650 FZ	129.64
1.08	378.1	475.98	514.3	4	557 588 648 651 FZ	128.57
1.08	374.9	473.10	510.0	3	558 587 615 FZ	169.99
1.08	371.7	470.18	505.6	4	559 586 653 654 FZ	126.40
1.07	368.4	467.20	501.1	4	560 585 652 655 FZ	125.28
1.07	379.1	500.97	536.0	3	561 584 612 FZ	178.66
1.07	375.6	497.65	531.1	4	562 583 656 659 FZ	132.76
1.06	372.1	494.27	526.0	4	563 582 657 658 FZ	131.51
1.06	368.5	490.82	521.0	3	564 581 609 FZ	173.65
1.06	364.8	487.32	515.8	4	565 580 661 662 FZ	128.95
1.06	361.1	483.74	510.5	4	566 579 660 663 FZ	127.63
1.05	367.1	512.24	539.0	3	567 578 606 FZ	179.67
1.05	363.2	508.27	533.2	4	568 577 665 666 FZ	133.30
1.05	359.2	504.22	527.3	4	569 576 664 667 FZ	131.83
1.04	355.1	500.09	521.3	3	570 575 603 FZ	173.76
1.04	350.9	495.86	515.2	4	571 574 669 670 FZ	128.79
1.04	346.6	491.53	508.9	4	572 573 668 671 FZ	127.23
1.03	329.7	615.33	634.9	7	4 6 372 443 444 446 447 FZ	90.69
1.03	325.4	609.60	626.6	6	383 388 393 394 449 451 FZ	104.44
1.02	321.1	603.72	618.3	4	382 387 392 395 FZ	154.56
1.02	316.6	597.69	609.7	4	381 386 391 396 FZ	152.42
1.02	312.1	591.50	600.9	4	380 385 390 397 FZ	150.23
1.01	307.4	585.13	591.9	4	379 384 389 398 FZ	147.98
1.01	308.5	608.04	612.4	7	14 18 302 360 361 363 364 FZ	87.48
1.00	303.5	600.93	602.5	6	295 300 318 319 367 369 FZ	100.41
1.00	298.3	593.61	592.3	4	294 299 317 320 FZ	148.07
0.99	293.1	586.03	581.8	4	293 298 316 321 FZ	145.45
0.99	287.6	578.20	571.0	4	292 297 315 322 FZ	142.75
0.98	282.0	570.07	559.8	4	291 296 314 323 FZ	139.96
0.98	281.6	589.87	575.9	7	13 17 205 277 278 280 281 FZ	82.28
0.97	275.5	580.64	563.4	6	216 221 265 274 283 285 FZ	93.90
0.96	269.1	571.01	550.5	4	215 220 266 273 FZ	137.61
0.96	262.5	560.93	537.0	4	214 219 267 272 FZ	134.25
0.95	255.7	550.35	522.9	4	213 218 268 271 FZ	130.74
0.94	248.5	539.20	508.3	4	212 217 269 270 FZ	127.07
0.93	247.5	557.84	521.3	7	12 16 111 144 145 147 148 FZ	74.47
0.93	239.4	544.60	504.2	6	116 121 126 127 150 152 FZ	84.03
0.92	230.8	530.46	486.1	4	115 120 125 128 FZ	121.52
0.91	221.7	515.26	466.8	4	114 119 124 129 FZ	116.70
0.89	211.9	498.78	446.1	4	113 118 123 130 FZ	111.54
0.88	201.3	480.73	423.8	4	112 117 122 131 FZ	105.96
0.87	193.4	483.39	419.2	7	11 15 20 68 69 71 72 FZ	59.88
0.85	180.3	459.67	390.8	6	31 36 51 52 74 76 FZ	65.14
0.83	165.5	432.21	358.7	4	30 35 50 53 FZ	89.68
0.80	148.2	399.22	321.2	4	29 34 49 54 FZ	80.30
0.77	126.8	356.95	274.9	4	28 33 48 55 FZ	68.72
0.71	97.2	294.80	210.7	4	27 32 47 56 FZ	52.66

n_o (Hz)	$3.6n_o(H/V_H)$	S	$(3.6n_o)/V_H$	E	υ (Hz)	g_p	σ/μ
3ra itera							
0.88811	1.74	0.07	0.019	0.138	0.73	4.11	0.29

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.16	439.0	301.55	350.3	2	953 954 FZ	175.16
1.16	437.1	300.62	348.8	2	998 1000 FZ	174.41
1.16	435.2	299.69	347.3	2	997 999 FZ	173.65
1.16	433.3	298.74	345.8	2	950 951 FZ	172.89
1.16	431.4	297.79	344.3	2	994 996 FZ	172.13
1.15	429.5	296.83	342.7	2	993 995 FZ	171.35
1.15	427.5	295.86	341.2	2	947 948 FZ	170.58
1.15	425.6	294.89	339.6	2	990 992 FZ	169.80
1.15	423.6	293.90	338.0	2	989 991 FZ	169.01
1.15	421.6	292.91	336.4	2	944 945 FZ	168.21
1.15	419.6	291.91	334.8	2	977 979 FZ	167.41
1.15	417.6	290.90	333.2	2	976 978 FZ	166.61
1.14	402.1	315.37	360.7	3	752 754 826 FZ	120.25
1.14	400.1	314.25	359.0	4	773 807 864 867 FZ	89.74
1.14	398.1	313.12	357.2	4	774 808 865 866 FZ	89.29
1.14	396.1	311.97	355.4	3	775 809 828 FZ	118.45
1.14	394.0	310.82	353.5	4	776 810 868 871 FZ	88.38
1.14	392.0	309.65	351.7	4	777 811 869 870 FZ	87.92
1.13	414.0	345.70	392.0	3	778 812 860 FZ	130.68
1.13	411.8	344.37	389.9	4	779 813 872 875 FZ	97.49
1.13	409.5	343.03	387.8	4	780 814 873 874 FZ	96.96
1.13	407.3	341.67	385.7	3	781 815 861 FZ	128.56
1.13	405.0	340.29	383.5	4	782 816 877 878 FZ	95.88
1.13	402.7	338.91	381.4	4	783 817 876 879 FZ	95.34
1.12	428.1	381.04	428.1	3	784 818 862 FZ	142.69
1.12	425.6	379.44	425.6	4	785 819 880 883 FZ	106.39
1.12	423.1	377.82	423.0	4	786 820 881 882 FZ	105.76
1.12	420.6	376.18	420.5	3	787 821 863 FZ	140.17
1.12	418.0	374.52	417.9	4	788 822 884 887 FZ	104.48
1.11	415.4	372.85	415.3	4	789 823 885 886 FZ	103.83
1.11	385.9	436.13	484.9	3	512 514 630 FZ	161.65
1.11	383.4	434.11	481.8	4	544 601 633 634 FZ	120.46
1.11	380.9	432.07	478.7	4	545 600 632 635 FZ	119.67
1.11	378.4	430.00	475.5	3	546 599 627 FZ	158.50
1.10	375.8	427.91	472.3	4	547 598 637 638 FZ	118.07
1.10	373.2	425.78	469.0	4	548 597 636 639 FZ	117.25
1.10	387.4	460.88	506.7	3	549 596 624 FZ	168.89
1.10	384.6	458.50	503.0	4	550 595 641 642 FZ	125.76
1.09	381.8	456.10	499.4	4	551 594 640 643 FZ	124.84
1.09	379.0	453.66	495.7	3	552 593 621 FZ	165.22
1.09	376.1	451.19	491.9	4	553 592 644 647 FZ	122.98
1.09	373.2	448.68	488.1	4	554 591 645 646 FZ	122.03
1.09	384.3	481.60	522.8	3	555 590 618 FZ	174.25

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.08	381.2	478.81	518.6	4	556 589 649 650 FZ	129.64
1.08	378.1	475.98	514.3	4	557 588 648 651 FZ	128.57
1.08	374.9	473.10	510.0	3	558 587 615 FZ	169.99
1.08	371.7	470.18	505.6	4	559 586 653 654 FZ	126.40
1.07	368.4	467.20	501.1	4	560 585 652 655 FZ	125.28
1.07	379.1	500.97	536.0	3	561 584 612 FZ	178.66
1.07	375.6	497.65	531.1	4	562 583 656 659 FZ	132.76
1.06	372.1	494.27	526.0	4	563 582 657 658 FZ	131.51
1.06	368.5	490.82	521.0	3	564 581 609 FZ	173.65
1.06	364.8	487.32	515.8	4	565 580 661 662 FZ	128.95
1.06	361.1	483.74	510.5	4	566 579 660 663 FZ	127.63
1.05	367.1	512.24	539.0	3	567 578 606 FZ	179.67
1.05	363.2	508.27	533.2	4	568 577 665 666 FZ	133.30
1.05	359.2	504.22	527.3	4	569 576 664 667 FZ	131.83
1.04	355.1	500.09	521.3	3	570 575 603 FZ	173.76
1.04	350.9	495.86	515.2	4	571 574 669 670 FZ	128.79
1.04	346.6	491.53	508.9	4	572 573 668 671 FZ	127.23
1.03	329.7	615.33	634.9	7	4 6 372 443 444 446 447 FZ	90.69
1.03	325.4	609.60	626.6	6	383 388 393 394 449 451 FZ	104.44
1.02	321.1	603.72	618.3	4	382 387 392 395 FZ	154.56
1.02	316.6	597.69	609.7	4	381 386 391 396 FZ	152.42
1.02	312.1	591.50	600.9	4	380 385 390 397 FZ	150.23
1.01	307.4	585.13	591.9	4	379 384 389 398 FZ	147.98
1.01	308.5	608.04	612.4	7	14 18 302 360 361 363 364 FZ	87.48
1.00	303.5	600.93	602.5	6	295 300 318 319 367 369 FZ	100.41
1.00	298.3	593.61	592.3	4	294 299 317 320 FZ	148.07
0.99	293.1	586.03	581.8	4	293 298 316 321 FZ	145.45
0.99	287.6	578.20	571.0	4	292 297 315 322 FZ	142.75
0.98	282.0	570.07	559.8	4	291 296 314 323 FZ	139.96
0.98	281.6	589.87	575.9	7	13 17 205 277 278 280 281 FZ	82.28
0.97	275.5	580.64	563.4	6	216 221 265 274 283 285 FZ	93.90
0.96	269.1	571.01	550.5	4	215 220 266 273 FZ	137.61
0.96	262.5	560.93	537.0	4	214 219 267 272 FZ	134.25
0.95	255.7	550.35	522.9	4	213 218 268 271 FZ	130.74
0.94	248.5	539.20	508.3	4	212 217 269 270 FZ	127.07
0.93	247.5	557.84	521.3	7	12 16 111 144 145 147 148 FZ	74.47
0.93	239.4	544.60	504.2	6	116 121 126 127 150 152 FZ	84.03
0.92	230.8	530.46	486.1	4	115 120 125 128 FZ	121.52
0.91	221.7	515.26	466.8	4	114 119 124 129 FZ	116.70
0.89	211.9	498.78	446.1	4	113 118 123 130 FZ	111.54
0.88	201.3	480.73	423.8	4	112 117 122 131 FZ	105.96
0.87	193.4	483.39	419.2	7	11 15 20 68 69 71 72 FZ	59.88
0.85	180.3	459.67	390.8	6	31 36 51 52 74 76 FZ	65.14
0.83	165.5	432.21	358.7	4	30 35 50 53 FZ	89.68
0.80	148.2	399.22	321.2	4	29 34 49 54 FZ	80.30
0.77	126.8	356.95	274.9	4	28 33 48 55 FZ	68.72
0.71	97.2	294.80	210.7	4	27 32 47 56 FZ	52.66

Presiones y Fuerzas sobre las Líneas en dirección Z-Z.

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
1	90	1.31	1.31	228.07	237.67	0.123825	0.123825	1.00	12.87	1.2	1.38
2	89	1.31	1.31	227.72	236.94	0.123825	0.123825	1.00	12.85	1.2	1.38
3	88	1.31	1.31	227.36	236.20	0.123825	0.123825	1.00	12.83	1.2	1.38
4	87	1.31	1.31	227.01	235.46	0.123825	0.123825	1.00	12.81	1.2	1.38
5	86	1.30	1.30	226.64	234.71	0.123825	0.123825	1.00	12.79	1.2	1.38
6	85	1.30	1.30	226.28	233.95	0.123825	0.123825	1.00	12.77	1.2	1.38
7	84	1.30	1.30	225.91	233.19	0.123825	0.123825	1.00	12.75	1.2	1.38
8	83	1.30	1.30	225.54	232.42	0.123825	0.123825	1.00	12.73	1.2	1.38
9	82	1.30	1.30	225.16	231.64	0.123825	0.123825	1.00	12.71	1.2	1.39
10	81	1.29	1.29	224.78	230.86	0.123825	0.123825	1.00	12.68	1.2	1.39
11	80	1.29	1.29	224.39	230.07	0.123825	0.123825	1.00	12.66	1.2	1.39
12	79	1.29	1.29	224.00	229.27	0.123825	0.123825	1.00	12.64	1.2	1.39
13	78	1.29	1.29	223.61	228.46	0.123825	0.123825	1.00	15.77	1.2	1.39
14	77	1.28	1.28	223.21	227.65	0.123825	0.123825	1.00	15.74	1.2	1.39
15	76	1.28	1.28	222.81	226.83	0.123825	0.123825	1.00	15.72	1.2	1.39
16	75	1.28	1.28	222.40	226.00	0.123825	0.123825	1.00	15.69	1.2	1.39
17	74	1.28	1.28	221.99	225.17	0.123825	0.123825	1.00	15.66	1.2	1.39
18	73	1.28	1.28	221.58	224.33	0.123825	0.123825	1.00	15.63	1.2	1.39
19	72	1.27	1.27	221.15	223.47	0.123825	0.123825	1.00	15.60	1.2	1.39
20	71	1.27	1.27	220.73	222.61	0.123825	0.123825	1.00	15.57	1.2	1.40
21	70	1.27	1.27	220.30	221.74	0.123825	0.123825	1.00	15.54	1.2	1.40
22	69	1.27	1.27	219.86	220.86	0.123825	0.123825	1.00	15.51	1.2	1.40
23	68	1.26	1.26	219.42	219.98	0.123825	0.123825	1.00	15.48	1.2	1.40
24	67	1.26	1.26	218.97	219.08	0.123825	0.123825	1.00	15.45	1.2	1.40
25	66	1.26	1.26	218.51	218.17	0.123825	0.123825	1.00	15.41	1.2	1.40
26	65	1.25	1.25	218.06	217.25	0.123825	0.123825	1.00	15.38	1.2	1.40
27	64	1.25	1.25	217.59	216.32	0.123825	0.123825	1.00	15.35	1.2	1.40
28	63	1.25	1.25	217.12	215.39	0.123825	0.123825	1.00	15.31	1.2	1.40
29	62	1.25	1.25	216.64	214.44	0.123825	0.123825	1.00	15.28	1.2	1.41
30	61	1.24	1.24	216.15	213.48	0.123825	0.123825	1.00	15.25	1.2	1.41
31	60	1.24	1.24	215.66	212.51	0.24765	0.24765	1.00	21.30	1.2	1.41
32	59	1.24	1.24	215.16	211.52	0.24765	0.24765	1.00	21.25	1.2	1.41
33	58	1.24	1.24	214.65	210.53	0.24765	0.24765	1.00	21.20	1.2	1.41
34	57	1.23	1.23	214.14	209.52	0.24765	0.24765	1.00	21.15	1.2	1.41
35	56	1.23	1.23	213.62	208.50	0.24765	0.24765	1.00	21.09	1.2	1.41
36	55	1.23	1.23	213.09	207.46	0.24765	0.24765	1.00	21.04	1.2	1.42
37	54	1.22	1.22	212.55	206.42	0.24765	0.24765	1.00	20.99	1.2	1.42
38	53	1.22	1.22	212.00	205.35	0.24765	0.24765	1.00	20.93	1.2	1.42
39	52	1.22	1.22	211.44	204.28	0.24765	0.24765	1.00	20.88	1.2	1.42
40	51	1.21	1.21	210.88	203.18	0.24765	0.24765	1.00	20.82	1.2	1.42
41	50	1.21	1.21	210.30	202.08	0.24765	0.24765	1.00	20.77	1.2	1.42
42	49	1.21	1.21	209.72	200.95	0.24765	0.24765	1.00	20.71	1.2	1.42
43	48	1.20	1.20	209.12	199.81	0.24765	0.24765	1.00	20.65	1.2	1.43
44	47	1.20	1.20	208.51	198.66	0.24765	0.24765	1.00	20.59	1.2	1.43
45	46	1.20	1.20	207.90	197.48	0.24765	0.24765	1.00	20.53	1.2	1.43
46	45	1.19	1.19	207.27	196.29	0.24765	0.24765	1.00	20.47	1.2	1.43
47	44	1.19	1.19	206.62	195.07	0.24765	0.24765	1.00	20.40	1.2	1.43

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
48	43	1.19	1.19	205.97	193.84	0.24765	0.24765	1.00	20.34	1.2	1.43
49	42	1.18	1.18	205.30	192.58	0.24765	0.24765	1.00	20.27	1.2	1.44
50	41	1.18	1.18	204.62	191.31	0.24765	0.24765	1.00	20.21	1.2	1.44
51	40	1.17	1.17	203.92	190.01	0.24765	0.24765	1.00	20.14	1.2	1.44
52	39	1.17	1.17	203.21	188.68	0.24765	0.24765	1.00	20.07	1.2	1.44
53	38	1.17	1.17	202.49	187.34	0.24765	0.24765	1.00	20.00	1.2	1.44
54	37	1.16	1.16	201.74	185.96	0.24765	0.24765	1.00	19.92	1.2	1.45
55	36	1.16	1.16	200.98	184.56	0.24765	0.24765	1.00	19.85	1.2	1.45
56	35	1.15	1.15	200.20	183.13	0.24765	0.24765	1.00	19.77	1.2	1.45
57	34	1.15	1.15	199.40	181.67	0.24765	0.24765	1.00	19.69	1.2	1.45
58	33	1.14	1.14	198.58	180.18	0.24765	0.24765	1.00	19.61	1.2	1.45
59	32	1.14	1.14	197.74	178.66	0.24765	0.24765	1.00	19.53	1.2	1.46
60	31	1.13	1.13	196.88	177.10	0.24765	0.24765	1.00	19.44	1.2	1.46
61	30	1.13	1.13	195.99	175.50	0.371475	0.371475	1.00	24.88	1.2	1.46
62	29	1.12	1.12	195.07	173.87	0.371475	0.371475	1.00	24.77	1.2	1.47
63	28	1.12	1.12	194.13	172.19	0.371475	0.371475	1.00	24.65	1.2	1.47
64	27	1.11	1.11	193.16	170.47	0.371475	0.371475	1.00	24.52	1.2	1.47
65	26	1.11	1.11	192.15	168.71	0.371475	0.371475	1.00	24.40	1.2	1.47
66	25	1.10	1.10	191.12	166.89	0.371475	0.371475	1.00	24.27	1.2	1.48
67	24	1.09	1.09	190.04	165.02	0.371475	0.371475	1.00	24.13	1.2	1.48
68	23	1.09	1.09	188.93	163.09	0.371475	0.371475	1.00	23.99	1.2	1.48
69	22	1.08	1.08	187.78	161.11	0.371475	0.371475	1.00	23.84	1.2	1.49
70	21	1.07	1.07	186.57	159.05	0.371475	0.371475	1.00	23.69	1.2	1.49
71	20	1.07	1.07	185.32	156.92	0.371475	0.371475	1.00	23.53	1.2	1.49
72	19	1.06	1.06	184.01	154.72	0.371475	0.371475	1.00	23.36	1.2	1.50
73	18	1.05	1.05	182.65	152.42	0.371475	0.371475	1.00	23.19	1.2	1.50
74	17	1.04	1.04	181.21	150.04	0.371475	0.371475	1.00	23.01	1.2	1.51
75	16	1.03	1.03	179.70	147.55	0.371475	0.371475	1.00	22.82	1.2	1.51
76	15	1.02	1.02	178.11	144.94	0.371475	0.371475	1.00	22.61	1.2	1.52
77	14	1.02	1.02	176.42	142.21	0.371475	0.371475	1.00	22.40	1.2	1.52
78	13	1.00	1.00	174.63	139.33	0.371475	0.371475	1.00	22.17	1.2	1.53
79	12	0.99	0.99	172.71	136.29	0.371475	0.371475	1.00	21.93	1.2	1.54
80	11	0.98	0.98	170.65	133.05	0.371475	0.371475	1.00	21.67	1.2	1.54
81	10	0.97	0.97	168.42	129.60	0.371475	0.371475	1.00	21.38	1.2	1.55
82	9	0.96	0.96	165.99	125.88	0.371475	0.371475	1.00	21.07	1.2	1.56
83	8	0.94	0.94	163.31	121.86	0.371475	0.371475	1.00	20.73	1.2	1.57
84	7	0.92	0.92	160.33	117.45	0.371475	0.371475	1.00	20.36	1.2	1.58
85	6	0.90	0.90	156.95	112.56	0.371475	0.371475	1.00	19.93	1.2	1.60
86	5	0.88	0.88	153.05	107.03	0.371475	0.371475	1.00	19.43	1.2	1.61
87	4	0.85	0.85	148.41	100.64	0.371475	0.371475	1.00	18.84	1.2	1.63
88	3	0.82	0.82	142.64	92.96	0.371475	0.371475	1.00	18.11	1.2	1.66
89	2	0.78	0.78	134.87	83.12	0.371475	0.371475	1.00	17.12	1.2	1.69
90	1	0.71	0.71	122.57	68.64	0.371475	0.371475	1.00	15.56	1.2	1.76

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
Valor propuesto							
2.00	3.92	0.019	0.04	0.075	0.96	4.18	0.19

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.9484	270.49	35.32	33.49	2	953 954 FZ	16.75
0.9473	269.33	35.21	33.35	2	998 1000 FZ	16.68
0.9461	268.17	35.10	33.21	2	997 999 FZ	16.60
0.9450	266.99	34.99	33.06	2	950 951 FZ	16.53
0.9438	265.81	34.87	32.91	2	994 996 FZ	16.46
0.9426	264.62	34.76	32.77	2	993 995 FZ	16.38
0.9414	263.42	34.65	32.62	2	947 948 FZ	16.31
0.9402	262.21	34.53	32.47	2	990 992 FZ	16.23
0.9389	260.99	34.42	32.32	2	989 991 FZ	16.16
0.9377	259.77	34.30	32.17	2	944 945 FZ	16.08
0.9364	258.53	34.19	32.01	2	977 979 FZ	16.01
0.9352	257.28	34.07	31.86	2	976 978 FZ	15.93
0.9339	256.03	33.95	31.70	3	752 754 826 FZ	10.57
0.9326	254.76	33.83	31.55	4	773 807 864 867 FZ	7.89
0.9313	253.49	33.71	31.39	4	774 808 865 866 FZ	7.85
0.9299	252.20	33.58	31.23	3	775 809 828 FZ	10.41
0.9286	250.91	33.46	31.07	4	776 810 868 871 FZ	7.77
0.9272	249.60	33.33	30.91	4	777 811 869 870 FZ	7.73
0.9258	248.28	33.21	30.74	3	778 812 860 FZ	10.25
0.9244	246.95	33.08	30.58	4	779 813 872 875 FZ	7.64
0.9230	245.61	32.95	30.41	4	780 814 873 874 FZ	7.60
0.9216	244.25	32.82	30.24	3	781 815 861 FZ	10.08
0.9201	242.89	32.69	30.08	4	782 816 877 878 FZ	7.52
0.9187	241.51	32.55	29.91	4	783 817 876 879 FZ	7.48
0.9172	240.12	32.42	29.73	3	784 818 862 FZ	9.91
0.9157	238.72	32.28	29.56	4	785 819 880 883 FZ	7.39
0.9141	237.30	32.14	29.38	4	786 820 881 882 FZ	7.35
0.9126	235.87	32.00	29.21	3	787 821 863 FZ	9.74
0.9110	234.42	31.86	29.03	4	788 822 884 887 FZ	7.26
0.9094	232.97	31.72	28.85	4	789 823 885 886 FZ	7.21
0.9078	231.49	63.15	57.33	3	512 514 630 FZ	19.11
0.9061	230.00	62.86	56.96	4	544 601 633 634 FZ	14.24
0.9045	228.50	62.56	56.59	4	545 600 632 635 FZ	14.15
0.9028	226.98	62.26	56.21	3	546 599 627 FZ	18.74
0.9010	225.44	61.96	55.83	4	547 598 637 638 FZ	13.96
0.8993	223.88	61.65	55.45	4	548 597 636 639 FZ	13.86
0.8975	222.31	61.34	55.06	3	549 596 624 FZ	18.35
0.8957	220.72	61.03	54.66	4	550 595 641 642 FZ	13.67
0.8939	219.11	60.71	54.26	4	551 594 640 643 FZ	13.57
0.8920	217.49	60.38	53.86	3	552 593 621 FZ	17.95
0.8901	215.84	60.05	53.45	4	553 592 644 647 FZ	13.36
0.8881	214.17	59.72	53.04	4	554 591 645 646 FZ	13.26
0.8862	212.48	59.38	52.62	3	555 590 618 FZ	17.54

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.8842	210.77	59.04	52.20	4	556 589 649 650 FZ	13.05
0.8821	209.04	58.69	51.77	4	557 588 648 651 FZ	12.94
0.8800	207.28	58.33	51.33	3	558 587 615 FZ	17.11
0.8779	205.50	57.97	50.89	4	559 586 653 654 FZ	12.72
0.8757	203.69	57.60	50.44	4	560 585 652 655 FZ	12.61
0.8735	201.86	57.23	49.99	3	561 584 612 FZ	16.66
0.8712	200.00	56.85	49.53	4	562 583 656 659 FZ	12.38
0.8689	198.11	56.47	49.06	4	563 582 657 658 FZ	12.27
0.8665	196.20	56.07	48.59	3	564 581 609 FZ	16.20
0.8641	194.25	55.67	48.11	4	565 580 661 662 FZ	12.03
0.8616	192.27	55.26	47.62	4	566 579 660 663 FZ	11.90
0.8591	190.26	54.85	47.12	3	567 578 606 FZ	15.71
0.8565	188.21	54.42	46.61	4	568 577 665 666 FZ	11.65
0.8538	186.13	53.99	46.09	4	569 576 664 667 FZ	11.52
0.8510	184.01	53.55	45.57	3	570 575 603 FZ	15.19
0.8482	181.85	53.09	45.03	4	571 574 669 670 FZ	11.26
0.8453	179.64	52.63	44.49	4	572 573 668 671 FZ	11.12
0.8423	177.39	78.23	65.90	7	4 6 372 443 444 446 447 FZ	9.41
0.8392	175.10	77.51	65.05	6	383 388 393 394 449 451 FZ	10.84
0.8361	172.76	76.76	64.17	4	382 387 392 395 FZ	16.04
0.8328	170.36	75.99	63.28	4	381 386 391 396 FZ	15.82
0.8294	167.91	75.20	62.37	4	380 385 390 397 FZ	15.59
0.8259	165.40	74.39	61.44	4	379 384 389 398 FZ	15.36
0.8223	162.83	73.56	60.49	7	14 18 302 360 361 363 364 FZ	8.64
0.8185	160.19	72.70	59.51	6	295 300 318 319 367 369 FZ	9.92
0.8146	157.48	71.82	58.50	4	294 299 317 320 FZ	14.62
0.8105	154.69	70.90	57.46	4	293 298 316 321 FZ	14.37
0.8062	151.82	69.95	56.40	4	292 297 315 322 FZ	14.10
0.8018	148.86	68.97	55.30	4	291 296 314 323 FZ	13.82
0.7971	145.80	67.95	54.16	7	13 17 205 277 278 280 281 FZ	7.74
0.7922	142.63	66.88	52.98	6	216 221 265 274 283 285 FZ	8.83
0.7870	139.35	65.77	51.77	4	215 220 266 273 FZ	12.94
0.7816	135.94	64.61	50.50	4	214 219 267 272 FZ	12.62
0.7758	132.38	63.39	49.18	4	213 218 268 271 FZ	12.29
0.7696	128.67	62.11	47.80	4	212 217 269 270 FZ	11.95
0.7629	124.78	60.75	46.35	7	12 16 111 144 145 147 148 FZ	6.62
0.7558	120.68	59.31	44.83	6	116 121 126 127 150 152 FZ	7.47
0.7481	116.34	57.77	43.22	4	115 120 125 128 FZ	10.80
0.7396	111.73	56.12	41.50	4	114 119 124 129 FZ	10.38
0.7303	106.79	54.32	39.67	4	113 118 123 130 FZ	9.92
0.7198	101.45	52.36	37.69	4	112 117 122 131 FZ	9.42
0.7079	95.62	50.17	35.52	7	11 15 20 68 69 71 72 FZ	5.07
0.6941	89.15	47.71	33.12	6	31 36 51 52 74 76 FZ	5.52
0.6776	81.83	44.86	30.40	4	30 35 50 53 FZ	7.60
0.6569	73.27	41.44	27.22	4	29 34 49 54 FZ	6.80
0.6287	62.71	37.05	23.29	4	28 33 48 55 FZ	5.82
0.5834	48.05	30.60	17.85	4	27 32 47 56 FZ	4.46

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
1ra itera							
0.92609	1.81	0.066	0.020	0.13	0.74	4.12	0.28

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.14	324.80	35.32	40.22	2	953 954 FZ	20.11
1.14	323.41	35.21	40.05	2	998 1000 FZ	20.02
1.14	322.01	35.10	39.87	2	997 999 FZ	19.94
1.13	320.60	34.99	39.70	2	950 951 FZ	19.85
1.13	319.18	34.87	39.52	2	994 996 FZ	19.76
1.13	317.75	34.76	39.35	2	993 995 FZ	19.67
1.13	316.31	34.65	39.17	2	947 948 FZ	19.58
1.13	314.86	34.53	38.99	2	990 992 FZ	19.49
1.13	313.39	34.42	38.81	2	989 991 FZ	19.40
1.13	311.92	34.30	38.62	2	944 945 FZ	19.31
1.12	310.44	34.19	38.44	2	977 979 FZ	19.22
1.12	308.94	34.07	38.25	2	976 978 FZ	19.13
1.12	307.43	33.95	38.07	3	752 754 826 FZ	12.69
1.12	305.91	33.83	37.88	4	773 807 864 867 FZ	9.47
1.12	304.38	33.71	37.69	4	774 808 865 866 FZ	9.42
1.12	302.84	33.58	37.50	3	775 809 828 FZ	12.50
1.12	301.28	33.46	37.31	4	776 810 868 871 FZ	9.33
1.11	299.71	33.33	37.11	4	777 811 869 870 FZ	9.28
1.11	298.13	33.21	36.92	3	778 812 860 FZ	12.31
1.11	296.53	33.08	36.72	4	779 813 872 875 FZ	9.18
1.11	294.92	32.95	36.52	4	780 814 873 874 FZ	9.13
1.11	293.29	32.82	36.32	3	781 815 861 FZ	12.11
1.10	291.66	32.69	36.11	4	782 816 877 878 FZ	9.03
1.10	290.00	32.55	35.91	4	783 817 876 879 FZ	8.98
1.10	288.33	32.42	35.70	3	784 818 862 FZ	11.90
1.10	286.65	32.28	35.49	4	785 819 880 883 FZ	8.87
1.10	284.94	32.14	35.28	4	786 820 881 882 FZ	8.82
1.10	283.23	32.00	35.07	3	787 821 863 FZ	11.69
1.09	281.49	31.86	34.86	4	788 822 884 887 FZ	8.71
1.09	279.74	31.72	34.64	4	789 823 885 886 FZ	8.66
1.09	277.97	63.15	68.84	3	512 514 630 FZ	22.95
1.09	276.18	62.86	68.40	4	544 601 633 634 FZ	17.10
1.09	274.37	62.56	67.95	4	545 600 632 635 FZ	16.99
1.08	272.55	62.26	67.50	3	546 599 627 FZ	22.50
1.08	270.70	61.96	67.04	4	547 598 637 638 FZ	16.76
1.08	268.83	61.65	66.58	4	548 597 636 639 FZ	16.64
1.08	266.95	61.34	66.11	3	549 596 624 FZ	22.04
1.08	265.04	61.03	65.64	4	550 595 641 642 FZ	16.41
1.07	263.11	60.71	65.16	4	551 594 640 643 FZ	16.29
1.07	261.15	60.38	64.67	3	552 593 621 FZ	21.56
1.07	259.17	60.05	64.18	4	553 592 644 647 FZ	16.05
1.07	257.17	59.72	63.69	4	554 591 645 646 FZ	15.92
1.06	255.14	59.38	63.19	3	555 590 618 FZ	21.06

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.06	253.09	59.04	62.68	4	556 589 649 650 FZ	15.67
1.06	251.01	58.69	62.16	4	557 588 648 651 FZ	15.54
1.06	248.90	58.33	61.64	3	558 587 615 FZ	20.55
1.05	246.76	57.97	61.11	4	559 586 653 654 FZ	15.28
1.05	244.59	57.60	60.57	4	560 585 652 655 FZ	15.14
1.05	242.39	57.23	60.03	3	561 584 612 FZ	20.01
1.05	240.16	56.85	59.47	4	562 583 656 659 FZ	14.87
1.04	237.89	56.47	58.91	4	563 582 657 658 FZ	14.73
1.04	235.59	56.07	58.34	3	564 581 609 FZ	19.45
1.04	233.25	55.67	57.76	4	565 580 661 662 FZ	14.44
1.03	230.87	55.26	57.18	4	566 579 660 663 FZ	14.29
1.03	228.46	54.85	56.58	3	567 578 606 FZ	18.86
1.03	226.00	54.42	55.97	4	568 577 665 666 FZ	13.99
1.03	223.50	53.99	55.35	4	569 576 664 667 FZ	13.84
1.02	220.95	53.55	54.72	3	570 575 603 FZ	18.24
1.02	218.36	53.09	54.08	4	571 574 669 670 FZ	13.52
1.02	215.71	52.63	53.42	4	572 573 668 671 FZ	13.36
1.01	213.01	78.23	79.13	7	4 6 372 443 444 446 447 FZ	11.30
1.01	210.26	77.51	78.10	6	383 388 393 394 449 451 FZ	13.02
1.00	207.44	76.76	77.06	4	382 387 392 395 FZ	19.26
1.00	204.56	75.99	75.99	4	381 386 391 396 FZ	19.00
1.00	201.62	75.20	74.90	4	380 385 390 397 FZ	18.72
0.99	198.61	74.39	73.78	4	379 384 389 398 FZ	18.44
0.99	195.52	73.56	72.63	7	14 18 302 360 361 363 364 FZ	10.38
0.98	192.35	72.70	71.45	6	295 300 318 319 367 369 FZ	11.91
0.98	189.09	71.82	70.24	4	294 299 317 320 FZ	17.56
0.97	185.75	70.90	69.00	4	293 298 316 321 FZ	17.25
0.97	182.30	69.95	67.72	4	292 297 315 322 FZ	16.93
0.96	178.74	68.97	66.40	4	291 296 314 323 FZ	16.60
0.96	175.07	67.95	65.03	7	13 17 205 277 278 280 281 FZ	9.29
0.95	171.27	66.88	63.62	6	216 221 265 274 283 285 FZ	10.60
0.95	167.33	65.77	62.16	4	215 220 266 273 FZ	15.54
0.94	163.23	64.61	60.64	4	214 219 267 272 FZ	15.16
0.93	158.96	63.39	59.05	4	213 218 268 271 FZ	14.76
0.92	154.50	62.11	57.39	4	212 217 269 270 FZ	14.35
0.92	149.83	60.75	55.66	7	12 16 111 144 145 147 148 FZ	7.95
0.91	144.90	59.31	53.83	6	116 121 126 127 150 152 FZ	8.97
0.90	139.70	57.77	51.89	4	115 120 125 128 FZ	12.97
0.89	134.16	56.12	49.84	4	114 119 124 129 FZ	12.46
0.88	128.23	54.32	47.63	4	113 118 123 130 FZ	11.91
0.86	121.82	52.36	45.25	4	112 117 122 131 FZ	11.31
0.85	114.81	50.17	42.65	7	11 15 20 68 69 71 72 FZ	6.09
0.83	107.05	47.71	39.77	6	31 36 51 52 74 76 FZ	6.63
0.81	98.26	44.86	36.50	4	30 35 50 53 FZ	9.13
0.79	87.98	41.44	32.68	4	29 34 49 54 FZ	8.17
0.75	75.30	37.05	27.97	4	28 33 48 55 FZ	6.99
0.70	57.70	30.60	21.43	4	27 32 47 56 FZ	5.36

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
2da itera							
0.89166	1.75	0.07	0.019	0.138	0.73	4.11	0.29

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.16	331.32	35.32	41.03	2	953 954 FZ	20.51
1.16	329.90	35.21	40.85	2	998 1000 FZ	20.43
1.16	328.47	35.10	40.67	2	997 999 FZ	20.34
1.16	327.04	34.99	40.50	2	950 951 FZ	20.25
1.16	325.59	34.87	40.32	2	994 996 FZ	20.16
1.15	324.13	34.76	40.14	2	993 995 FZ	20.07
1.15	322.66	34.65	39.95	2	947 948 FZ	19.98
1.15	321.18	34.53	39.77	2	990 992 FZ	19.88
1.15	319.69	34.42	39.59	2	989 991 FZ	19.79
1.15	318.18	34.30	39.40	2	944 945 FZ	19.70
1.15	316.67	34.19	39.21	2	977 979 FZ	19.61
1.15	315.14	34.07	39.02	2	976 978 FZ	19.51
1.14	313.61	33.95	38.83	3	752 754 826 FZ	12.94
1.14	312.06	33.83	38.64	4	773 807 864 867 FZ	9.66
1.14	310.49	33.71	38.45	4	774 808 865 866 FZ	9.61
1.14	308.92	33.58	38.25	3	775 809 828 FZ	12.75
1.14	307.33	33.46	38.06	4	776 810 868 871 FZ	9.51
1.14	305.73	33.33	37.86	4	777 811 869 870 FZ	9.46
1.13	304.11	33.21	37.66	3	778 812 860 FZ	12.55
1.13	302.48	33.08	37.46	4	779 813 872 875 FZ	9.36
1.13	300.84	32.95	37.25	4	780 814 873 874 FZ	9.31
1.13	299.18	32.82	37.05	3	781 815 861 FZ	12.35
1.13	297.51	32.69	36.84	4	782 816 877 878 FZ	9.21
1.13	295.82	32.55	36.63	4	783 817 876 879 FZ	9.16
1.12	294.12	32.42	36.42	3	784 818 862 FZ	12.14
1.12	292.40	32.28	36.21	4	785 819 880 883 FZ	9.05
1.12	290.67	32.14	35.99	4	786 820 881 882 FZ	9.00
1.12	288.91	32.00	35.77	3	787 821 863 FZ	11.92
1.12	287.14	31.86	35.56	4	788 822 884 887 FZ	8.89
1.11	285.36	31.72	35.33	4	789 823 885 886 FZ	8.83
1.11	283.55	63.15	70.22	3	512 514 630 FZ	23.41
1.11	281.73	62.86	69.77	4	544 601 633 634 FZ	17.44
1.11	279.88	62.56	69.31	4	545 600 632 635 FZ	17.33
1.11	278.02	62.26	68.85	3	546 599 627 FZ	22.95
1.10	276.14	61.96	68.39	4	547 598 637 638 FZ	17.10
1.10	274.23	61.65	67.91	4	548 597 636 639 FZ	16.98
1.10	272.31	61.34	67.44	3	549 596 624 FZ	22.48
1.10	270.36	61.03	66.95	4	550 595 641 642 FZ	16.74
1.09	268.39	60.71	66.47	4	551 594 640 643 FZ	16.62
1.09	266.40	60.38	65.97	3	552 593 621 FZ	21.99
1.09	264.38	60.05	65.47	4	553 592 644 647 FZ	16.37
1.09	262.33	59.72	64.97	4	554 591 645 646 FZ	16.24
1.09	260.27	59.38	64.45	3	555 590 618 FZ	21.48

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.08	258.17	59.04	63.94	4	556 589 649 650 FZ	15.98
1.08	256.05	58.69	63.41	4	557 588 648 651 FZ	15.85
1.08	253.89	58.33	62.88	3	558 587 615 FZ	20.96
1.08	251.71	57.97	62.34	4	559 586 653 654 FZ	15.58
1.07	249.50	57.60	61.79	4	560 585 652 655 FZ	15.45
1.07	247.26	57.23	61.23	3	561 584 612 FZ	20.41
1.07	244.98	56.85	60.67	4	562 583 656 659 FZ	15.17
1.06	242.67	56.47	60.10	4	563 582 657 658 FZ	15.02
1.06	240.32	56.07	59.52	3	564 581 609 FZ	19.84
1.06	237.93	55.67	58.92	4	565 580 661 662 FZ	14.73
1.06	235.51	55.26	58.32	4	566 579 660 663 FZ	14.58
1.05	233.05	54.85	57.71	3	567 578 606 FZ	19.24
1.05	230.54	54.42	57.09	4	568 577 665 666 FZ	14.27
1.05	227.99	53.99	56.46	4	569 576 664 667 FZ	14.12
1.04	225.39	53.55	55.82	3	570 575 603 FZ	18.61
1.04	222.74	53.09	55.16	4	571 574 669 670 FZ	13.79
1.04	220.04	52.63	54.49	4	572 573 668 671 FZ	13.62
1.03	217.29	78.23	80.72	7	4 6 372 443 444 446 447 FZ	11.53
1.03	214.48	77.51	79.67	6	383 388 393 394 449 451 FZ	13.28
1.02	211.61	76.76	78.61	4	382 387 392 395 FZ	19.65
1.02	208.67	75.99	77.52	4	381 386 391 396 FZ	19.38
1.02	205.67	75.20	76.40	4	380 385 390 397 FZ	19.10
1.01	202.60	74.39	75.26	4	379 384 389 398 FZ	18.81
1.01	199.44	73.56	74.09	7	14 18 302 360 361 363 364 FZ	10.58
1.00	196.21	72.70	72.89	6	295 300 318 319 367 369 FZ	12.15
1.00	192.89	71.82	71.65	4	294 299 317 320 FZ	17.91
0.99	189.48	70.90	70.39	4	293 298 316 321 FZ	17.60
0.99	185.96	69.95	69.08	4	292 297 315 322 FZ	17.27
0.98	182.33	68.97	67.73	4	291 296 314 323 FZ	16.93
0.98	178.58	67.95	66.34	7	13 17 205 277 278 280 281 FZ	9.48
0.97	174.71	66.88	64.90	6	216 221 265 274 283 285 FZ	10.82
0.96	170.69	65.77	63.41	4	215 220 266 273 FZ	15.85
0.96	166.51	64.61	61.85	4	214 219 267 272 FZ	15.46
0.95	162.16	63.39	60.24	4	213 218 268 271 FZ	15.06
0.94	157.61	62.11	58.55	4	212 217 269 270 FZ	14.64
0.93	152.84	60.75	56.77	7	12 16 111 144 145 147 148 FZ	8.11
0.93	147.81	59.31	54.91	6	116 121 126 127 150 152 FZ	9.15
0.92	142.50	57.77	52.94	4	115 120 125 128 FZ	13.23
0.91	136.85	56.12	50.84	4	114 119 124 129 FZ	12.71
0.89	130.80	54.32	48.59	4	113 118 123 130 FZ	12.15
0.88	124.26	52.36	46.16	4	112 117 122 131 FZ	11.54
0.87	117.12	50.17	43.51	7	11 15 20 68 69 71 72 FZ	6.22
0.85	109.20	47.71	40.57	6	31 36 51 52 74 76 FZ	6.76
0.83	100.23	44.86	37.23	4	30 35 50 53 FZ	9.31
0.80	89.75	41.44	33.34	4	29 34 49 54 FZ	8.33
0.77	76.81	37.05	28.53	4	28 33 48 55 FZ	7.13
0.71	58.86	30.60	21.87	4	27 32 47 56 FZ	5.47

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
3^ra^ itera							
0.88811	1.74	0.07	0.019	0.138	0.73	4.11	0.29

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.16	331.32	35.32	41.03	2	953 954 FZ	20.51
1.16	329.90	35.21	40.85	2	998 1000 FZ	20.43
1.16	328.47	35.10	40.67	2	997 999 FZ	20.34
1.16	327.04	34.99	40.50	2	950 951 FZ	20.25
1.16	325.59	34.87	40.32	2	994 996 FZ	20.16
1.15	324.13	34.76	40.14	2	993 995 FZ	20.07
1.15	322.66	34.65	39.95	2	947 948 FZ	19.98
1.15	321.18	34.53	39.77	2	990 992 FZ	19.88
1.15	319.69	34.42	39.59	2	989 991 FZ	19.79
1.15	318.18	34.30	39.40	2	944 945 FZ	19.70
1.15	316.67	34.19	39.21	2	977 979 FZ	19.61
1.15	315.14	34.07	39.02	2	976 978 FZ	19.51
1.14	313.61	33.95	38.83	3	752 754 826 FZ	12.94
1.14	312.06	33.83	38.64	4	773 807 864 867 FZ	9.66
1.14	310.49	33.71	38.45	4	774 808 865 866 FZ	9.61
1.14	308.92	33.58	38.25	3	775 809 828 FZ	12.75
1.14	307.33	33.46	38.06	4	776 810 868 871 FZ	9.51
1.14	305.73	33.33	37.86	4	777 811 869 870 FZ	9.46
1.13	304.11	33.21	37.66	3	778 812 860 FZ	12.55
1.13	302.48	33.08	37.46	4	779 813 872 875 FZ	9.36
1.13	300.84	32.95	37.25	4	780 814 873 874 FZ	9.31
1.13	299.18	32.82	37.05	3	781 815 861 FZ	12.35
1.13	297.51	32.69	36.84	4	782 816 877 878 FZ	9.21
1.13	295.82	32.55	36.63	4	783 817 876 879 FZ	9.16
1.12	294.12	32.42	36.42	3	784 818 862 FZ	12.14
1.12	292.40	32.28	36.21	4	785 819 880 883 FZ	9.05
1.12	290.67	32.14	35.99	4	786 820 881 882 FZ	9.00
1.12	288.91	32.00	35.77	3	787 821 863 FZ	11.92
1.12	287.14	31.86	35.56	4	788 822 884 887 FZ	8.89
1.11	285.36	31.72	35.33	4	789 823 885 886 FZ	8.83
1.11	283.55	63.15	70.22	3	512 514 630 FZ	23.41
1.11	281.73	62.86	69.77	4	544 601 633 634 FZ	17.44
1.11	279.88	62.56	69.31	4	545 600 632 635 FZ	17.33
1.11	278.02	62.26	68.85	3	546 599 627 FZ	22.95
1.10	276.14	61.96	68.39	4	547 598 637 638 FZ	17.10
1.10	274.23	61.65	67.91	4	548 597 636 639 FZ	16.98
1.10	272.31	61.34	67.44	3	549 596 624 FZ	22.48
1.10	270.36	61.03	66.95	4	550 595 641 642 FZ	16.74
1.09	268.39	60.71	66.47	4	551 594 640 643 FZ	16.62
1.09	266.40	60.38	65.97	3	552 593 621 FZ	21.99
1.09	264.38	60.05	65.47	4	553 592 644 647 FZ	16.37
1.09	262.33	59.72	64.97	4	554 591 645 646 FZ	16.24
1.09	260.27	59.38	64.45	3	555 590 618 FZ	21.48

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
1.08	258.17	59.04	63.94	4	556 589 649 650 FZ	15.98
1.08	256.05	58.69	63.41	4	557 588 648 651 FZ	15.85
1.08	253.89	58.33	62.88	3	558 587 615 FZ	20.96
1.08	251.71	57.97	62.34	4	559 586 653 654 FZ	15.58
1.07	249.50	57.60	61.79	4	560 585 652 655 FZ	15.45
1.07	247.26	57.23	61.23	3	561 584 612 FZ	20.41
1.07	244.98	56.85	60.67	4	562 583 656 659 FZ	15.17
1.06	242.67	56.47	60.10	4	563 582 657 658 FZ	15.02
1.06	240.32	56.07	59.52	3	564 581 609 FZ	19.84
1.06	237.93	55.67	58.92	4	565 580 661 662 FZ	14.73
1.06	235.51	55.26	58.32	4	566 579 660 663 FZ	14.58
1.05	233.05	54.85	57.71	3	567 578 606 FZ	19.24
1.05	230.54	54.42	57.09	4	568 577 665 666 FZ	14.27
1.05	227.99	53.99	56.46	4	569 576 664 667 FZ	14.12
1.04	225.39	53.55	55.82	3	570 575 603 FZ	18.61
1.04	222.74	53.09	55.16	4	571 574 669 670 FZ	13.79
1.04	220.04	52.63	54.49	4	572 573 668 671 FZ	13.62
1.03	217.29	78.23	80.72	7	4 6 372 443 444 446 447 FZ	11.53
1.03	214.48	77.51	79.67	6	383 388 393 394 449 451 FZ	13.28
1.02	211.61	76.76	78.61	4	382 387 392 395 FZ	19.65
1.02	208.67	75.99	77.52	4	381 386 391 396 FZ	19.38
1.02	205.67	75.20	76.40	4	380 385 390 397 FZ	19.10
1.01	202.60	74.39	75.26	4	379 384 389 398 FZ	18.81
1.01	199.44	73.56	74.09	7	14 18 302 360 361 363 364 FZ	10.58
1.00	196.21	72.70	72.89	6	295 300 318 319 367 369 FZ	12.15
1.00	192.89	71.82	71.65	4	294 299 317 320 FZ	17.91
0.99	189.48	70.90	70.39	4	293 298 316 321 FZ	17.60
0.99	185.96	69.95	69.08	4	292 297 315 322 FZ	17.27
0.98	182.33	68.97	67.73	4	291 296 314 323 FZ	16.93
0.98	178.58	67.95	66.34	7	13 17 205 277 278 280 281 FZ	9.48
0.97	174.71	66.88	64.90	6	216 221 265 274 283 285 FZ	10.82
0.96	170.69	65.77	63.41	4	215 220 266 273 FZ	15.85
0.96	166.51	64.61	61.85	4	214 219 267 272 FZ	15.46
0.95	162.16	63.39	60.24	4	213 218 268 271 FZ	15.06
0.94	157.61	62.11	58.55	4	212 217 269 270 FZ	14.64
0.93	152.84	60.75	56.77	7	12 16 111 144 145 147 148 FZ	8.11
0.93	147.81	59.31	54.91	6	116 121 126 127 150 152 FZ	9.15
0.92	142.50	57.77	52.94	4	115 120 125 128 FZ	13.23
0.91	136.85	56.12	50.84	4	114 119 124 129 FZ	12.71
0.89	130.80	54.32	48.59	4	113 118 123 130 FZ	12.15
0.88	124.26	52.36	46.16	4	112 117 122 131 FZ	11.54
0.87	117.12	50.17	43.51	7	11 15 20 68 69 71 72 FZ	6.22
0.85	109.20	47.71	40.57	6	31 36 51 52 74 76 FZ	6.76
0.83	100.23	44.86	37.23	4	30 35 50 53 FZ	9.31
0.80	89.75	41.44	33.34	4	29 34 49 54 FZ	8.33
0.77	76.81	37.05	28.53	4	28 33 48 55 FZ	7.13
0.71	58.86	30.60	21.87	4	27 32 47 56 FZ	5.47

Fuerzas sobre las Parábolas en dirección Z-Z.

Antenas Parabólicas	Altura (ft).	Grados (γ)	Diámetro (φ) (ft).	Wind Force Coefficients for Typical Paraboloid Without Radome C_A	C_S	C_M	Ap (ft²).
1	295.2756	0	9.8425	0.00397	0.00000	0.000000	76.0856
2	295.2756	0	9.8425	0.00397	0.00000	0.000000	76.0856
3	295.2756	180	9.8425	0.00270	0.00000	0.000000	76.0856
4	196.8504	0	9.8425	0.00397	0.00000	0.000000	76.0856
5	196.8504	0	9.8425	0.00397	0.00000	0.000000	76.0856
6	196.8504	180	9.8425	0.00270	0.00000	0.000000	76.0856
7	98.4252	0	9.8425	0.00397	0.00000	0.000000	76.0856
8	98.4252	0	9.8425	0.00397	0.00000	0.000000	76.0856
9	98.4252	180	9.8425	0.00270	0.00000	0.000000	76.0856
PLATAF-1	98.4252	0	8.0410	0.00397	0.00000	0.000000	50.7809
PLATAF-2	196.8504	0	6.7274	0.00397	0.00000	0.000000	35.5457

K_Z (ft)	G_H (ft).	V_R (mi/h)	F_A (lb).	Fs (lb).	M (lb-ft).	FX (lb).
1.87033	1.08872	98.18	5928.51	0.00	0.00	0.00
1.87033	1.08872	98.18	5928.51	0.00	0.00	0.00
1.87033	1.08872	98.18	4031.99	0.00	0.00	0.00
1.66574	1.08872	98.18	5280.00	0.00	0.00	0.00
1.66574	1.08872	98.18	5280.00	0.00	0.00	0.00
1.66574	1.08872	98.18	3590.93	0.00	0.00	0.00
1.36646	1.08872	98.18	4331.37	0.00	0.00	0.00
1.36646	1.08872	98.18	4331.37	0.00	0.00	0.00
1.36646	1.08872	98.18	2945.77	0.00	0.00	0.00
1.36646	1.08872	98.18	2890.83	0.00	0.00	0.00
1.66574	1.08872	98.18	2466.71	0.00	0.00	0.00

FZ (lb).	Nodos	FZ (kg).	FZ / # nodos (kg).
5928.51	953 FZ	2689.17	
5928.51	954 FZ	2689.17	
4031.99	955 FZ	1828.91	
5280.00	512 FZ	2395.01	
5280.00	513 FZ	2395.01	
3590.93	514 FZ	1628.85	
4331.37	4 FZ	1964.71	
4331.37	5 FZ	1964.71	
2945.77	6 FZ	1336.20	
2890.83	496 511 510 509 508 507 495 460 493 492 491 490 489 459 FZ	1311.28	93.66
2466.71	848 859 858 857 850 830 847 846 845 832 FZ	1118.90	111.89

El valor obtenido de frecuencia natural en dirección Z-Z, con las iteraciones conjuntas de la estructura, líneas y parábolas es:

n_o (Hz)
Definitivo
0.88811

Por lo tanto las fuerzas obtenidas de la tercera iteración, son las fuerzas de diseño.

Presiones y Fuerzas sobre la Estructura en dirección X-X.

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
1	90	1.31	1.31	228.07	237.67	4.531	10.393	0.44	12.87	1.54	1.38
2	89	1.31	1.31	227.72	236.94	4.531	10.393	0.44	12.85	1.54	1.38
3	88	1.31	1.31	227.36	236.20	4.531	10.393	0.44	12.83	1.54	1.38
4	87	1.31	1.31	227.01	235.46	4.531	10.393	0.44	12.81	1.54	1.38
5	86	1.30	1.30	226.64	234.71	4.531	10.393	0.44	12.79	1.54	1.38
6	85	1.30	1.30	226.28	233.95	4.531	10.393	0.44	12.77	1.54	1.38
7	84	1.30	1.30	225.91	233.19	4.531	10.393	0.44	12.75	1.54	1.38
8	83	1.30	1.30	225.54	232.42	4.531	10.393	0.44	12.73	1.54	1.38
9	82	1.30	1.30	225.16	231.64	4.531	10.393	0.44	12.71	1.54	1.39
10	81	1.29	1.29	224.78	230.86	4.531	10.393	0.44	12.68	1.54	1.39
11	80	1.29	1.29	224.39	230.07	4.531	10.393	0.44	12.66	1.54	1.39
12	79	1.29	1.29	224.00	229.27	4.531	10.393	0.44	12.64	1.54	1.39
13	78	1.29	1.29	223.61	228.46	5.258	12.11	0.43	15.77	1.51	1.39
14	77	1.28	1.28	223.21	227.65	5.258	12.11	0.43	15.74	1.51	1.39
15	76	1.28	1.28	222.81	226.83	5.258	12.11	0.43	15.72	1.51	1.39
16	75	1.28	1.28	222.40	226.00	5.258	12.11	0.43	15.69	1.51	1.39
17	74	1.28	1.28	221.99	225.17	5.258	12.11	0.43	15.66	1.51	1.39
18	73	1.28	1.28	221.58	224.33	5.258	12.11	0.43	15.63	1.51	1.39
19	72	1.27	1.27	221.15	223.47	5.508	15.568	0.35	15.60	1.60	1.39
20	71	1.27	1.27	220.73	222.61	5.508	15.568	0.35	15.57	1.60	1.40
21	70	1.27	1.27	220.30	221.74	5.508	15.568	0.35	15.54	1.60	1.40
22	69	1.27	1.27	219.86	220.86	5.508	15.568	0.35	15.51	1.60	1.40
23	68	1.26	1.26	219.42	219.98	5.508	15.568	0.35	15.48	1.60	1.40
24	67	1.26	1.26	218.97	219.08	5.508	15.568	0.35	15.45	1.60	1.40
25	66	1.26	1.26	218.51	218.17	5.774	19.027	0.30	15.41	1.66	1.40
26	65	1.25	1.25	218.06	217.25	5.774	19.027	0.30	15.38	1.66	1.40
27	64	1.25	1.25	217.59	216.32	5.774	19.027	0.30	15.35	1.66	1.40
28	63	1.25	1.25	217.12	215.39	5.774	19.027	0.30	15.31	1.66	1.40
29	62	1.25	1.25	216.64	214.44	5.774	19.027	0.30	15.28	1.66	1.41
30	61	1.24	1.24	216.15	213.48	5.774	19.027	0.30	15.25	1.66	1.41
31	60	1.24	1.24	215.66	212.51	7.2622	22.318	0.33	21.30	1.57	1.41
32	59	1.24	1.24	215.16	211.52	7.2622	22.318	0.33	21.25	1.57	1.41
33	58	1.24	1.24	214.65	210.53	7.2622	22.318	0.33	21.20	1.57	1.41
34	57	1.23	1.23	214.14	209.52	7.2622	22.318	0.33	21.15	1.57	1.41
35	56	1.23	1.23	213.62	208.50	7.2622	22.318	0.33	21.09	1.57	1.41
36	55	1.23	1.23	213.09	207.46	7.2622	22.318	0.33	21.04	1.57	1.42
37	54	1.22	1.22	212.55	206.42	7.5202	25.433	0.30	20.99	1.62	1.42
38	53	1.22	1.22	212.00	205.35	7.5202	25.433	0.30	20.93	1.62	1.42
39	52	1.22	1.22	211.44	204.28	7.5202	25.433	0.30	20.88	1.62	1.42
40	51	1.21	1.21	210.88	203.18	7.5202	25.433	0.30	20.82	1.62	1.42
41	50	1.21	1.21	210.30	202.08	7.5202	25.433	0.30	20.77	1.62	1.42
42	49	1.21	1.21	209.72	200.95	7.5202	25.433	0.30	20.71	1.62	1.42
43	48	1.20	1.20	209.12	199.81	7.7842	28.548	0.27	20.65	1.69	1.43
44	47	1.20	1.20	208.51	198.66	7.7842	28.548	0.27	20.59	1.69	1.43
45	46	1.20	1.20	207.90	197.48	7.7842	28.548	0.27	20.53	1.69	1.43

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
46	45	1.19	1.19	207.27	196.29	7.7842	28.548	0.27	20.47	1.69	1.43
47	44	1.19	1.19	206.62	195.07	7.7842	28.548	0.27	20.40	1.69	1.43
48	43	1.19	1.19	205.97	193.84	7.7842	28.548	0.27	20.34	1.69	1.43
49	42	1.18	1.18	205.30	192.58	8.0562	31.664	0.25	20.27	1.76	1.44
50	41	1.18	1.18	204.62	191.31	8.0562	31.664	0.25	20.21	1.76	1.44
51	40	1.17	1.17	203.92	190.01	8.0562	31.664	0.25	20.14	1.76	1.44
52	39	1.17	1.17	203.21	188.68	8.0562	31.664	0.25	20.07	1.76	1.44
53	38	1.17	1.17	202.49	187.34	8.0562	31.664	0.25	20.00	1.76	1.44
54	37	1.16	1.16	201.74	185.96	8.0562	31.664	0.25	19.92	1.76	1.45
55	36	1.16	1.16	200.98	184.56	8.3322	34.779	0.24	19.85	1.81	1.45
56	35	1.15	1.15	200.20	183.13	8.3322	34.779	0.24	19.77	1.81	1.45
57	34	1.15	1.15	199.40	181.67	8.3322	34.779	0.24	19.69	1.81	1.45
58	33	1.14	1.14	198.58	180.18	8.3322	34.779	0.24	19.61	1.81	1.45
59	32	1.14	1.14	197.74	178.66	8.3322	34.779	0.24	19.53	1.81	1.46
60	31	1.13	1.13	196.88	177.10	8.3322	34.779	0.24	19.44	1.81	1.46
61	30	1.13	1.13	195.99	175.50	10.9984	37.894	0.29	24.88	1.72	1.46
62	29	1.12	1.12	195.07	173.87	10.9984	37.894	0.29	24.77	1.72	1.47
63	28	1.12	1.12	194.13	172.19	10.9984	37.894	0.29	24.65	1.72	1.47
64	27	1.11	1.11	193.16	170.47	10.9984	37.894	0.29	24.52	1.72	1.47
65	26	1.11	1.11	192.15	168.71	10.9984	37.894	0.29	24.40	1.72	1.47
66	25	1.10	1.10	191.12	166.89	10.9984	37.894	0.29	24.27	1.72	1.48
67	24	1.09	1.09	190.04	165.02	11.3054	41.01	0.28	24.13	1.75	1.48
68	23	1.09	1.09	188.93	163.09	11.3054	41.01	0.28	23.99	1.75	1.48
69	22	1.08	1.08	187.78	161.11	11.3054	41.01	0.28	23.84	1.75	1.49
70	21	1.07	1.07	186.57	159.05	11.3054	41.01	0.28	23.69	1.75	1.49
71	20	1.07	1.07	185.32	156.92	11.3054	41.01	0.28	23.53	1.75	1.49
72	19	1.06	1.06	184.01	154.72	11.3054	41.01	0.28	23.36	1.75	1.50
73	18	1.05	1.05	182.65	152.42	11.6084	44.125	0.26	23.19	1.82	1.50
74	17	1.04	1.04	181.21	150.04	11.6084	44.125	0.26	23.01	1.82	1.51
75	16	1.03	1.03	179.70	147.55	11.6084	44.125	0.26	22.82	1.82	1.51
76	15	1.02	1.02	178.11	144.94	11.6084	44.125	0.26	22.61	1.82	1.52
77	14	1.02	1.02	176.42	142.21	11.6084	44.125	0.26	22.40	1.82	1.52
78	13	1.00	1.00	174.63	139.33	11.6084	44.125	0.26	22.17	1.82	1.53
79	12	0.99	0.99	172.71	136.29	11.9124	47.24	0.25	21.93	1.86	1.54
80	11	0.98	0.98	170.65	133.05	11.9124	47.24	0.25	21.67	1.86	1.54
81	10	0.97	0.97	168.42	129.60	11.9124	47.24	0.25	21.38	1.86	1.55
82	9	0.96	0.96	165.99	125.88	11.9124	47.24	0.25	21.07	1.86	1.56
83	8	0.94	0.94	163.31	121.86	11.9124	47.24	0.25	20.73	1.86	1.57
84	7	0.92	0.92	160.33	117.45	11.9124	47.24	0.25	20.36	1.86	1.58
85	6	0.90	0.90	156.95	112.56	12.2264	50.359	0.24	19.93	1.89	1.60
86	5	0.88	0.88	153.05	107.03	12.2264	50.359	0.24	19.43	1.89	1.61
87	4	0.85	0.85	148.41	100.64	12.2264	50.359	0.24	18.84	1.89	1.63
88	3	0.82	0.82	142.64	92.96	12.2264	50.359	0.24	18.11	1.89	1.66
89	2	0.78	0.78	134.87	83.12	12.2264	50.359	0.24	17.12	1.89	1.69
90	1	0.71	0.71	122.57	68.64	12.2264	50.359	0.24	15.56	1.89	1.76

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
Valor propuesto							
2.00	3.92	0.019	0.04	0.075	0.96	4.18	0.19

Fg	Pz (kg/m²)	Fa (kg)	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.9484	348.21	277.26	262.96	2	953 955 FX	131.48
0.9473	346.72	276.41	261.83	2	998 1015 FX	130.92
0.9461	345.22	275.55	260.70	2	997 1014 FX	130.35
0.9450	343.71	274.68	259.56	2	950 952 FX	129.78
0.9438	342.19	273.80	258.41	2	994 1013 FX	129.20
0.9426	340.65	272.92	257.25	2	993 1012 FX	128.63
0.9414	339.11	272.03	256.08	2	947 949 FX	128.04
0.9402	337.55	271.13	254.91	2	990 1011 FX	127.45
0.9389	335.99	270.23	253.73	2	989 1010 FX	126.86
0.9377	334.41	269.31	252.53	2	944 946 FX	126.27
0.9364	332.82	268.39	251.33	2	975 979 FX	125.67
0.9352	331.21	267.46	250.12	2	974 978 FX	125.06
0.9339	322.64	302.76	282.74	3	752 755 825 FX	94.25
0.9326	321.04	301.68	281.34	4	790 807 892 895 FX	70.34
0.9313	319.44	300.60	279.93	4	791 808 893 894 FX	69.98
0.9299	317.82	299.50	278.51	3	792 809 829 FX	92.84
0.9286	316.18	298.39	277.08	4	793 810 896 899 FX	69.27
0.9272	314.54	297.27	275.64	4	794 811 897 898 FX	68.91
0.9258	330.00	327.21	302.94	3	795 812 888 FX	100.98
0.9244	328.24	325.95	301.32	4	796 813 902 905 FX	75.33
0.9230	326.45	324.68	299.69	4	797 814 903 904 FX	74.92
0.9216	324.66	323.39	298.03	3	798 815 889 FX	99.34
0.9201	322.84	322.09	296.37	4	799 816 906 909 FX	74.09
0.9187	321.01	320.78	294.69	4	800 817 907 908 FX	73.67
0.9172	332.97	349.36	320.43	3	801 818 890 FX	106.81
0.9157	331.02	347.89	318.55	4	802 819 910 913 FX	79.64
0.9141	329.06	346.41	316.66	4	803 820 911 912 FX	79.17
0.9126	327.07	344.90	314.75	3	804 821 891 FX	104.92
0.9110	325.07	343.38	312.82	4	805 822 900 915 FX	78.21
0.9094	323.05	341.85	310.88	4	806 823 901 914 FX	77.72
0.9078	302.37	403.15	365.97	3	512 513 631 FX	121.99
0.9061	300.42	401.28	363.62	4	543 601 672 675 FX	90.91
0.9045	298.46	399.40	361.24	4	542 600 673 674 FX	90.31
0.9028	296.47	397.48	358.84	3	541 599 628 FX	119.61
0.9010	294.46	395.55	356.41	4	540 598 676 679 FX	89.10
0.8993	292.43	393.58	353.95	4	539 597 677 678 FX	88.49
0.8975	299.38	418.08	375.23	3	538 596 625 FX	125.08
0.8957	297.24	415.93	372.55	4	537 595 680 683 FX	93.14
0.8939	295.07	413.75	369.84	4	536 594 681 682 FX	92.46
0.8920	292.88	411.54	367.09	3	535 593 622 FX	122.36
0.8901	290.66	409.29	364.31	4	534 592 684 687 FX	91.08
0.8881	288.42	407.02	361.49	4	533 591 685 686 FX	90.37
0.8862	299.95	439.14	389.15	3	532 590 619 FX	129.72

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.8842	297.54	436.59	386.02	4	531 589 688 691 FX	96.50
0.8821	295.09	434.01	382.84	4	530 588 689 690 FX	95.71
0.8800	292.61	431.38	379.62	3	529 587 616 FX	126.54
0.8779	290.10	428.72	376.36	4	528 586 692 695 FX	94.09
0.8757	287.55	426.00	373.05	4	527 585 693 694 FX	93.26
0.8735	295.73	454.59	397.07	3	526 584 613 FX	132.36
0.8712	293.00	451.57	393.42	4	525 583 696 699 FX	98.35
0.8689	290.24	448.51	389.70	4	524 582 697 698 FX	97.43
0.8665	287.43	445.38	385.93	3	523 581 610 FX	128.64
0.8641	284.58	442.20	382.10	4	522 580 701 702 FX	95.53
0.8616	281.68	438.96	378.21	4	521 579 700 703 FX	94.55
0.8591	286.28	462.78	397.55	3	520 578 607 FX	132.52
0.8565	283.20	459.19	393.27	4	519 577 704 707 FX	98.32
0.8538	280.06	455.53	388.92	4	518 576 705 706 FX	97.23
0.8510	276.87	451.79	384.49	3	517 575 604 FX	128.16
0.8482	273.62	447.97	379.97	4	516 574 709 710 FX	94.99
0.8453	270.30	444.07	375.37	4	515 573 708 711 FX	93.84
0.8423	254.27	553.34	466.09	7	4 5 373 421 422 424 425 FX	66.58
0.8392	250.98	548.19	460.06	6	378 383 403 404 427 429 FX	76.68
0.8361	247.62	542.90	453.90	4	377 382 402 405 FX	113.47
0.8328	244.18	537.48	447.60	4	376 381 401 406 FX	111.90
0.8294	240.67	531.91	441.16	4	375 380 400 407 FX	110.29
0.8259	250.97	557.02	460.04	4	374 379 399 408 FX	115.01
0.8223	237.84	545.01	448.14	7	10 18 303 339 340 342 343 FX	64.02
0.8185	233.98	538.65	440.87	6	290 300 328 329 345 347 FX	73.48
0.8146	230.02	532.08	433.41	4	289 299 327 330 FX	108.35
0.8105	225.95	525.29	425.74	4	288 298 326 331 FX	106.43
0.8062	221.75	518.27	417.84	4	287 297 325 332 FX	104.46
0.8018	217.43	510.98	409.69	4	286 296 324 333 FX	102.42
0.7971	221.22	536.96	428.01	7	9 17 206 234 235 237 238 FX	61.14
0.7922	216.42	528.55	418.72	6	211 216 226 227 240 242 FX	69.79
0.7870	211.44	519.78	409.08	4	210 215 225 228 FX	102.27
0.7816	206.26	510.61	399.07	4	209 214 224 229 FX	99.77
0.7758	200.87	500.97	388.63	4	208 213 223 230 FX	97.16
0.7696	195.24	490.83	377.73	4	207 212 222 231 FX	94.43
0.7629	192.99	502.20	383.16	7	8 16 154 172 173 175 176 FX	54.74
0.7558	186.65	490.29	370.57	6	121 159 160 169 178 180 FX	61.76
0.7481	179.94	477.56	357.25	4	120 158 161 168 FX	89.31
0.7396	172.80	463.87	343.08	4	119 157 162 167 FX	85.77
0.7303	165.16	449.03	327.91	4	118 156 163 166 FX	81.98
0.7198	156.91	432.79	311.52	4	117 155 164 165 FX	77.88
0.7079	150.76	433.95	307.20	7	7 15 21 88 89 91 92 FX	43.89
0.6941	140.56	412.65	286.43	6	26 36 57 66 94 96 FX	47.74
0.6776	129.02	388.01	262.91	4	25 35 58 65 FX	65.73
0.6569	115.53	358.39	235.41	4	24 34 59 64 FX	58.85
0.6287	98.87	320.45	201.47	4	23 33 60 63 FX	50.37
0.5834	75.76	264.65	154.39	4	22 32 61 62 FX	38.60

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
1ra itera							
1.33196	2.61	0.032	0.029	0.091	0.83	4.15	0.21

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.99	364.76	277.26	275.45	2	953 955 FX	137.73
0.99	363.19	276.41	274.27	2	998 1015 FX	137.14
0.99	361.62	275.55	273.09	2	997 1014 FX	136.54
0.99	360.04	274.68	271.89	2	950 952 FX	135.94
0.99	358.44	273.80	270.68	2	994 1013 FX	135.34
0.99	356.84	272.92	269.47	2	993 1012 FX	134.74
0.99	355.22	272.03	268.25	2	947 949 FX	134.13
0.98	353.59	271.13	267.02	2	990 1011 FX	133.51
0.98	351.95	270.23	265.78	2	989 1010 FX	132.89
0.98	350.29	269.31	264.53	2	944 946 FX	132.26
0.98	348.63	268.39	263.27	2	975 979 FX	131.64
0.98	346.95	267.46	262.00	2	974 978 FX	131.00
0.98	337.97	302.76	296.17	3	752 755 825 FX	98.72
0.98	336.30	301.68	294.71	4	790 807 892 895 FX	73.68
0.98	334.61	300.60	293.23	4	791 808 893 894 FX	73.31
0.97	332.92	299.50	291.75	3	792 809 829 FX	97.25
0.97	331.20	298.39	290.25	4	793 810 896 899 FX	72.56
0.97	329.48	297.27	288.73	4	794 811 897 898 FX	72.18
0.97	345.68	327.21	317.34	3	795 812 888 FX	105.78
0.97	343.83	325.95	315.64	4	796 813 902 905 FX	78.91
0.97	341.96	324.68	313.92	4	797 814 903 904 FX	78.48
0.97	340.08	323.39	312.19	3	798 815 889 FX	104.06
0.96	338.18	322.09	310.45	4	799 816 906 909 FX	77.61
0.96	336.26	320.78	308.69	4	800 817 907 908 FX	77.17
0.96	348.79	349.36	335.65	3	801 818 890 FX	111.88
0.96	346.75	347.89	333.69	4	802 819 910 913 FX	83.42
0.96	344.69	346.41	331.71	4	803 820 911 912 FX	82.93
0.96	342.61	344.90	329.71	3	804 821 891 FX	109.90
0.95	340.51	343.38	327.69	4	805 822 900 915 FX	81.92
0.95	338.39	341.85	325.65	4	806 823 901 914 FX	81.41
0.95	316.73	403.15	383.36	3	512 513 631 FX	127.79
0.95	314.69	401.28	380.90	4	543 601 672 675 FX	95.22
0.95	312.64	399.40	378.40	4	542 600 673 674 FX	94.60
0.95	310.55	397.48	375.88	3	541 599 628 FX	125.29
0.94	308.45	395.55	373.34	4	540 598 676 679 FX	93.33
0.94	306.32	393.58	370.76	4	539 597 677 678 FX	92.69
0.94	313.60	418.08	393.06	3	538 596 625 FX	131.02
0.94	311.36	415.93	390.25	4	537 595 680 683 FX	97.56
0.94	309.09	413.75	387.41	4	536 594 681 682 FX	96.85
0.93	306.80	411.54	384.53	3	535 593 622 FX	128.18
0.93	304.47	409.29	381.62	4	534 592 684 687 FX	95.40
0.93	302.12	407.02	378.67	4	533 591 685 686 FX	94.67
0.93	314.20	439.14	407.64	3	532 590 619 FX	135.88

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.93	311.67	436.59	404.36	4	531 589 688 691 FX	101.09
0.92	309.11	434.01	401.03	4	530 588 689 690 FX	100.26
0.92	306.51	431.38	397.66	3	529 587 616 FX	132.55
0.92	303.88	428.72	394.24	4	528 586 692 695 FX	98.56
0.92	301.21	426.00	390.78	4	527 585 693 694 FX	97.69
0.91	309.78	454.59	415.94	3	526 584 613 FX	138.65
0.91	306.92	451.57	412.11	4	525 583 696 699 FX	103.03
0.91	304.03	448.51	408.22	4	524 582 697 698 FX	102.05
0.91	301.09	445.38	404.27	3	523 581 610 FX	134.76
0.91	298.10	442.20	400.25	4	522 580 701 702 FX	100.06
0.90	295.06	438.96	396.18	4	521 579 700 703 FX	99.04
0.90	299.88	462.78	416.44	3	520 578 607 FX	138.81
0.90	296.65	459.19	411.96	4	519 577 704 707 FX	102.99
0.89	293.37	455.53	407.40	4	518 576 705 706 FX	101.85
0.89	290.02	451.79	402.75	3	517 575 604 FX	134.25
0.89	286.62	447.97	398.02	4	516 574 709 710 FX	99.51
0.89	283.14	444.07	393.20	4	515 573 708 711 FX	98.30
0.88	266.35	553.34	488.23	7	4 5 373 421 422 424 425 FX	69.75
0.88	262.90	548.19	481.91	6	378 383 403 404 427 429 FX	80.32
0.88	259.38	542.90	475.46	4	377 382 402 405 FX	118.87
0.87	255.78	537.48	468.87	4	376 381 401 406 FX	117.22
0.87	252.10	531.91	462.12	4	375 380 400 407 FX	115.53
0.87	262.89	557.02	481.89	4	374 379 399 408 FX	120.47
0.86	249.14	545.01	469.43	7	10 18 303 339 340 342 343 FX	67.06
0.86	245.10	538.65	461.82	6	290 300 328 329 345 347 FX	76.97
0.85	240.95	532.08	454.00	4	289 299 327 330 FX	113.50
0.85	236.68	525.29	445.97	4	288 298 326 331 FX	111.49
0.84	232.29	518.27	437.69	4	287 297 325 332 FX	109.42
0.84	227.76	510.98	429.15	4	286 296 324 333 FX	107.29
0.83	231.73	536.96	448.34	7	9 17 206 234 235 237 238 FX	64.05
0.83	226.70	528.55	438.61	6	211 216 226 227 240 242 FX	73.10
0.82	221.49	519.78	428.52	4	210 215 225 228 FX	107.13
0.82	216.06	510.61	418.03	4	209 214 224 229 FX	104.51
0.81	210.42	500.97	407.10	4	208 213 223 230 FX	101.77
0.81	204.51	490.83	395.68	4	207 212 222 231 FX	98.92
0.80	202.16	502.20	401.36	7	8 16 154 172 173 175 176 FX	57.34
0.79	195.51	490.29	388.17	6	121 159 160 169 178 180 FX	64.70
0.78	188.49	477.56	374.22	4	120 158 161 168 FX	93.56
0.77	181.01	463.87	359.38	4	119 157 162 167 FX	89.85
0.76	173.01	449.03	343.49	4	118 156 163 166 FX	85.87
0.75	164.36	432.79	326.32	4	117 155 164 165 FX	81.58
0.74	157.92	433.95	321.80	7	7 15 21 88 89 91 92 FX	45.97
0.73	147.24	412.65	300.04	6	26 36 57 66 94 96 FX	50.01
0.71	135.15	388.01	275.40	4	25 35 58 65 FX	68.85
0.69	121.01	358.39	246.60	4	24 34 59 64 FX	61.65
0.66	103.57	320.45	211.04	4	23 33 60 63 FX	52.76
0.61	79.36	264.65	161.72	4	22 32 61 62 FX	40.43

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
2das itera							
1.31116	2.57	0.032	0.029	0.091	0.81	4.15	0.21

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.99	364.8	277.26	275.5	2	953 955 FX	137.73
0.99	363.2	276.41	274.3	2	998 1015 FX	137.14
0.99	361.6	275.55	273.1	2	997 1014 FX	136.54
0.99	360.0	274.68	271.9	2	950 952 FX	135.94
0.99	358.4	273.80	270.7	2	994 1013 FX	135.34
0.99	356.8	272.92	269.5	2	993 1012 FX	134.74
0.99	355.2	272.03	268.3	2	947 949 FX	134.13
0.98	353.6	271.13	267.0	2	990 1011 FX	133.51
0.98	351.9	270.23	265.8	2	989 1010 FX	132.89
0.98	350.3	269.31	264.5	2	944 946 FX	132.26
0.98	348.6	268.39	263.3	2	975 979 FX	131.64
0.98	346.9	267.46	262.0	2	974 978 FX	131.00
0.98	338.0	302.76	296.2	3	752 755 825 FX	98.72
0.98	336.3	301.68	294.7	4	790 807 892 895 FX	73.68
0.98	334.6	300.60	293.2	4	791 808 893 894 FX	73.31
0.97	332.9	299.50	291.7	3	792 809 829 FX	97.25
0.97	331.2	298.39	290.2	4	793 810 896 899 FX	72.56
0.97	329.5	297.27	288.7	4	794 811 897 898 FX	72.18
0.97	345.7	327.21	317.3	3	795 812 888 FX	105.78
0.97	343.8	325.95	315.6	4	796 813 902 905 FX	78.91
0.97	342.0	324.68	313.9	4	797 814 903 904 FX	78.48
0.97	340.1	323.39	312.2	3	798 815 889 FX	104.06
0.96	338.2	322.09	310.4	4	799 816 906 909 FX	77.61
0.96	336.3	320.78	308.7	4	800 817 907 908 FX	77.17
0.96	348.8	349.36	335.6	3	801 818 890 FX	111.88
0.96	346.7	347.89	333.7	4	802 819 910 913 FX	83.42
0.96	344.7	346.41	331.7	4	803 820 911 912 FX	82.93
0.96	342.6	344.90	329.7	3	804 821 891 FX	109.90
0.95	340.5	343.38	327.7	4	805 822 900 915 FX	81.92
0.95	338.4	341.85	325.6	4	806 823 901 914 FX	81.41
0.95	316.7	403.15	383.4	3	512 513 631 FX	127.79
0.95	314.7	401.28	380.9	4	543 601 672 675 FX	95.22
0.95	312.6	399.40	378.4	4	542 600 673 674 FX	94.60
0.95	310.6	397.48	375.9	3	541 599 628 FX	125.29
0.94	308.5	395.55	373.3	4	540 598 676 679 FX	93.33
0.94	306.3	393.58	370.8	4	539 597 677 678 FX	92.69
0.94	313.6	418.08	393.1	3	538 596 625 FX	131.02
0.94	311.4	415.93	390.3	4	537 595 680 683 FX	97.56
0.94	309.1	413.75	387.4	4	536 594 681 682 FX	96.85
0.93	306.8	411.54	384.5	3	535 593 622 FX	128.18
0.93	304.5	409.29	381.6	4	534 592 684 687 FX	95.40
0.93	302.1	407.02	378.7	4	533 591 685 686 FX	94.67
0.93	314.2	439.14	407.6	3	532 590 619 FX	135.88

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de *nodos*	Nodos	Fz / #nodos
0.93	311.7	436.59	404.4	4	531 589 688 691 FX	101.09
0.92	309.1	434.01	401.0	4	530 588 689 690 FX	100.26
0.92	306.5	431.38	397.7	3	529 587 616 FX	132.55
0.92	303.9	428.72	394.2	4	528 586 692 695 FX	98.56
0.92	301.2	426.00	390.8	4	527 585 693 694 FX	97.69
0.91	309.8	454.59	415.9	3	526 584 613 FX	138.65
0.91	306.9	451.57	412.1	4	525 583 696 699 FX	103.03
0.91	304.0	448.51	408.2	4	524 582 697 698 FX	102.05
0.91	301.1	445.38	404.3	3	523 581 610 FX	134.76
0.91	298.1	442.20	400.3	4	522 580 701 702 FX	100.06
0.90	295.1	438.96	396.2	4	521 579 700 703 FX	99.04
0.90	299.9	462.78	416.4	3	520 578 607 FX	138.81
0.90	296.7	459.19	412.0	4	519 577 704 707 FX	102.99
0.89	293.4	455.53	407.4	4	518 576 705 706 FX	101.85
0.89	290.0	451.79	402.8	3	517 575 604 FX	134.25
0.89	286.6	447.97	398.0	4	516 574 709 710 FX	99.51
0.89	283.1	444.07	393.2	4	515 573 708 711 FX	98.30
0.88	266.3	553.34	488.2	7	4 5 373 421 422 424 425 FX	69.75
0.88	262.9	548.19	481.9	6	378 383 403 404 427 429 FX	80.32
0.88	259.4	542.90	475.5	4	377 382 402 405 FX	118.87
0.87	255.8	537.48	468.9	4	376 381 401 406 FX	117.22
0.87	252.1	531.91	462.1	4	375 380 400 407 FX	115.53
0.87	262.9	557.02	481.9	4	374 379 399 408 FX	120.47
0.86	249.1	545.01	469.4	7	10 18 303 339 340 342 343 FX	67.06
0.86	245.1	538.65	461.8	6	290 300 328 329 345 347 FX	76.97
0.85	240.9	532.08	454.0	4	289 299 327 330 FX	113.50
0.85	236.7	525.29	446.0	4	288 298 326 331 FX	111.49
0.84	232.3	518.27	437.7	4	287 297 325 332 FX	109.42
0.84	227.8	510.98	429.2	4	286 296 324 333 FX	107.29
0.83	231.7	536.96	448.3	7	9 17 206 234 235 237 238 FX	64.05
0.83	226.7	528.55	438.6	6	211 216 226 227 240 242 FX	73.10
0.82	221.5	519.78	428.5	4	210 215 225 228 FX	107.13
0.82	216.1	510.61	418.0	4	209 214 224 229 FX	104.51
0.81	210.4	500.97	407.1	4	208 213 223 230 FX	101.77
0.81	204.5	490.83	395.7	4	207 212 222 231 FX	98.92
0.80	202.2	502.20	401.4	7	8 16 154 172 173 175 176 FX	57.34
0.79	195.5	490.29	388.2	6	121 159 160 169 178 180 FX	64.70
0.78	188.5	477.56	374.2	4	120 158 161 168 FX	93.56
0.77	181.0	463.87	359.4	4	119 157 162 167 FX	89.85
0.76	173.0	449.03	343.5	4	118 156 163 166 FX	85.87
0.75	164.4	432.79	326.3	4	117 155 164 165 FX	81.58
0.74	157.9	433.95	321.8	7	7 15 21 88 89 91 92 FX	45.97
0.73	147.2	412.65	300.0	6	26 36 57 66 94 96 FX	50.01
0.71	135.1	388.01	275.4	4	25 35 58 65 FX	68.85
0.69	121.0	358.39	246.6	4	24 34 59 64 FX	61.65
0.66	103.6	320.45	211.0	4	23 33 60 63 FX	52.76
0.61	79.4	264.65	161.7	4	22 32 61 62 FX	40.43

Presiones y Fuerzas sobre las Líneas en dirección X-X.

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
1	90	1.31	1.31	228.07	237.67	0.0413	0.0413	1.00	12.87	1.2	1.38
2	89	1.31	1.31	227.72	236.94	0.0413	0.0413	1.00	12.85	1.2	1.38
3	88	1.31	1.31	227.36	236.20	0.0413	0.0413	1.00	12.83	1.2	1.38
4	87	1.31	1.31	227.01	235.46	0.0413	0.0413	1.00	12.81	1.2	1.38
5	86	1.30	1.30	226.64	234.71	0.0413	0.0413	1.00	12.79	1.2	1.38
6	85	1.30	1.30	226.28	233.95	0.0413	0.0413	1.00	12.77	1.2	1.38
7	84	1.30	1.30	225.91	233.19	0.0413	0.0413	1.00	12.75	1.2	1.38
8	83	1.30	1.30	225.54	232.42	0.0413	0.0413	1.00	12.73	1.2	1.38
9	82	1.30	1.30	225.16	231.64	0.0413	0.0413	1.00	12.71	1.2	1.39
10	81	1.29	1.29	224.78	230.86	0.0413	0.0413	1.00	12.68	1.2	1.39
11	80	1.29	1.29	224.39	230.07	0.0413	0.0413	1.00	12.66	1.2	1.39
12	79	1.29	1.29	224.00	229.27	0.0413	0.0413	1.00	12.64	1.2	1.39
13	78	1.29	1.29	223.61	228.46	0.0413	0.0413	1.00	12.62	1.2	1.39
14	77	1.28	1.28	223.21	227.65	0.0413	0.0413	1.00	12.60	1.2	1.39
15	76	1.28	1.28	222.81	226.83	0.0413	0.0413	1.00	12.57	1.2	1.39
16	75	1.28	1.28	222.40	226.00	0.0413	0.0413	1.00	12.55	1.2	1.39
17	74	1.28	1.28	221.99	225.17	0.0413	0.0413	1.00	12.53	1.2	1.39
18	73	1.28	1.28	221.58	224.33	0.0413	0.0413	1.00	12.50	1.2	1.39
19	72	1.27	1.27	221.15	223.47	0.0413	0.0413	1.00	12.48	1.2	1.39
20	71	1.27	1.27	220.73	222.61	0.0413	0.0413	1.00	12.46	1.2	1.40
21	70	1.27	1.27	220.30	221.74	0.0413	0.0413	1.00	12.43	1.2	1.40
22	69	1.27	1.27	219.86	220.86	0.0413	0.0413	1.00	12.41	1.2	1.40
23	68	1.26	1.26	219.42	219.98	0.0413	0.0413	1.00	12.38	1.2	1.40
24	67	1.26	1.26	218.97	219.08	0.0413	0.0413	1.00	12.36	1.2	1.40
25	66	1.26	1.26	218.51	218.17	0.0413	0.0413	1.00	12.33	1.2	1.40
26	65	1.25	1.25	218.06	217.25	0.0413	0.0413	1.00	12.30	1.2	1.40
27	64	1.25	1.25	217.59	216.32	0.0413	0.0413	1.00	12.28	1.2	1.40
28	63	1.25	1.25	217.12	215.39	0.0413	0.0413	1.00	12.25	1.2	1.40
29	62	1.25	1.25	216.64	214.44	0.0413	0.0413	1.00	12.22	1.2	1.41
30	61	1.24	1.24	216.15	213.48	0.0413	0.0413	1.00	12.20	1.2	1.41
31	60	1.24	1.24	215.66	212.51	0.0413	0.0413	1.00	15.21	1.2	1.41
32	59	1.24	1.24	215.16	211.52	0.0413	0.0413	1.00	15.18	1.2	1.41
33	58	1.24	1.24	214.65	210.53	0.0413	0.0413	1.00	15.14	1.2	1.41
34	57	1.23	1.23	214.14	209.52	0.0413	0.0413	1.00	15.10	1.2	1.41
35	56	1.23	1.23	213.62	208.50	0.0413	0.0413	1.00	15.07	1.2	1.41
36	55	1.23	1.23	213.09	207.46	0.0413	0.0413	1.00	15.03	1.2	1.42
37	54	1.22	1.22	212.55	206.42	0.0413	0.0413	1.00	14.99	1.2	1.42
38	53	1.22	1.22	212.00	205.35	0.0413	0.0413	1.00	14.95	1.2	1.42
39	52	1.22	1.22	211.44	204.28	0.0413	0.0413	1.00	14.91	1.2	1.42
40	51	1.21	1.21	210.88	203.18	0.0413	0.0413	1.00	14.87	1.2	1.42
41	50	1.21	1.21	210.30	202.08	0.0413	0.0413	1.00	14.83	1.2	1.42
42	49	1.21	1.21	209.72	200.95	0.0413	0.0413	1.00	14.79	1.2	1.42
43	48	1.20	1.20	209.12	199.81	0.0413	0.0413	1.00	14.75	1.2	1.43
44	47	1.20	1.20	208.51	198.66	0.0413	0.0413	1.00	14.71	1.2	1.43
45	46	1.20	1.20	207.90	197.48	0.0413	0.0413	1.00	14.66	1.2	1.43
46	45	1.19	1.19	207.27	196.29	0.0413	0.0413	1.00	14.62	1.2	1.43
47	44	1.19	1.19	206.62	195.07	0.0413	0.0413	1.00	14.57	1.2	1.43
48	43	1.19	1.19	205.97	193.84	0.0413	0.0413	1.00	14.53	1.2	1.43
49	42	1.18	1.18	205.30	192.58	0.0413	0.0413	1.00	14.48	1.2	1.44

Sección	Altura (m).	Frz	Fa	V_D (km/h).	q_z (kg/m²).	Ae (m²).	AT (m²).	Solidez ϕ	bV_D	Ca	g
50	41	1.18	1.18	204.62	191.31	0.0413	0.0413	1.00	14.43	1.2	1.44
51	40	1.17	1.17	203.92	190.01	0.0413	0.0413	1.00	14.38	1.2	1.44
52	39	1.17	1.17	203.21	188.68	0.0413	0.0413	1.00	14.33	1.2	1.44
53	38	1.17	1.17	202.49	187.34	0.0413	0.0413	1.00	14.28	1.2	1.44
54	37	1.16	1.16	201.74	185.96	0.0413	0.0413	1.00	14.23	1.2	1.45
55	36	1.16	1.16	200.98	184.56	0.0413	0.0413	1.00	14.18	1.2	1.45
56	35	1.15	1.15	200.20	183.13	0.0413	0.0413	1.00	14.12	1.2	1.45
57	34	1.15	1.15	199.40	181.67	0.0413	0.0413	1.00	14.06	1.2	1.45
58	33	1.14	1.14	198.58	180.18	0.0413	0.0413	1.00	14.01	1.2	1.45
59	32	1.14	1.14	197.74	178.66	0.0413	0.0413	1.00	13.95	1.2	1.46
60	31	1.13	1.13	196.88	177.10	0.0413	0.0413	1.00	13.89	1.2	1.46
61	30	1.13	1.13	195.99	175.50	0.0413	0.0413	1.00	19.35	1.2	1.46
62	29	1.12	1.12	195.07	173.87	0.0413	0.0413	1.00	19.26	1.2	1.47
63	28	1.12	1.12	194.13	172.19	0.0413	0.0413	1.00	19.17	1.2	1.47
64	27	1.11	1.11	193.16	170.47	0.0413	0.0413	1.00	19.07	1.2	1.47
65	26	1.11	1.11	192.15	168.71	0.0413	0.0413	1.00	18.98	1.2	1.47
66	25	1.10	1.10	191.12	166.89	0.0413	0.0413	1.00	18.87	1.2	1.48
67	24	1.09	1.09	190.04	165.02	0.0413	0.0413	1.00	18.77	1.2	1.48
68	23	1.09	1.09	188.93	163.09	0.0413	0.0413	1.00	18.66	1.2	1.48
69	22	1.08	1.08	187.78	161.11	0.0413	0.0413	1.00	18.54	1.2	1.49
70	21	1.07	1.07	186.57	159.05	0.0413	0.0413	1.00	18.42	1.2	1.49
71	20	1.07	1.07	185.32	156.92	0.0413	0.0413	1.00	18.30	1.2	1.49
72	19	1.06	1.06	184.01	154.72	0.0413	0.0413	1.00	18.17	1.2	1.50
73	18	1.05	1.05	182.65	152.42	0.0413	0.0413	1.00	18.04	1.2	1.50
74	17	1.04	1.04	181.21	150.04	0.0413	0.0413	1.00	17.89	1.2	1.51
75	16	1.03	1.03	179.70	147.55	0.0413	0.0413	1.00	17.75	1.2	1.51
76	15	1.02	1.02	178.11	144.94	0.0413	0.0413	1.00	17.59	1.2	1.52
77	14	1.02	1.02	176.42	142.21	0.0413	0.0413	1.00	17.42	1.2	1.52
78	13	1.00	1.00	174.63	139.33	0.0413	0.0413	1.00	17.24	1.2	1.53
79	12	0.99	0.99	172.71	136.29	0.0413	0.0413	1.00	17.05	1.2	1.54
80	11	0.98	0.98	170.65	133.05	0.0413	0.0413	1.00	16.85	1.2	1.54
81	10	0.97	0.97	168.42	129.60	0.0413	0.0413	1.00	16.63	1.2	1.55
82	9	0.96	0.96	165.99	125.88	0.0413	0.0413	1.00	16.39	1.2	1.56
83	8	0.94	0.94	163.31	121.86	0.0413	0.0413	1.00	16.13	1.2	1.57
84	7	0.92	0.92	160.33	117.45	0.0413	0.0413	1.00	15.83	1.2	1.58
85	6	0.90	0.90	156.95	112.56	0.0413	0.0413	1.00	15.50	1.2	1.60
86	5	0.88	0.88	153.05	107.03	0.0413	0.0413	1.00	15.11	1.2	1.61
87	4	0.85	0.85	148.41	100.64	0.0413	0.0413	1.00	14.66	1.2	1.63
88	3	0.82	0.82	142.64	92.96	0.0413	0.0413	1.00	14.09	1.2	1.66
89	2	0.78	0.78	134.87	83.12	0.0413	0.0413	1.00	13.32	1.2	1.69
90	1	0.71	0.71	122.57	68.64	0.0413	0.0413	1.00	12.10	1.2	1.76

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
Valor propuesto							
2.00	3.92	0.019	0.04	0.075	0.96	4.18	0.19

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.9484	270.49	11.77	11.16	2	953 955 FX	5.58
0.9473	269.33	11.74	11.12	2	998 1015 FX	5.56
0.9461	268.17	11.70	11.07	2	997 1014 FX	5.53
0.9450	266.99	11.66	11.02	2	950 952 FX	5.51
0.9438	265.81	11.62	10.97	2	994 1013 FX	5.49
0.9426	264.62	11.59	10.92	2	993 1012 FX	5.46
0.9414	263.42	11.55	10.87	2	947 949 FX	5.44
0.9402	262.21	11.51	10.82	2	990 1011 FX	5.41
0.9389	260.99	11.47	10.77	2	989 1010 FX	5.39
0.9377	259.77	11.43	10.72	2	944 946 FX	5.36
0.9364	258.53	11.40	10.67	2	975 979 FX	5.34
0.9352	257.28	11.36	10.62	2	974 978 FX	5.31
0.9339	256.03	11.32	10.57	3	752 755 825 FX	3.52
0.9326	254.76	11.28	10.52	4	790 807 892 895 FX	2.63
0.9313	253.49	11.24	10.46	4	791 808 893 894 FX	2.62
0.9299	252.20	11.19	10.41	3	792 809 829 FX	3.47
0.9286	250.91	11.15	10.36	4	793 810 896 899 FX	2.59
0.9272	249.60	11.11	10.30	4	794 811 897 898 FX	2.58
0.9258	248.28	11.07	10.25	3	795 812 888 FX	3.42
0.9244	246.95	11.03	10.19	4	796 813 902 905 FX	2.55
0.9230	245.61	10.98	10.14	4	797 814 903 904 FX	2.53
0.9216	244.25	10.94	10.08	3	798 815 889 FX	3.36
0.9201	242.89	10.90	10.03	4	799 816 906 909 FX	2.51
0.9187	241.51	10.85	9.97	4	800 817 907 908 FX	2.49
0.9172	240.12	10.81	9.91	3	801 818 890 FX	3.30
0.9157	238.72	10.76	9.85	4	802 819 910 913 FX	2.46
0.9141	237.30	10.71	9.79	4	803 820 911 912 FX	2.45
0.9126	235.87	10.67	9.74	3	804 821 891 FX	3.25
0.9110	234.42	10.62	9.68	4	805 822 900 915 FX	2.42
0.9094	232.97	10.57	9.62	4	806 823 901 914 FX	2.40
0.9078	231.49	10.53	9.55	3	512 513 631 FX	3.18
0.9061	230.00	10.48	9.49	4	543 601 672 675 FX	2.37
0.9045	228.50	10.43	9.43	4	542 600 673 674 FX	2.36
0.9028	226.98	10.38	9.37	3	541 599 628 FX	3.12
0.9010	225.44	10.33	9.31	4	540 598 676 679 FX	2.33
0.8993	223.88	10.28	9.24	4	539 597 677 678 FX	2.31
0.8975	222.31	10.22	9.18	3	538 596 625 FX	3.06
0.8957	220.72	10.17	9.11	4	537 595 680 683 FX	2.28
0.8939	219.11	10.12	9.04	4	536 594 681 682 FX	2.26
0.8920	217.49	10.06	8.98	3	535 593 622 FX	2.99
0.8901	215.84	10.01	8.91	4	534 592 684 687 FX	2.23
0.8881	214.17	9.95	8.84	4	533 591 685 686 FX	2.21
0.8862	212.48	9.90	8.77	3	532 590 619 FX	2.92
0.8842	210.77	9.84	8.70	4	531 589 688 691 FX	2.17
0.8821	209.04	9.78	8.63	4	530 588 689 690 FX	2.16

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.8800	207.28	9.72	8.56	3	529 587 616 FX	2.85
0.8779	205.50	9.66	8.48	4	528 586 692 695 FX	2.12
0.8757	203.69	9.60	8.41	4	527 585 693 694 FX	2.10
0.8735	201.86	9.54	8.33	3	526 584 613 FX	2.78
0.8712	200.00	9.48	8.26	4	525 583 696 699 FX	2.06
0.8689	198.11	9.41	8.18	4	524 582 697 698 FX	2.04
0.8665	196.20	9.35	8.10	3	523 581 610 FX	2.70
0.8641	194.25	9.28	8.02	4	522 580 701 702 FX	2.00
0.8616	192.27	9.21	7.94	4	521 579 700 703 FX	1.98
0.8591	190.26	9.14	7.85	3	520 578 607 FX	2.62
0.8565	188.21	9.07	7.77	4	519 577 704 707 FX	1.94
0.8538	186.13	9.00	7.68	4	518 576 705 706 FX	1.92
0.8510	184.01	8.92	7.59	3	517 575 604 FX	2.53
0.8482	181.85	8.85	7.51	4	516 574 709 710 FX	1.88
0.8453	179.64	8.77	7.41	4	515 573 708 711 FX	1.85
0.8423	177.39	8.69	7.32	7	4 5 373 421 422 424 425 FX	1.05
0.8392	175.10	8.61	7.23	6	378 383 403 404 427 429 FX	1.20
0.8361	172.76	8.53	7.13	4	377 382 402 405 FX	1.78
0.8328	170.36	8.44	7.03	4	376 381 401 406 FX	1.76
0.8294	167.91	8.36	6.93	4	375 380 400 407 FX	1.73
0.8259	165.40	8.27	6.83	4	374 379 399 408 FX	1.71
0.8223	162.83	8.17	6.72	7	10 18 303 339 340 342 343 FX	0.96
0.8185	160.19	8.08	6.61	6	290 300 328 329 345 347 FX	1.10
0.8146	157.48	7.98	6.50	4	289 299 327 330 FX	1.62
0.8105	154.69	7.88	6.38	4	288 298 326 331 FX	1.60
0.8062	151.82	7.77	6.27	4	287 297 325 332 FX	1.57
0.8018	148.86	7.66	6.14	4	286 296 324 333 FX	1.54
0.7971	145.80	7.55	6.02	7	9 17 206 234 235 237 238 FX	0.86
0.7922	142.63	7.43	5.89	6	211 216 226 227 240 242 FX	0.98
0.7870	139.35	7.31	5.75	4	210 215 225 228 FX	1.44
0.7816	135.94	7.18	5.61	4	209 214 224 229 FX	1.40
0.7758	132.38	7.04	5.46	4	208 213 223 230 FX	1.37
0.7696	128.67	6.90	5.31	4	207 212 222 231 FX	1.33
0.7629	124.78	6.75	5.15	7	8 16 154 172 173 175 176 FX	0.74
0.7558	120.68	6.59	4.98	6	121 159 160 169 178 180 FX	0.83
0.7481	116.34	6.42	4.80	4	120 158 161 168 FX	1.20
0.7396	111.73	6.24	4.61	4	119 157 162 167 FX	1.15
0.7303	106.79	6.04	4.41	4	118 156 163 166 FX	1.10
0.7198	101.45	5.82	4.19	4	117 155 164 165 FX	1.05
0.7079	95.62	5.57	3.95	7	7 15 21 88 89 91 92 FX	0.56
0.6941	89.15	5.30	3.68	6	26 36 57 66 94 96 FX	0.61
0.6776	81.83	4.98	3.38	4	25 35 58 65 FX	0.84
0.6569	73.27	4.60	3.02	4	24 34 59 64 FX	0.76
0.6287	62.71	4.12	2.59	4	23 33 60 63 FX	0.65
0.5834	48.05	3.40	1.98	4	22 32 61 62 FX	0.50

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
1ª itera							
1.33196	2.61	0.032	0.029	0.091	0.82	4.15	0.21

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.99	283.34	11.77	11.69	2	953 955 FX	5.85
0.99	282.13	11.74	11.64	2	998 1015 FX	5.82
0.99	280.91	11.70	11.59	2	997 1014 FX	5.80
0.99	279.68	11.66	11.54	2	950 952 FX	5.77
0.99	278.44	11.62	11.49	2	994 1013 FX	5.75
0.99	277.19	11.59	11.44	2	993 1012 FX	5.72
0.99	275.93	11.55	11.39	2	947 949 FX	5.69
0.98	274.67	11.51	11.34	2	990 1011 FX	5.67
0.98	273.39	11.47	11.28	2	989 1010 FX	5.64
0.98	272.11	11.43	11.23	2	944 946 FX	5.62
0.98	270.81	11.40	11.18	2	975 979 FX	5.59
0.98	269.51	11.36	11.12	2	974 978 FX	5.56
0.98	268.19	11.32	11.07	3	752 755 825 FX	3.69
0.98	266.87	11.28	11.01	4	790 807 892 895 FX	2.75
0.98	265.53	11.24	10.96	4	791 808 893 894 FX	2.74
0.97	264.18	11.19	10.90	3	792 809 829 FX	3.63
0.97	262.83	11.15	10.85	4	793 810 896 899 FX	2.71
0.97	261.46	11.11	10.79	4	794 811 897 898 FX	2.70
0.97	260.07	11.07	10.73	3	795 812 888 FX	3.58
0.97	258.68	11.03	10.68	4	796 813 902 905 FX	2.67
0.97	257.28	10.98	10.62	4	797 814 903 904 FX	2.65
0.97	255.86	10.94	10.56	3	798 815 889 FX	3.52
0.96	254.43	10.90	10.50	4	799 816 906 909 FX	2.63
0.96	252.99	10.85	10.44	4	800 817 907 908 FX	2.61
0.96	251.53	10.81	10.38	3	801 818 890 FX	3.46
0.96	250.06	10.76	10.32	4	802 819 910 913 FX	2.58
0.96	248.57	10.71	10.26	4	803 820 911 912 FX	2.56
0.96	247.08	10.67	10.20	3	804 821 891 FX	3.40
0.95	245.56	10.62	10.14	4	805 822 900 915 FX	2.53
0.95	244.03	10.57	10.07	4	806 823 901 914 FX	2.52
0.95	242.49	10.53	10.01	3	512 513 631 FX	3.34
0.95	240.93	10.48	9.94	4	543 601 672 675 FX	2.49
0.95	239.35	10.43	9.88	4	542 600 673 674 FX	2.47
0.95	237.76	10.38	9.81	3	541 599 628 FX	3.27
0.94	236.15	10.33	9.75	4	540 598 676 679 FX	2.44
0.94	234.52	10.28	9.68	4	539 597 677 678 FX	2.42
0.94	232.87	10.22	9.61	3	538 596 625 FX	3.20
0.94	231.21	10.17	9.54	4	537 595 680 683 FX	2.39
0.94	229.52	10.12	9.47	4	536 594 681 682 FX	2.37
0.93	227.82	10.06	9.40	3	535 593 622 FX	3.13
0.93	226.09	10.01	9.33	4	534 592 684 687 FX	2.33
0.93	224.35	9.95	9.26	4	533 591 685 686 FX	2.31
0.93	222.58	9.90	9.19	3	532 590 619 FX	3.06

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.93	220.78	9.84	9.11	4	531 589 688 691 FX	2.28
0.92	218.97	9.78	9.04	4	530 588 689 690 FX	2.26
0.92	217.13	9.72	8.96	3	529 587 616 FX	2.99
0.92	215.26	9.66	8.88	4	528 586 692 695 FX	2.22
0.92	213.37	9.60	8.81	4	527 585 693 694 FX	2.20
0.91	211.45	9.54	8.73	3	526 584 613 FX	2.91
0.91	209.50	9.48	8.65	4	525 583 696 699 FX	2.16
0.91	207.53	9.41	8.57	4	524 582 697 698 FX	2.14
0.91	205.52	9.35	8.48	3	523 581 610 FX	2.83
0.91	203.48	9.28	8.40	4	522 580 701 702 FX	2.10
0.90	201.41	9.21	8.31	4	521 579 700 703 FX	2.08
0.90	199.30	9.14	8.23	3	520 578 607 FX	2.74
0.90	197.15	9.07	8.14	4	519 577 704 707 FX	2.03
0.89	194.97	9.00	8.05	4	518 576 705 706 FX	2.01
0.89	192.75	8.92	7.96	3	517 575 604 FX	2.65
0.89	190.48	8.85	7.86	4	516 574 709 710 FX	1.97
0.89	188.18	8.77	7.77	4	515 573 708 711 FX	1.94
0.88	185.82	8.69	7.67	7	4 5 373 421 422 424 425 FX	1.10
0.88	183.42	8.61	7.57	6	378 383 403 404 427 429 FX	1.26
0.88	180.96	8.53	7.47	4	377 382 402 405 FX	1.87
0.87	178.45	8.44	7.37	4	376 381 401 406 FX	1.84
0.87	175.89	8.36	7.26	4	375 380 400 407 FX	1.81
0.87	173.26	8.27	7.15	4	374 379 399 408 FX	1.79
0.86	170.56	8.17	7.04	7	10 18 303 339 340 342 343 FX	1.01
0.86	167.80	8.08	6.93	6	290 300 328 329 345 347 FX	1.15
0.85	164.96	7.98	6.81	4	289 299 327 330 FX	1.70
0.85	162.04	7.88	6.69	4	288 298 326 331 FX	1.67
0.84	159.03	7.77	6.56	4	287 297 325 332 FX	1.64
0.84	155.93	7.66	6.44	4	286 296 324 333 FX	1.61
0.83	152.72	7.55	6.30	7	9 17 206 234 235 237 238 FX	0.90
0.83	149.41	7.43	6.17	6	211 216 226 227 240 242 FX	1.03
0.82	145.97	7.31	6.02	4	210 215 225 228 FX	1.51
0.82	142.40	7.18	5.88	4	209 214 224 229 FX	1.47
0.81	138.67	7.04	5.72	4	208 213 223 230 FX	1.43
0.81	134.78	6.90	5.56	4	207 212 222 231 FX	1.39
0.80	130.70	6.75	5.39	7	8 16 154 172 173 175 176 FX	0.77
0.79	126.41	6.59	5.22	6	121 159 160 169 178 180 FX	0.87
0.78	121.87	6.42	5.03	4	120 158 161 168 FX	1.26
0.77	117.03	6.24	4.83	4	119 157 162 167 FX	1.21
0.76	111.86	6.04	4.62	4	118 156 163 166 FX	1.15
0.75	106.27	5.82	4.39	4	117 155 164 165 FX	1.10
0.74	100.16	5.57	4.13	7	7 15 21 88 89 91 92 FX	0.59
0.73	93.39	5.30	3.85	6	26 36 57 66 94 96 FX	0.64
0.71	85.72	4.98	3.54	4	25 35 58 65 FX	0.88
0.69	76.75	4.60	3.17	4	24 34 59 64 FX	0.79
0.66	65.69	4.12	2.71	4	23 33 60 63 FX	0.68
0.61	50.34	3.40	2.08	4	22 32 61 62 FX	0.52

n_o (Hz)	$3.6n_o(H/V'_H)$	S	$(3.6n_o)/V'_H$	E	υ (Hz)	g_p	σ/μ
2da itera							
1.31116	2.57	0.032	0.029	0.091	0.81	4.15	0.21

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.99	283.34	11.77	11.69	2	953 955 FX	5.85
0.99	282.13	11.74	11.64	2	998 1015 FX	5.82
0.99	280.91	11.70	11.59	2	997 1014 FX	5.80
0.99	279.68	11.66	11.54	2	950 952 FX	5.77
0.99	278.44	11.62	11.49	2	994 1013 FX	5.75
0.99	277.19	11.59	11.44	2	993 1012 FX	5.72
0.99	275.93	11.55	11.39	2	947 949 FX	5.69
0.98	274.67	11.51	11.34	2	990 1011 FX	5.67
0.98	273.39	11.47	11.28	2	989 1010 FX	5.64
0.98	272.11	11.43	11.23	2	944 946 FX	5.62
0.98	270.81	11.40	11.18	2	975 979 FX	5.59
0.98	269.51	11.36	11.12	2	974 978 FX	5.56
0.98	268.19	11.32	11.07	3	752 755 825 FX	3.69
0.98	266.87	11.28	11.01	4	790 807 892 895 FX	2.75
0.98	265.53	11.24	10.96	4	791 808 893 894 FX	2.74
0.97	264.18	11.19	10.90	3	792 809 829 FX	3.63
0.97	262.83	11.15	10.85	4	793 810 896 899 FX	2.71
0.97	261.46	11.11	10.79	4	794 811 897 898 FX	2.70
0.97	260.07	11.07	10.73	3	795 812 888 FX	3.58
0.97	258.68	11.03	10.68	4	796 813 902 905 FX	2.67
0.97	257.28	10.98	10.62	4	797 814 903 904 FX	2.65
0.97	255.86	10.94	10.56	3	798 815 889 FX	3.52
0.96	254.43	10.90	10.50	4	799 816 906 909 FX	2.63
0.96	252.99	10.85	10.44	4	800 817 907 908 FX	2.61
0.96	251.53	10.81	10.38	3	801 818 890 FX	3.46
0.96	250.06	10.76	10.32	4	802 819 910 913 FX	2.58
0.96	248.57	10.71	10.26	4	803 820 911 912 FX	2.56
0.96	247.08	10.67	10.20	3	804 821 891 FX	3.40
0.95	245.56	10.62	10.14	4	805 822 900 915 FX	2.53
0.95	244.03	10.57	10.07	4	806 823 901 914 FX	2.52
0.95	242.49	10.53	10.01	3	512 513 631 FX	3.34
0.95	240.93	10.48	9.94	4	543 601 672 675 FX	2.49
0.95	239.35	10.43	9.88	4	542 600 673 674 FX	2.47
0.95	237.76	10.38	9.81	3	541 599 628 FX	3.27
0.94	236.15	10.33	9.75	4	540 598 676 679 FX	2.44
0.94	234.52	10.28	9.68	4	539 597 677 678 FX	2.42
0.94	232.87	10.22	9.61	3	538 596 625 FX	3.20
0.94	231.21	10.17	9.54	4	537 595 680 683 FX	2.39
0.94	229.52	10.12	9.47	4	536 594 681 682 FX	2.37
0.93	227.82	10.06	9.40	3	535 593 622 FX	3.13
0.93	226.09	10.01	9.33	4	534 592 684 687 FX	2.33
0.93	224.35	9.95	9.26	4	533 591 685 686 FX	2.31
0.93	222.58	9.90	9.19	3	532 590 619 FX	3.06

Fg	Pz (kg/m²).	Fa (kg).	Fz (kg)	No. de nodos	Nodos	Fz / #nodos
0.93	220.78	9.84	9.11	4	531 589 688 691 FX	2.28
0.92	218.97	9.78	9.04	4	530 588 689 690 FX	2.26
0.92	217.13	9.72	8.96	3	529 587 616 FX	2.99
0.92	215.26	9.66	8.88	4	528 586 692 695 FX	2.22
0.92	213.37	9.60	8.81	4	527 585 693 694 FX	2.20
0.91	211.45	9.54	8.73	3	526 584 613 FX	2.91
0.91	209.50	9.48	8.65	4	525 583 696 699 FX	2.16
0.91	207.53	9.41	8.57	4	524 582 697 698 FX	2.14
0.91	205.52	9.35	8.48	3	523 581 610 FX	2.83
0.91	203.48	9.28	8.40	4	522 580 701 702 FX	2.10
0.90	201.41	9.21	8.31	4	521 579 700 703 FX	2.08
0.90	199.30	9.14	8.23	3	520 578 607 FX	2.74
0.90	197.15	9.07	8.14	4	519 577 704 707 FX	2.03
0.89	194.97	9.00	8.05	4	518 576 705 706 FX	2.01
0.89	192.75	8.92	7.96	3	517 575 604 FX	2.65
0.89	190.48	8.85	7.86	4	516 574 709 710 FX	1.97
0.89	188.18	8.77	7.77	4	515 573 708 711 FX	1.94
0.88	185.82	8.69	7.67	7	4 5 373 421 422 424 425 FX	1.10
0.88	183.42	8.61	7.57	6	378 383 403 404 427 429 FX	1.26
0.88	180.96	8.53	7.47	4	377 382 402 405 FX	1.87
0.87	178.45	8.44	7.37	4	376 381 401 406 FX	1.84
0.87	175.89	8.36	7.26	4	375 380 400 407 FX	1.81
0.87	173.26	8.27	7.15	4	374 379 399 408 FX	1.79
0.86	170.56	8.17	7.04	7	10 18 303 339 340 342 343 FX	1.01
0.86	167.80	8.08	6.93	6	290 300 328 329 345 347 FX	1.15
0.85	164.96	7.98	6.81	4	289 299 327 330 FX	1.70
0.85	162.04	7.88	6.69	4	288 298 326 331 FX	1.67
0.84	159.03	7.77	6.56	4	287 297 325 332 FX	1.64
0.84	155.93	7.66	6.44	4	286 296 324 333 FX	1.61
0.83	152.72	7.55	6.30	7	9 17 206 234 235 237 238 FX	0.90
0.83	149.41	7.43	6.17	6	211 216 226 227 240 242 FX	1.03
0.82	145.97	7.31	6.02	4	210 215 225 228 FX	1.51
0.82	142.40	7.18	5.88	4	209 214 224 229 FX	1.47
0.81	138.67	7.04	5.72	4	208 213 223 230 FX	1.43
0.81	134.78	6.90	5.56	4	207 212 222 231 FX	1.39
0.80	130.70	6.75	5.39	7	8 16 154 172 173 175 176 FX	0.77
0.79	126.41	6.59	5.22	6	121 159 160 169 178 180 FX	0.87
0.78	121.87	6.42	5.03	4	120 158 161 168 FX	1.26
0.77	117.03	6.24	4.83	4	119 157 162 167 FX	1.21
0.76	111.86	6.04	4.62	4	118 156 163 166 FX	1.15
0.75	106.27	5.82	4.39	4	117 155 164 165 FX	1.10
0.74	100.16	5.57	4.13	7	7 15 21 88 89 91 92 FX	0.59
0.73	93.39	5.30	3.85	6	26 36 57 66 94 96 FX	0.64
0.71	85.72	4.98	3.54	4	25 35 58 65 FX	0.88
0.69	76.75	4.60	3.17	4	24 34 59 64 FX	0.79
0.66	65.69	4.12	2.71	4	23 33 60 63 FX	0.68
0.61	50.34	3.40	2.08	4	22 32 61 62 FX	0.52

Fuerzas sobre las Parábolas en dirección X-X.

Antenas Parabólicas	Altura (ft).	Grados (γ)	Diámetro (ϕ) (ft).	Wind Force Coefficients for Typical Paraboloid Without Radome C_A	C_S	C_M	Ap (ft²).	K_Z (ft)	G_H (ft).
1	295.2756	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.8703	1.0887
2	295.2756	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.8703	1.0887
3	295.2756	90	9.8425	-0.00003	0.00088	0.000336	76.0856	1.8703	1.0887
4	196.8504	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.6657	1.0887
5	196.8504	90	9.8425	-0.00003	0.00088	0.000336	76.0856	1.6657	1.0887
6	196.8504	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.6657	1.0887
7	98.4252	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.3665	1.0887
8	98.4252	90	9.8425	-0.00003	0.00088	0.000336	76.0856	1.3665	1.0887
9	98.4252	270	9.8425	-0.00003	-0.00088	-0.000336	76.0856	1.3665	1.0887
PLATAF-1	98.4252	0	7.3281	0.00397	0.00000	0.000000	42.1765	1.3665	1.0887
PLATAF-2	196.8504	0	6.1112	0.00397	0.00000	0.000000	29.3323	1.6657	1.0887

V_R (mi/h)	F_A (lb).	Fs (lb).	M (lb-ft).	FZ (lb).	FX (lb).	FX (kg).	FZ (kg).	M (kg-m).
98.18	-44.80	-1314.13	-4938.56	-44.80	-1314.13	-596.09	-20.32	-682.78
98.18	-44.80	-1314.13	-4938.56	-44.80	-1314.13	-596.09	-20.32	-682.78
98.18	-44.80	1314.13	4938.56	-44.80	1314.13	596.09	-20.32	682.78
98.18	-39.90	-1170.38	-4398.34	-39.90	-1170.38	-530.88	-18.10	-608.09
98.18	-39.90	1170.38	4398.34	-39.90	1170.38	530.88	-18.10	608.09
98.18	-39.90	-1170.38	-4398.34	-39.90	-1170.38	-530.88	-18.10	-608.09
98.18	-32.73	-960.10	-3608.11	-32.73	-960.10	-435.50	-14.85	-498.84
98.18	-32.73	960.10	3608.11	-32.73	960.10	435.50	-14.85	498.84
98.18	-32.73	-960.10	-3608.11	-32.73	-960.10	-435.50	-14.85	-498.84
98.18	2401.01	0.00	0.00	0.00	2401.01	1089.10	0.00	0.00
98.18	2035.53	0.00	0.00	0.00	2035.53	923.32	0.00	0.00

Por convención del programa STAAD, las direcciones de las Fuerzas y Momentos serán los siguientes:

Nodos	FX (kg).	FX / # nodos (kg).	Nodos	FZ (kg).	Nodos	M (kg-m).
953 FX	596.09		953 FZ	-20.32	953 MY	-682.78
954 FX	596.09		954 FZ	-20.32	954 MY	-682.78
955 FX	596.09		955 FZ	20.32	955 MY	682.78
512 FX	530.88		512 FZ	-18.10	512 MY	-608.09
513 FX	530.88		513 FZ	18.10	513 MY	608.09
514 FX	530.88		514 FZ	-18.10	514 MY	-608.09
4 FX	435.50		4 FZ	-14.85	4 MY	-498.84
5 FX	435.50		5 FZ	14.85	5 MY	498.84
6 FX	435.50		6 FZ	-14.85	6 MY	-498.84
496 497 498 499 500 501 494 460 464 465 466 467 468 458 FX	1089.10	77.79				
848 854 855 856 849 830 842 843 844 831 FX	923.32	92.33				

El valor obtenido de frecuencia natural en dirección X-X, con las iteraciones conjuntas de la estructura, líneas y parábolas es:

n_0 (Hz)

Definitivo

1.31116

Por lo tanto las fuerzas obtenidas de la segunda iteración, son las fuerzas de diseño.

III. 3. 4. Sismo.

Para el sismo se realizó el espectro de diseño, el cual se hizo de la siguiente manera:

Clasificación de la construcción según su destino:	Grupo A
Clasificación de la construcción según su estructuración:	Tipo 4
Terreno:	Tipo II
Región sísmica:	Zona A.
Factor de coeficiente sísmico:	Q = 2

Para diseñar se necesita considerar el comportamiento inelástico de la estructura, aunque sea de manera aproximada. Para ello las ordenadas espectrales se reducirán dividiéndolas entre el factor reductivo Q' a fin de obtener las fuerzas sísmicas reducidas por ductilidad. El factor reductivo se calcula de la siguiente manera:

$$Q' = 1 + (Q-1)\frac{T}{T_a}; \quad \text{si} \quad T < T_a$$

$$Q' = Q \quad ; \quad \text{si} \quad T > T_a$$

De la tabla II. 2. 6. 1.

$a_o = 0.04$

$c = 0.16$

$T_a\,(s) = 0.3$

$T_b\,(s) = 1.5$

$r = 0.6667$

$Fa = 1.5$

Espectro de diseño

$$a = a_o + (c - a_o)\frac{T}{T_a} \quad ; \quad \text{si}\, T < T_a$$

$$a = c \quad ; \quad \text{si } T_a \leq T \leq T_b$$

$$a = c\left[\frac{T_b}{T}\right]^r \quad ; \quad \text{si } T > T_b$$

Espectro de Diseño

T (s)	Q'	a/g
0.00	1.00	0.06
0.05	1.17	0.08
0.10	1.33	0.09
0.15	1.50	0.10
0.20	1.67	0.11
0.25	1.83	0.11
0.30	2.00	0.12
0.50	2.00	0.12
0.70	2.00	0.12
0.90	2.00	0.12
1.10	2.00	0.12
1.30	2.00	0.12
1.50	2.00	0.12
1.60	2.00	0.11
1.90	2.00	0.10
2.20	2.00	0.09
2.50	2.00	0.09
2.80	2.00	0.08

Continuación...

T (s)	Q'	a/g
3.10	2.00	0.07
3.40	2.00	0.07
3.70	2.00	0.07
4.00	2.00	0.06
4.30	2.00	0.06
4.60	2.00	0.06
4.90	2.00	0.05
5.20	2.00	0.05
5.50	2.00	0.05
5.80	2.00	0.05
6.10	2.00	0.05
6.40	2.00	0.05
6.70	2.00	0.04
7.00	2.00	0.04
7.30	2.00	0.04
7.60	2.00	0.04
7.90	2.00	0.04
8.20	2.00	0.04

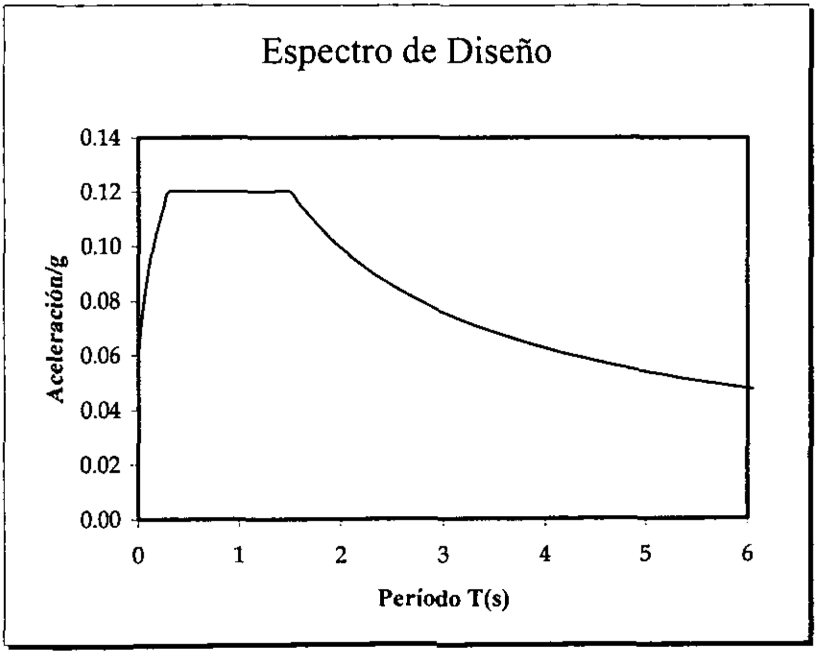


Figura III. 3. 1. Espectro de diseño.

Los valores del espectro del diseño fueron introducidos al programa STAAD para llevar a cabo el análisis de fuerzas.

- Factores de escalamiento para el análisis sísmico.

Para la obtención de los factores de escalamiento se debe obtener primero el peso total de la estructura y el período correspondiente al primer modo de vibración de la esta.

Peso de la estructura	129 843 kg
Peso de las parábolas	1 800 kg
Peso total	**131 643 kg**

Período de la estructura = **0.94545 s**

Con el valor del período fundamental entramos a la gráfica del espectro de diseño (figura III. 3. 1), con la cual obtenemos la siguiente aceleración:

$$a = 0.12$$

Con este valor y el peso total de la estructura obtenemos el cortante basal:

$$V = 0.12\ (\ 131\ 643\ )$$

$$\mathbf{V = 15\ 797\ kg}$$

Los cortantes obtenidos en la corrida del STAAD son:

Cortante en dirección Z-Z = **7 345.36 kg**

Cortante en dirección X-X = **7345.08 kg**

Los factores de escalamiento son aplicados para cada dirección del análisis. La forma de obtener los factores de escalamiento se llevará a cabo de la siguiente manera:

Factor de escalamiento en Z-Z = (15 797 / 7 345.36)

Factor de escalamiento en Z-Z = **2.151**

Factor de escalamiento en X-X = (15 797 / 7345.08)

Factor de escalamiento en X-X = **2.151**

	Para Cimentación		Para Diseño	
	100%	30%	100%	30%
Factor de escalamiento en Z-Z =	2.151	0.645	1.613	0.484
Factor de escalamiento en X-X =	2.151	0.645	1.613	0.484

Estos factores serán considerados en las combinaciones de cargas.

III. 4. Estados de carga y combinaciones.

- Estados de carga.

1.- Peso propio y peso de parábolas. (CM).

2.- Carga viva (CV).

3.- Viento en dirección Z-Z (VZ).

4.- Viento en dirección X-X (VX).

5.- Sismo en dirección de Z-Z (SZ).

6.- Sismo en dirección de X-X (SX).

- Combinaciones de carga.

Cimentación.

7.- (CM + CV)*1

8.- (CM + CV + VZ)*1

9.- (CM + CV - VZ)*1

10.- (CM + CV + VX)*1

11.- (CM + CV - VX)*1

12.- (CM + CV + 100% SZ + 30% SX)*1

13.- (CM + CV + 100% SZ - 30% SX)*1

14.- (CM + CV - 100% SZ + 30% SX)*1

15.- (CM + CV - 100% SZ - 30% SX)*1

16.- (CM + CV + 30% SZ + 100% SX)*1

17.- (CM + CV + 30% SZ - 100% SX)*1

18.- (CM + CV - 30% SZ + 100% SX)*1

19.- (CM + CV - 30% SZ - 100% SX)*1

Diseño.

20.- (CM + CV)*1

21.- (CM + CV + VZ)*0.75

22.- (CM + CV - VZ)*0.75

23.- (CM + CV + VX)*0.75

24.- (CM + CV - VX)*0.75

25.- (CM + CV + 100% SZ + 30% SX)*0.75

26.- (CM + CV + 100% SZ - 30% SX)*0.75

27.- (CM + CV - 100% SZ + 30% SX)*0.75

28.- (CM + CV - 100% SZ - 30% SX)*0.75

29.- (CM + CV + 30% SZ + 100% SX)*0.75

30.- (CM + CV + 30% SZ - 100% SX)*0.75

31.- (CM + CV - 30% SZ + 100% SX)*0.75

32.- (CM + CV - 30% SZ - 100% SX)*0.75

A continuación se presentan las mismas combinaciones de carga, las cuales a diferencia de las anteriores, fueron modificadas por los factores de escalamiento en los factores de carga.

Cimentación.

7.- (CM + CV)*1

8.- (CM + CV + VZ)*1

9.- (CM + CV - VZ)*1

10.- (CM + CV + VX)*1

11.- (CM + CV - VX)*1

12.- (CM + CV)*1 + (100% SZ * 2.151) + (30% SX * 0.6453)

13.- (CM + CV)*1 + (100% SZ * 2.151) - (30% SX * 0.6453)

14 (CM + CV)*1 – (100% SZ * 2.151) + (30% SX * 0.6453)

15.- (CM + CV)*1 – (100% SZ * 2.151) – (30% SX * 0.6453)

16.- (CM + CV)*1 + (30% SZ * 0.6453) + (100% SX * 2.151)

17.- (CM + CV)*1 + (30% SZ * 0.6453) – (100% SX * 2.151)

18.- (CM + CV)*1 – (30% SZ * 0.6453) + (100% SX * 2.151)

19.- (CM + CV)*1 – (30% SZ * 0.6453) - (100% SX * 2.151)

Diseño.

20.- (CM + CV)*1

21.- (CM + CV + VZ)*0.75

22.- (CM + CV - VZ)*0.75

23.- (CM + CV + VX)*0.75

24.- (CM + CV - VX)*0.75

25.- (CM + CV)*0.75 + (100% SZ * 1.61325) + (30% SX * 0.48397)

26.- (CM + CV)*0.75 + (100% SZ * 1.61325) – (30% SX * 0.48397)

27.- (CM + CV)*0.75 – (100% SZ * 1.61325) + (30% SX * 0.48397)

28.- (CM + CV)*0.75 – (100% SZ * 1.61325) – (30% SX * 0.48397)

29.- (CM + CV)*0.75 + (30% SZ * 0.48397) + (100% SX * 1.61325)

30.- (CM + CV)*0.75 + (30% SZ * 0.48397) – (100% SX * 1.61325)

31.- (CM + CV)*0.75 – (30% SZ * 0.48397) + (100% SX * 1.61325)

32.- (CM + CV)*0.75 – (30% SZ * 0.48397) – (100% SX * 1.61325)

III. 5. Modelo matemático.

La estructura esqueletal es analizada por medio del programa STAAD-Pro versión 2001, este programa nos ayuda a realizar un análisis tridimensional matricial, para la aplicación del método de análisis, con este programa se elabora un archivo de entrada de datos que consiste en los cuatro puntos siguientes:

1)Topología de la estructura esqueletal (Definición de coordenadas y elementos de incidencia).

2)Propiedades geométricas de los elementos estructurales.

3)Estados y combinaciones de carga.

4)Condiciones de apoyo y restricciones de la estructura esqueletal.

El tipo de análisis que se utiliza en este programa, consiste esencialmente en lo siguiente:

El método que lleva a cabo el programa STAAD-Pro, es el *método de rigideces en tres dimensiones.* Primero obtiene la matriz de rigideces de cada uno de los elementos estructurales $[\underline{k}^m]$, para posteriormente ensamblar con cada una de estas, la matriz global de rigideces $[\underline{K}^m]$.

Una vez obtenidas las fuerzas externas [F], se deben introducir en el archivo de datos, el programa procede a calcular los desplazamientos [d] en cada nudo de la estructura, es decir, resuelve el sistema matricial siguiente:

$$[F] = [K]\,[d]$$

Una vez obtenidos los desplazamientos, el programa procede a calcular las deformaciones de cada elemento y con estas sus esfuerzos principales, así mismo, calcula los elementos mecánicos (fuerzas axiales, fuerzas cortantes y momentos flexionantes) en cada uno de los elementos de la estructura.

III. 6. Análisis del modelo matemático.

El análisis del modelo matemático se presenta en su totalidad en los apéndices A y B. El apéndice A contiene los archivos de entrada y salida de datos; en tanto que en el apéndice B se presentan algunos gráficos ilustrativos de la estructura.

IV. Diseño.

Criterios de Diseño Estructural

Toda estructura y cada una de sus partes deberán diseñarse para cumplir con los requisitos básicos siguientes:

I. Tener seguridad adecuada contra la aparición de todo estado límite de falla posible ante las combinaciones de acciones más desfavorables que puedan presentarse durante su vid esperada.

II. No rebasar ningún estado límite de servicio ante combinaciones de acciones que corresponden a condiciones normales de operación

Estado límite de falla.

Se considera como estado límite de falla cualquier situación que corresponda al agotamiento de la capacidad de carga de la estructura o de cualesquiera de sus componentes, incluyendo la cimentación, o al hecho de que ocurran daños irreversibles que afecten significativamente la resistencia ante nuevas aplicaciones de carga.

Estado límite de servicio.

Se considerará como estado límite de servicio la ocurrencia de desplazamientos, agrietamientos vibraciones o daños que afecten el correcto funcionamiento de la edificación, pero que no perjudiquen su capacidad para soportar cargas.

Los estados límite de falla y de servicio se revisarán conforme el avance de este trabajo.

IV. 1. Diseño de la estructura

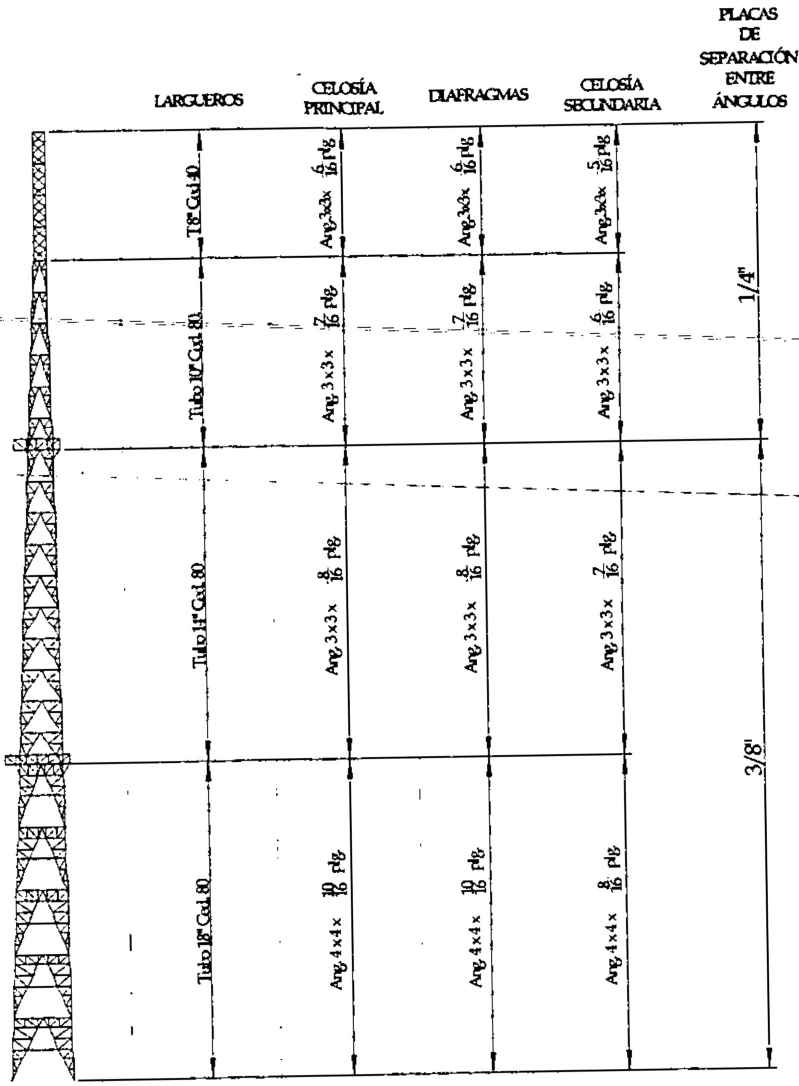


Figura: IV. 1. 1. Propiedades geométricas de la estructura

Las propiedades geométricas obtenidas en el diseño de la estructura, son las que se presentan en la figura (IV. 1. 1.). En esta figura también se puede observar las propiedades de las placas que se encuentran entre los ángulos de la celosía.

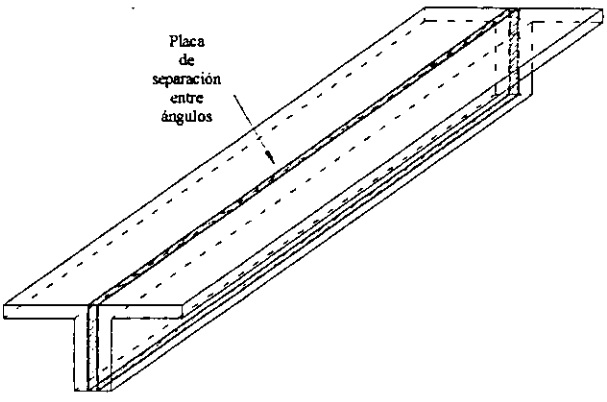


Figura: IV. 1. 2. Placa entre ángulos.

Las propiedades de los largueros (tubo galvanizado) empleados son:

Diámetro exterior = ϕ ext.
Diámetro interior = ϕ int.
Área a cortante = Ac

Tubo 18" cédula 80: ϕ ext.= 457 mm.
ϕ int.= 410 mm.
Ac = 325 cm^2.

Tubo 14" cédula 80: ϕ ext.= 356 mm.
ϕ int.= 317 mm.
Ac = 201.42 cm^2.

Tubo 10" cédula 80: ϕ ext.= 273 mm.
ϕ int.= 243 mm.
Ac = 122.3 cm^2.

Tubo 8" cédula 40: ϕ ext.= 219 mm.
ϕ int.= 203 mm.
Ac = 54.3 cm².

Cálculo de máxima deflexión.

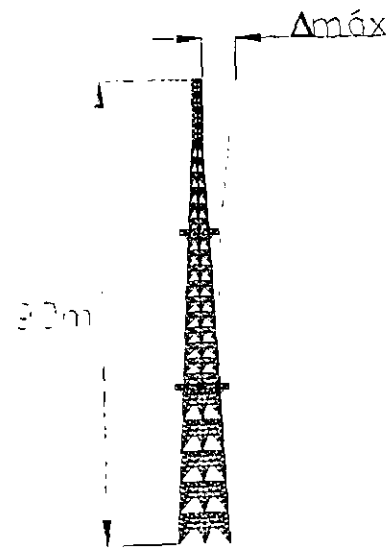
Deflexión permisible:

$$\Delta perm = 0.006\ (H)$$
$$\Delta perm = 0.006\ (90\ m) = 0.54\ m = 54\ cm.$$

Máxima deflexión:

$\Delta máx = 48.79$ cm. (Ver apéndice A).

Como: $\Delta perm > \Delta máx$ entonces, cumple por deformaciones.



Revisión de Presiones en la Cimentación

Revisión de losa de cimentación en dirección "Z"

De la página 34 de resultados del STAAD obtenemos: *Combinación de Carga No. 8*
CM+CV+Viento en "Z"

Nodo 1			*Nodo 2*		
Tensión =	-145431	kg	*Compresión =*	423104	kg
Vz =	-11519	kg	*Vz =*	-45055	kg
Mx =	-3162	kg-m	*Mx =*	7111	kg-m

Nodo 3		
Tensión =	-145430	kg
Vz =	-11147	kg
Mx =	-2806	kg-m

Parámetros

Capacidad admisible del terreno	σ_{adm} =	16000	kg / m^2
Peso volumétrico del concreto	$\gamma_{concreto}$ =	2400	kg / m^3
Peso volumétrico del relleno	$\gamma_{relleno}$ =	1600	Kg / m^3
Factor de seguridad	F.S.=	1.1	

Dimensiones Propuestas

B_{Losa} =	13	m.	$h_{Peralte}$ =	1.0	m.
L_{Losa} =	13	m.	$B_{Columna}$ =	0.7	m
Df =	2.5	m.	$L_{Columna}$ =	0.7	m

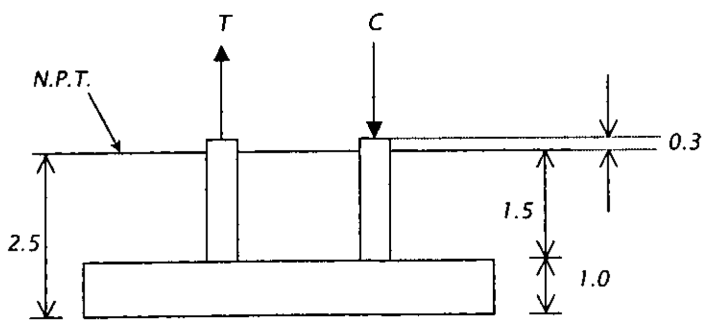


Fig. IV. 2. 1. Esquema de Losa de Cimentación (Unidades en metros).

Fuerzas de Diseño

Nodo 1			Nodo 2		
Tensión =	145431	kg	Compresión =	423104	kg
Mx_{total} =	29089	kg-m	Mx_{total} =	133264	kg-m

Nodo 3
Tensión = 145430 kg
Mx_{total} = 28405 kg-m

Momento de Volteo

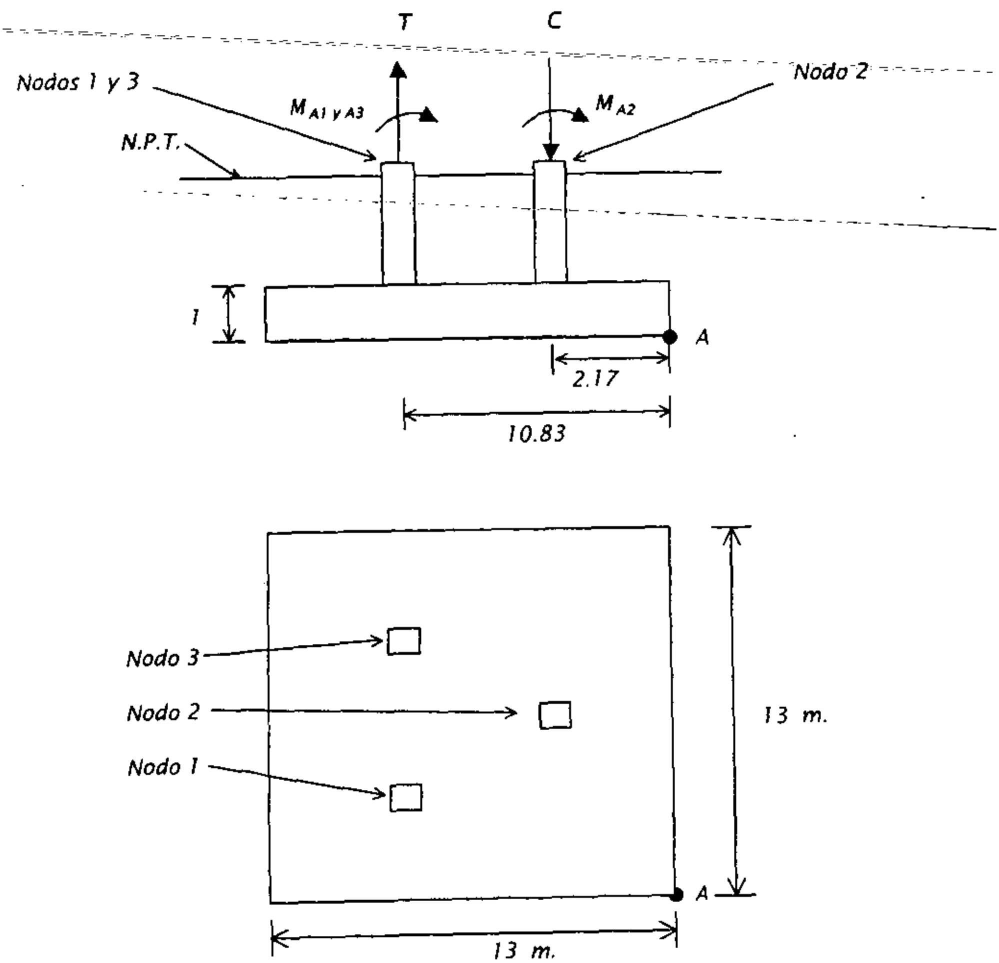


Fig. IV. 2. 2 Esquema de Losa en Planta y Elevación (Unidades en metros).

Suma de momentos respecto de "A"

$Mt =$ 255681 kg-m

$Mv =$ (Mt)(F.S.)

$Mv =$ 281249 kg-m

Esfuerzo ejercido

Tensión Nudo 1 =	145431	kg
Compresión Nudo 2 =	423104	kg
Tensión Nudo 3 =	145430	kg
Área de dados =	1.47	m^2
Volumen de dados =	2.646	m^3
Área de losa =	169	m^2
Volumen losa =	169	m^3
Volumen de concreto =	171.646	m^3
Peso de losa y dados =	411950.4	kg
Área de relleno =	167.53	m^2
Volumen del relleno =	251.295	m^3
Peso del relleno =	402072	kg

Fuerza Resultante

$P =$ 946265 kg

$P_{Total} =$ (P)(F.S.)

$P_{Total} =$ 1040892 kg

Cálculo de la excentricidad

$$e = \frac{Mv}{P_{Total}}$$

$e =$ 0.27 m.

$a =$ 6.23 m.

$$B/3 = 4.33 \quad m.$$

$$B/6 = 2.17 \quad m.$$

$$Si \quad e = 0 \qquad \sigma = \frac{P_{Total}}{A_{Losa}} \qquad ...(1)$$

$$Si \quad e < B/6 \quad ó \quad a > B/3 \qquad \sigma = \left(\frac{P_{Total}}{A_{Losa}}\right)\left[1 \pm \left(\frac{6e}{B}\right)\right] \qquad ...(2)$$

$$Si \quad e = B/6 \quad ó \quad a = B/3 \qquad \sigma = 2\left(\frac{P_{Total}}{A_{Losa}}\right) \qquad ...(3)$$

$$Si \quad e > B/6 \qquad \sigma = \frac{4P_{Total}}{[3L(B-2e)]} \qquad ...(4)$$

Se empleará la ecuación que conforme a los parámetros calculados sea la indicada

$\sigma_{máx}$ =	6927	kg/m^2	<	$\sigma_{admisible}$ =	16000	kg/m^2
σ_{min} =	5391	kg/m^2	<	$\sigma_{admisible}$ =	16000	kg/m^2

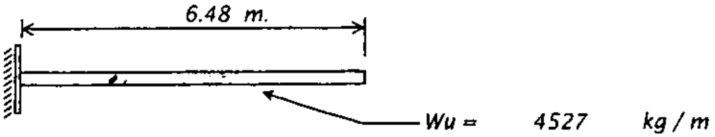
Por lo tanto se acepta.

Diseño de Losa de Cimentación

Esfuerzo empleado para el diseño: Esf_D

$$Esf_D = \sigma_{máx} - esf_{relleno}$$

$$Esf_D = 4527 \quad kg/m^2$$



"L" para la sección más crítica: 6.48 m

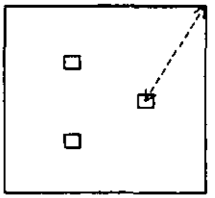


Fig. IV. 2. 3. Esquema de la losa vista en planta

$$Mu = \frac{Wu(L)^2}{2} \quad ; \quad Vu = Wu(L)$$

Mu = 95156 kg-m ; Vu = 29353 kg

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días: f 'c = 350 Kg/cm²
Esfuerzo de fluencia del acero de refuerzo: fy = 4200 Kg/cm²

f*c = 0.8 f 'c	f*c =	280	Kg/cm²	
f "c = [1.05 - (f *c/1250)](f *c)	f "c =	231.28	Kg/cm²	Si f*c > 250 kg/cm²
f "c =0.85 f *c	f "c =	238	Kg/cm²	Si f*c ≤ 250 kg/cm²
Definitivo	f "c =	231.28	Kg/cm²	

Porcentaje balanceado de acero para losas de concreto: ρb

$$\rho b = \frac{f''c}{fy}\frac{4800}{fy+6000}$$ ρb = 0.0259

$\rho_{máx} = 0.75\ \rho b$ $\rho_{máx} = 0.0194$

$$\rho_{min} = \frac{0.7\sqrt{f'c}}{fy}$$ $\rho_{mín} = 0.0031$

Se propondrá ρ = 0.0045 de porcentaje para cálculo

$$q = \frac{\rho\ fy}{f'c}$$

q = 0.0541

Revisión del peralte por flexión.

$$df = \sqrt{\frac{Mu}{F_R\, f''c\, b\, q\,(1-0.5q)}}$$

df = 93.17 *cm.*

Peralte total propuesto	*h =*	100	*cm.*
Recubrimiento libre	*r =*	5	*cm.*
Peralte efectivo	*dp =*	95	*cm.*

Como: *dp =* 95 *cm.* > *df =* 93.17 *cm.*

entónces el peralte propuesto es correcto. (ok).

Revisión por cortante como viga ancha.

$$Vud = (L-d)Wu$$

Vud = 25052 *kg*

Capacidad del concreto para tomar cortante.

Si $\rho < 0.01$ $$V_{CR} = F_R\, b\, d(0.2 + 30\rho)\sqrt{f^*c}$$

V_{CR} = 42643 *kg*

Si $\rho \geq 0.01$ $$V_{CR} = 0.5\ F_R\, bd\sqrt{f^*c}$$

V_{CR} = 63586 *kg*

Debido al porcentaje de acero propuesto se toma:

V_{CR} = 42643 *kg*

Como el peralte es mayor de 70 cm, se reducirá en 30% la capacidad del cortante:

Definitivo V_{CR} = 29850 *kg*

Como: V_{CR} > *Vud* *entónces el peralte es correcto. (ok).*

Revisión por penetración.

C1 =	70	cm.
C2 =	70	cm.
dp =	95	cm.
C1+dp =	165	cm.
C2+dp =	165	cm.

$$\alpha = 1 - \frac{1}{1 + 0.67\sqrt{(C1+dp)/(C2+dp)}}$$

$\alpha =$ 0.401198

Momento que toma la losa:

α Mx = 5346532.52 kg-cm

V_{Total} = P - [(C1+dp)(C2+dp)(Esf $_D$)]

V_{Total} = 682119 kg

Ac = 2[(C1+dp)+(C2+dp)](dp)

Ac = 62700 cm^2

$$Jc = \frac{dp(C1+dp)^3}{6} + \frac{(C1+dp)dp^3}{6} + \frac{dp(C2+dp)(C1+dp)^2}{2}$$

Jc = 71125312.5 + 23577813 + 213375938

Jc = 308079063 cm^4

Sustituyendo valores en la fórmula de la escuadría.

$$Vu = \frac{V_{Total}}{Ac} \pm \frac{\alpha\ Mx\ C_{AB}}{Jc}$$

$Vu_{máx.}$ = 12.31 Kg/cm^2

$Vu_{mín.}$ = 9.45 Kg/cm^2

El esfuerzo cortante que resiste el concreto por penetración es:

$Vcr = F_R\sqrt{f*c}$ Vcr = 13.39 Kg/cm^2

Como Vcr > $Vu_{máx.}$ no existe penetración de la columna en la losa de cimentación.

Por lo tanto se aceptan las dimensiones propuestas para la cimentación.

Acero de refuerzo por flexión:

$As = \rho\ bd$ $As =$ 42.85 cm²

Separación de varillas para la losa en su cara inferior.

Varilla que se utilizará 1 " Barra del No. 8

$as =$ 5.07 cm²

No. de barras: 1

$$s = \frac{100\ as}{As}$$ $s =$ 11.82 cm

Utilizar paquetes de: 1 barras

Con varillas de: 1 " a cada 12 cm.

Acero requerido por Cambios Volumétricos

Separación de varillas para la losa en su cara superior.

$$a_{ST} = \frac{660\ x_1}{fy\left(x_1 + 100\right)}$$ $a_{ST} =$ 7.86 cm²/cm

Por ser un elemento que está en contacto con el terreno, el área será aumentada en un 50%

$a_{ST} =$ 11.79 cm²/cm

Varilla que se utilizará 1/2 " Barra del No. 4

$as =$ 1.27 cm²

$$s = \frac{100\ as}{a_{ST}}$$ $s =$ 10.75 cm ≤ 50 cm por norma

Utilizar barras de: 1/2 " a cada 10.00 cm.

Diseño de Dados o Columnas.

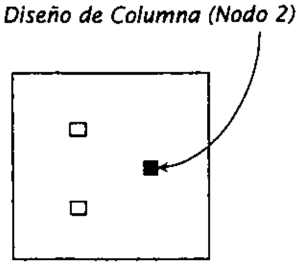


Fig. IV. 2. 4. Losa vista en planta

Acero de refuerzo por flexocompresión:

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días:	$f'c =$	350	Kg/cm^2
Esfuerzo de fluencia del acero de refuerzo:	$fy =$	4200	Kg/cm^2

$f^*c = 0.8\ f'c$	$f^*c =$	280	Kg/cm^2	
$f''c = [1.05 - (f^*c/1250)](f^*c)$	$f''c =$	231.28	Kg/cm^2	Si $f^*c > 250\ kg/cm^2$
$f''c = 0.85\ f^*c$	$f''c =$	238	Kg/cm^2	Si $f^*c \leq 250\ kg/cm^2$
Definitivo	$f''c =$	231.28	Kg/cm^2	

Sección de la columna.

$h =$	70	cm
$b =$	70	cm
$r =$	5	cm
$d =$	65	cm

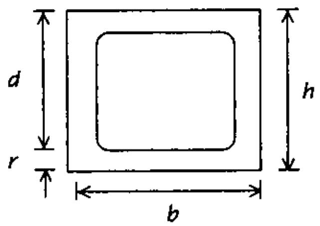


Fig. IV. 2. 5. Columna vista en planta

$e = Mu / Pu$ $e =$ 0.31 m.

$e / h = 0.45$

$d / h = 0.93$

$$K = \frac{Pu}{F_R\, b\, h\, f''c} \qquad K = 0.51$$

$$R = \frac{Mu}{F_R\, b\, h^2\, f''c} \qquad R = 0.23$$

Con los valores calculados entramos a diagrámas de interación, para obtener "q"

$q = 0.38$

Sustituyendo en:

$$\rho = q\frac{f''c}{fy} \qquad \rho = 0.02093$$

$$\rho_{min} = \frac{20}{fy} = 0.00476 \leq 0.020925 \leq \rho_{máx} = 0.06$$

Diseño del acero longitudinal de la columna.

$\rho = 0.02093$

$As = \rho\, bh$ $\qquad As = 102.53\ cm^2$

Varilla que se utilizará 1 3/8 " *Barra del No.* 11

Área de la barra: $as = 9.58\ cm^2$

$No.\ de\ Varillas = \frac{As}{as}$; *No. de Varillas =* 10.70 12

Utilizar 12 *varillas de* 1 3/8 "

Revisión por Cortante

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $\qquad V_{CR} = \left[F_R bd(0.2+30\rho)\sqrt{f^*c}\right]\left[1+0.007\left(\frac{Pu}{Ag}\right)\right]$

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $\qquad V_{CR} = 0.5F_R bd\sqrt{f^*c}\left[1+0.007\left(\frac{Pu}{Ag}\right)\right]$

As =	102.53	cm^2	;	Ag =	4900	cm^2
Pu =	465414	kg	;	0.7f*cAg+2000As =	1165468	kg

Si ρ < 0.01 y Pu ≤ 0.7f*cAg+2000As V_{CR} = 83939.64 kg

Si ρ ≥ 0.01 y Pu ≤ 0.7f*cAg+2000As V_{CR} = 50702.88 kg

De los parámetros anteriores se obtiene que
el cortante que resiste el concreto es: V_{CR} = 50703 kg

Diseño del acero transversal (estribos) para la columna.

Los estribos serán de: 3/8 " Estribos del No. 3

Separación de estribos.

S_2

La menor separación de:

1.-	$S = \frac{850}{\sqrt{fy}} \phi b$	s =	45.81	cm
2.-	s = 48 diámetros del estribo.	s =	45.72	cm
3.-	$s = b_{Columna} / 2$	s =	35.00	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\ d}{Vz - V_{CR}}$	s =	-272.42	cm
		S_2 =	35	cm

S_1

La menor separación de:

1.-	$S = \frac{425}{\sqrt{fy}} \phi b$	s =	22.90	cm
2.-	s = 20 cm.	s =	20.00	cm
3.-	$s = b_{Columna} / 4$	s =	17.50	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\ d}{Vz - V_{CR}}$	s =	-272.42	cm
		S_1 =	17	cm

Hc

La mayor separación de:

1.- $s = \text{Dim. mayor} (C_1 \text{ ó } C_2)$	s =	70.00	cm
2.- $s = H_{Libre} / 6$	s =	30.00	cm
3.- $s = 60$ cm.	s =	60.00	cm
	Hc =	70	cm

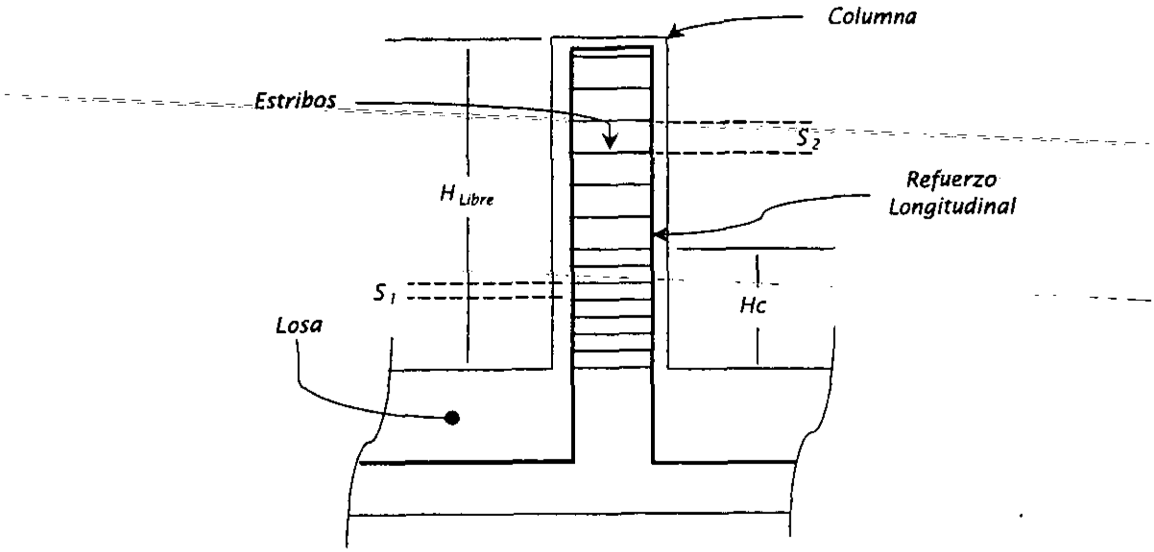


Fig. IV. 2. 6. Representación de la separación de estribos

El cortante que resiste el acero es:

$$V_{SR} = \frac{F_R \, Av \, fy \, d}{s} \qquad V_{SR} = 8893 \text{ kg}$$

Cortante que actúa en la columna: $Vz =$ 49560 kg

El cotante total que resiste el elemento es:

$$V_R = V_{CR} + V_{SR} \qquad V_R = 59596 \text{ kg}$$

Como $V_{CR} > Vz$, *entónces no hay problemas por cortante.*

Por lo tanto se aceptan las dimensiones propuestas para la columna (dados).

Revisión de Columnas (Nodos 1 y 3)

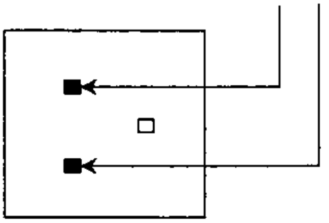


Fig. IV. 2. 7. Losa vista en planta

Acero de refuerzo por flexotensión:

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días: $f'c$ = 350 Kg/cm²
Esfuerzo de fluencia del acero de refuerzo: fy = 4200 Kg/cm²

$f^*c = 0.8\, f'c$	f^*c =	280	Kg/cm²	
$f''c = [1.05 - (f^*c/1250)](f^*c)$	$f''c$ =	231.28	Kg/cm²	Si $f^*c > 250$ kg/cm²
$f''c = 0.85\, f^*c$	$f''c$ =	238	Kg/cm²	Si $f^*c \leq 250$ kg/cm²
Definitivo	$f''c$ =	231.28	Kg/cm²	

Sección de la columna.

h =	70	cm
b =	70	cm
r =	5	cm
d =	65	cm

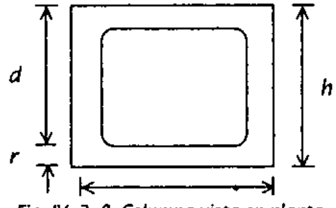


Fig. IV. 2. 8. Columna vista en planta

$e = Mu / Pu$ e = 0.20 m.

$e / h = 0.29$ $d / h = 0.93$

$$K = \frac{Pu}{F_R\, b\, h\, f''c}$$ K = 0.18

$$R = \frac{Mu}{F_R\, b\, h^2\, f''c}$$ R = 0.05

Con los valores calculados entramos a diagrámas de interación, para obtener "q"

$q = 0.3$

Sustituyendo en:

$$\rho = q\frac{f''c}{fy} \qquad \rho = 0.01652$$

$$\rho_{min} = \frac{20}{fy} = 0.00476 \leq 0.01652 \leq \rho_{máx} = 0.06$$

Diseño del acero longitudinal de la columna.

$\rho = 0.01652$

$As = \rho\, bh$ $\qquad$ $As = 80.95\ cm^2$

Varilla que se utilizará 1 3/8 " $\qquad$ *Barra del No. 11*

Área de la barra: $\qquad$ $as = 9.58\ cm^2$

$No.\ de\ Varillas = \frac{As}{as}$; *No. de Varillas = 8.45* $\qquad$ 10

Utilizar 10 varillas de 1 3/8 "

Revisión por Cortante

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$ $\qquad$ $V_{CR} = \left[F_R bd(0.2 + 30\rho)\sqrt{f^*c}\right]\left[1 - 0.03\left(\frac{Pu}{Ag}\right)\right]$

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$ $\qquad$ $V_{CR} = 0.5F_R bd\sqrt{f^*c}\left[1 - 0.03\left(\frac{Pu}{Ag}\right)\right]$

$As = 80.95\ cm^2$; $\qquad$ $Ag = 4900\ cm^2$

$Pu = 159974\ kg$; $\qquad$ $0.7f^*cAg + 2000As = 1122296$ ton

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$ $\qquad$ $V_{CR} = 747.1813\ kg$

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$ $\qquad$ $V_{CR} = 626.3255\ kg$

De los parámetros anteriores se obtiene que el cortante que resiste el concreto es: $\qquad$ $V_{CR} = 626\ kg$

Diseño del acero transversal (estribos) para la columna.

Los estribos serán de: 3/8 " *Estribos del No.* 3

Separación de estribos.

S_2

La menor separación de:

1.-	$S = \frac{850}{\sqrt{fy}} \phi b$	s =	45.81	cm
2.-	s = 48 diámetros del estribo.	s =	45.72	cm
3.-	$s = b_{Columna} / 2$	s =	35.00	cm
4.-	Por cortante $s = \frac{F_R \, Av \, fy \, d}{Vz - V_{CR}}$	s =	25.84	cm
		$S_2 =$	25	cm

S_1

La menor separación de:

1.-	$S = \frac{425}{\sqrt{fy}} \phi b$	s =	22.90	cm
2.-	s = 20 cm.	s =	20.00	cm
3.-	$s = b_{Columna} / 4$	s =	17.50	cm
4.-	Por cortante $s = \frac{F_R \, Av \, fy \, d}{Vz - V_{CR}}$	s =	25.84	cm
		$S_1 =$	17	cm

Hc

La mayor separación de:

1.-	s = Dim. mayor (C_1 ó C_2)	s =	70.00	cm
2.-	$s = H_{Libre} / 6$	s =	30.00	cm
3.-	s = 60 cm.	s =	60.00	cm
		Hc =	70	cm

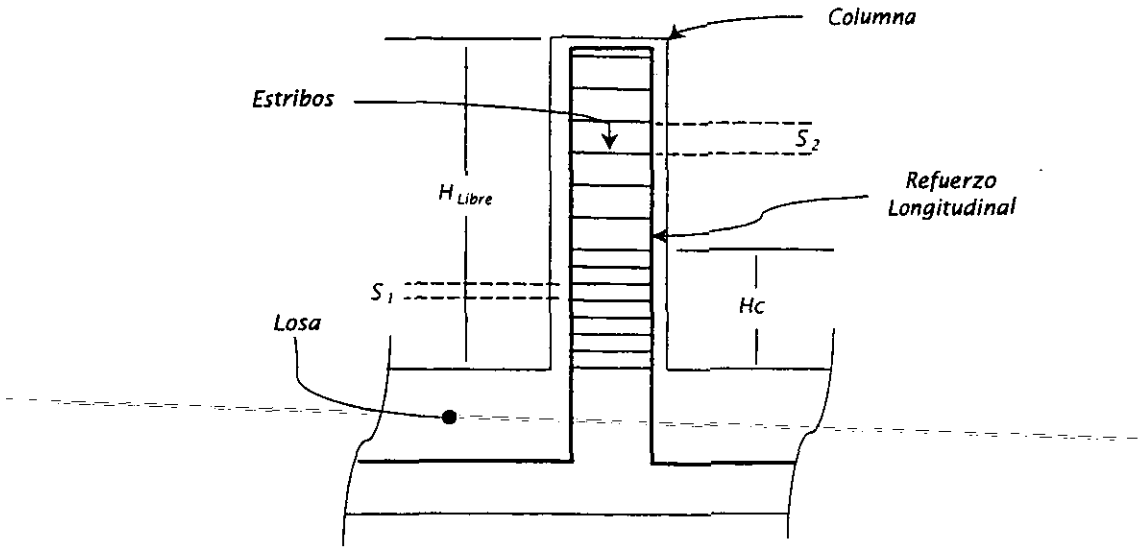


Fig. IV. 2. 9. Representación de la separación de estribos

El cortante que resiste el acero es:

$$V_{SR} = \frac{F_R \, Av \, fy \, d}{s} \qquad V_{SR} = 12450 \text{ kg}$$

Cortante que actúa en la columna: $Vz =$ 12670 kg

El cotante total que resiste el elemento es:

$V_R = V_{CR} + V_{SR}$ $V_R =$ 13076 kg

Como $V_{CR} > Vz$, *entónces no hay problemas por cortante.*

Por lo tanto se aceptan las dimensiones propuestas para la columna (dados).

Revisión de Presiones en la Cimentación

Revisión de losa de cimentación en dirección "Z"

De la página 34 de resultados del STAAD obtenemos: *Combinación de Carga No. 9*
CM+CV - Viento en "Z"

Nodo 1			*Nodo 2*		
Compresión =	*233589*	*kg*	*Tensión =*	*-334937*	*kg*
Vz =	*16007*	*kg*	*Vz =*	*36078*	*kg*
Mx =	*1773*	*kg-m*	*Mx =*	*-4390*	*kg-m*

Nodo 3		
Compresión =	*233590*	*kg*
Vz =	*15635*	*kg*
Mx =	*1416*	*kg-m*

Parámetros

Capacidad admisible del terreno	σ_{adm} =	16000	kg/m^2
Peso volumétrico del concreto	$\gamma_{concreto}$ =	2400	kg/m^3
Peso volumétrico del relleno	$\gamma_{relleno}$ =	1600	Kg/m^3
Factor de seguridad	F.S.=	1.1	

Dimensiones Propuestas

B_{Losa} =	13	m.	$h_{Peralte}$ =	1.0	m.
L_{Losa} =	13	m.	$B_{Columna}$ =	0.7	m
Df =	2.5	m.	$L_{Columna}$ =	0.7	m

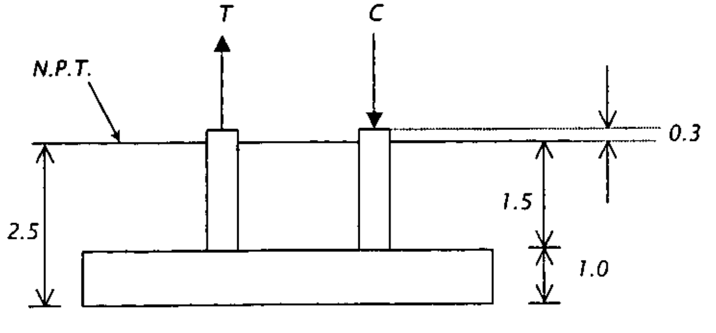


Fig. IV. 2. 10. Losa en elevación (Unidades en metros).

Fuerzas de Diseño

Nodo 1			Nodo 2		
Compresión =	233589	kg	Tensión =	334937	kg
Mx_{total} =	43046	kg-m	Mx_{total} =	105408	kg-m

Nodo 3		
Compresión =	233590	kg
Mx_{total} =	42363	kg-m

Momento de Volteo

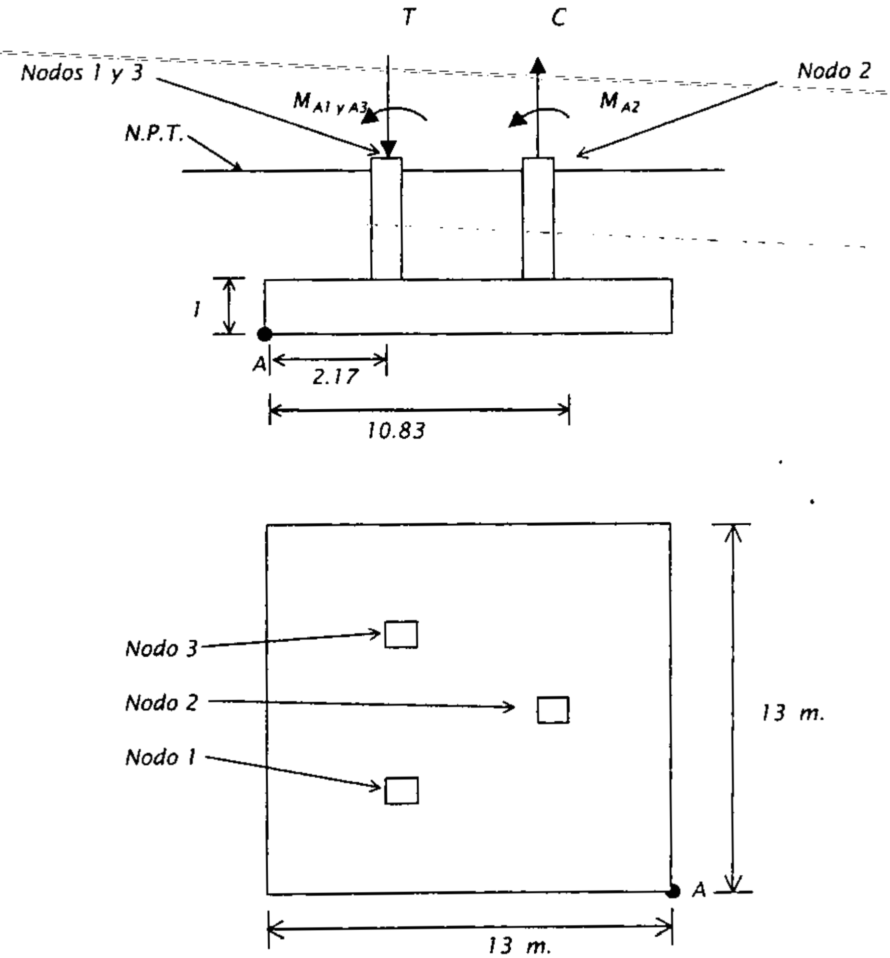


Fig. IV. 2. 11. Losa en planta y elevación (Unidades en metros).

Suma de momentos respecto de "A"

$Mt = 141365$ kg-m

$Mv = (Mt)(F.S.)$

$Mv = 155502$ kg-m

Esfuerzo ejercido

Compresión Nudo 1 =	233589	kg
Tensión Nudo 2 =	334937	kg
Compresión Nudo 3 =	233590	kg
Área de dados =	1.47	m^2
Volumen de dados =	2.646	m^3
Área de losa =	169	m^2
Volumen losa =	169	m^3
Volumen de concreto =	171.646	m^3
Peso de losa y dados =	411950.4	kg
Área de relleno =	167.53	m^2
Volumen del relleno =	251.295	m^3
Peso del relleno =	402072	kg

Fuerza Resultante

$P = 946265$ kg

$P_{Total} = (P)(F.S.)$

$P_{Total} = 1040892$ kg

Cálculo de la excentricidad

$$e = \frac{Mv}{P_{Total}}$$

$e = 0.15$ m.

$a = 6.35$ m.

$B/3 = \quad 4.33 \quad m.$

$B/6 = \quad 2.17 \quad m.$

$Si \quad e = 0 \qquad \sigma = \frac{P_{Total}}{A_{Losa}}$ ...(1)

$Si \quad e < B/6 \quad ó \quad a > B/3 \qquad \sigma = \left(\frac{P_{Total}}{A_{Losa}}\right)\left[1 \pm \left(\frac{6e}{B}\right)\right]$ ...(2)

$Si \quad e = B/6 \quad ó \quad a = B/3 \qquad \sigma = 2\left(\frac{P_{Total}}{A_{Losa}}\right)$ ...(3)

$Si \quad e > B/6 \qquad \sigma = \frac{4P_{Total}}{[3L(B-2e)]}$ ...(4)

Se empleará la ecuación que conforme a los parámetros calculados sea la indicada

$\sigma_{máx}$ =	6584	kg/m^2	<	$\sigma_{admisible}$ =	16000	kg/m^2
$\sigma_{mín}$ =	5734	kg/m^2	<	$\sigma_{admisible}$ =	16000	kg/m^2

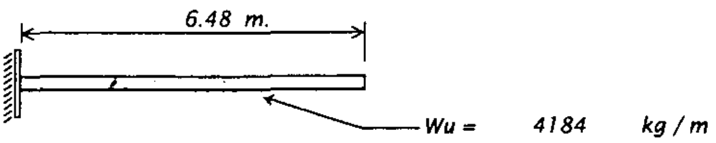
Por lo tanto se acepta.

Diseño de Losa de Cimentación

Esfuerzo empleado para el diseño: Esf_D

$$Esf_D = \sigma_{máx} - esf_{relleno}$$

$$Esf_D = \quad 4184 \quad kg/m^2$$



"L" para la sección más crítica: 6.48 m

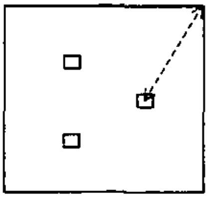


Fig. IV. 2. 12. Losa vista en planta

$$Mu = \frac{Wu(L)^2}{2} \quad ; \quad Vu = Wu(L)$$

Mu = 87938 kg-m ; Vu = 27126 kg

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días: f 'c = 350 Kg/cm²
Esfuerzo de fluencia del acero de refuerzo: fy = 4200 Kg/cm²

f*c = 0.8 f 'c	f*c =	280	Kg/cm²	
f "c = [1.05 - (f *c/1250)](f *c)	f "c =	231.28	Kg/cm²	Si f*c > 250 kg/cm²
f "c =0.85 f *c	f "c =	238	Kg/cm²	Si f*c ≤ 250 kg/cm²
Definitivo	f "c =	231.28	Kg/cm²	

Porcentaje balanceado de acero para losas de concreto: ρb

$$\rho b = \frac{f''c}{fy}\frac{4800}{fy+6000}$$ ρb = 0.0259

$\rho_{máx} = 0.75\ \rho b$ $\rho_{máx}$ = 0.0194

$$\rho_{min} = \frac{0.7\sqrt{f'c}}{fy}$$ $\rho_{mín}$ = 0.0031

Se propondrá ρ = 0.0045 de porcentaje para cálculo

$$q = \frac{\rho\, fy}{f'c}$$

q = 0.0541

Revisión del peralte por flexión.

$$df = \sqrt{\frac{Mu}{F_R\ f''c\ b\ q\left(1-0.5q\right)}}$$

$df =$ 89.57 cm.

Peralte total propuesto	$h =$	100	cm.
Recubrimiento libre	$r =$	5	cm.
Peralte efectivo	$dp =$	95	cm.

Como: $dp =$ 95 cm. > $df =$ 89.57 cm.

entónces el peralte propuesto es correcto. (ok).

Revisión por cortante como viga ancha.

$$Vud = (L-d)Wu$$

$Vud =$ 23152 kg

Capacidad del concreto para tomar cortante.

Si $\rho < 0.01$

$$V_{CR} = F_R\ b\ d\left(0.2+30\rho\right)\sqrt{f^*c}$$

$V_{CR} =$ 42643 kg

Si $\rho \geq 0.01$

$$V_{CR} = 0.5\ F_R\ bd\sqrt{f^*c}$$

$V_{CR} =$ 63586 kg

Debido al porcentaje de acero propuesto se toma:

$V_{CR} =$ 42643 kg

Como el peralte es mayor de 70 cm, se reducirá en 30% la capacidad del cortante:

Definitivo $V_{CR} =$ 29850 kg

Como: V_{CR} > Vud *entónces el peralte es correcto. (ok).*

Revisión por penetración.

C1 =	70	cm.
C2 =	70	cm.
dp =	95	cm.
C1+dp =	165	cm.
C2+dp =	165	cm.

$$\alpha = 1 - \frac{1}{1 + 0.67\sqrt{(C1+dp)/(C2+dp)}}$$

$\alpha =$ 0.401198

Momento que toma la losa:

$\alpha\, Mx =$ 4228941.95 kg-cm

$V_{Total} = P - [(C1+dp)(C2+dp)(Esf_D)]$

$V_{Total} =$ 594887 kg

$Ac = 2[(C1+dp)+(C2+dp)](dp)$

$Ac =$ 62700 cm^2

$$Jc = \frac{dp(C1+dp)^3}{6} + \frac{(C1+dp)dp^3}{6} + \frac{dp(C2+dp)(C1+dp)^2}{2}$$

Jc = 71125312.5 + 23577813 + 213375938

Jc = 308079063 cm^4

Sustituyendo valores en la fórmula de la escuadría.

$$Vu = \frac{V_{Total}}{Ac} \pm \frac{\alpha\ Mx\ C_{AB}}{Jc}$$

$Vu_{máx.} =$ 10.62 Kg/cm^2

$Vu_{mín.} =$ 8.36 Kg/cm^2

El esfuerzo cortante que resiste el concreto por penetración es:

$Vcr = F_R\sqrt{f^*c}$ $\quad$ $Vcr =$ 13.39 Kg/cm^2

Como $Vcr > Vu_{máx.}$ *no existe penetración de la columna en la losa de cimentación.*

Por lo tanto se aceptan las dimensiones propuestas para la cimentación.

Acero de refuerzo por flexión:

$As = \rho\ bd$ $\quad\quad$ *As =* 42.85 *cm²*

Separación de varillas para la losa en su cara inferior.

Varilla que se utilizará 1 " $\quad$ *Barra del No.* 8

$a_s =$ 5.07 *cm²*

No. de barras: 1

$$s = \frac{100\ a_s}{As} \qquad s = 11.82 \text{ cm}$$

Utilizar paquetes de: 1 *barras*

Con varillas de: 1 " *a* *cada* 12 *cm.*

Acero requerido por Cambios Volumétricos

Separación de varillas para la losa en su cara superior.

$$a_{ST} = \frac{660\ x_1}{fy\ (x_1 + 100)} \qquad a_{ST} = 7.86 \text{ cm}^2/\text{cm}$$

Por ser un elemento que está en contacto con el terreno, el área será aumentada en un 50%

$$a_{ST} = 11.79 \text{ cm}^2/\text{cm}$$

Varilla que se utilizará 1/2 " $\quad$ *Barra del No.* 4

$a_s =$ 1.27 *cm²*

$$s = \frac{100\ a_s}{a_{ST}} \qquad s = 10.75 \text{ cm} \quad \leq \quad 50 \text{ cm por norma}$$

Utilizar barras de: 1/2 " *a* *cada* 10 *cm.*

Diseño de Dados o Columnas.

Diseño de Columna (Nodo 2)

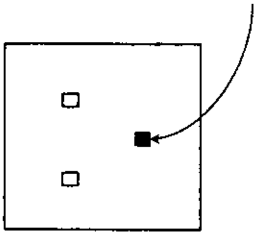


Fig. IV. 2. 13. Losa vista en planta

Acero de refuerzo por flexocompresión:

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días: $f'c =$ 350 Kg/cm^2
Esfuerzo de fluencia del acero de refuerzo: $fy =$ 4200 Kg/cm^2

$f^*c = 0.8\ f'c$	$f^*c =$	280	Kg/cm^2	
$f''c = [1.05 - (f^*c/1250)](f^*c)$	$f''c =$	231.28	Kg/cm^2	Si $f^*c > 250\ kg/cm^2$
$f''c = 0.85\ f^*c$	$f''c =$	238	Kg/cm^2	Si $f^*c \leq 250\ kg/cm^2$
Definitivo	$f''c =$	231.28	Kg/cm^2	

Sección de la columna.

$h =$	70	cm
$b =$	70	cm
$r =$	5	cm
$d =$	65	cm

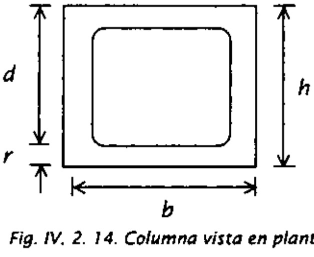


Fig. IV. 2. 14. Columna vista en planta

$e = Mu / Pu$ $e =$ 0.18 m.

$e / h =$ 0.26

$d / h =$ 0.93

$$K = \frac{Pu}{F_R\, b\, h\, f''c} \qquad K = 0.28$$

$$R = \frac{Mu}{F_R\, b\, h^2\, f''c} \qquad R = 0.07$$

Con los valores calculados entramos a diagrámas de interación, para obtener "q"

$q = 0$

Sustituyendo en:

$$\rho = q\frac{f''c}{fy} \qquad \rho = 0.00000$$

$$\rho_{min} = \frac{20}{fy} = 0.00476 \quad \leq \quad 0.004762 \quad \leq \quad \rho_{máx} = 0.06$$

Diseño del acero longitudinal de la columna.

$\rho = 0.00476$

$As = \rho\, bh$ $As = 23.33$ cm²

Varilla que se utilizará 1 3/8 "   *Barra del No.* 11

Área de la barra: $as = 9.58$ cm²

$No.\ de\ Varillas = \frac{As}{as}$; *No. de Varillas* = 2.44   4

Utilizar 4 *varillas de* 1 3/8 "

Revisión por Cortante

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$

$$V_{CR} = \left[F_R bd(0.2 + 30\rho)\sqrt{f^*c}\right]\left[1 + 0.007\left(\frac{Pu}{Ag}\right)\right]$$

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg + 2000As$

$$V_{CR} = 0.5F_R bd\sqrt{f^*c}\left[1 + 0.007\left(\frac{Pu}{Ag}\right)\right]$$

$As =$ 23.33 cm^2 ; $Ag =$ 4900 cm^2

$Pu =$ 256948 kg ; $0.7f^*cAg+2000As =$ 1007067 kg

Si $\rho < 0.01$ y $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} =$ 22600.94 kg

Si $\rho \geq 0.01$ y $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} =$ 41633.31 kg

De los parámetros anteriores se obtiene que el cortante que resiste el concreto es: $V_{CR} =$ 22601 kg

Diseño del acero transversal (estribos) para la columna.

Los estribos serán de: 3/8 " Estribos del No. 3

Separación de estribos.

S_2

La menor separación de:

1.-	$S = \frac{850}{\sqrt{fy}}\phi b$	s =	45.81	cm
2.-	s = 48 diámetros del estribo.	s =	45.72	cm
3.-	$s = b_{Columna} / 2$	s =	35.00	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\, d}{Vz - V_{CR}}$	s =	-62.33	cm
		$S_2 =$	35	cm

S_1

La menor separación de:

1.-	$S = \frac{425}{\sqrt{fy}}\phi b$	s =	22.90	cm
2.-	s = 20 cm.	s =	20.00	cm
3.-	$s = b_{Columna} / 4$	s =	17.50	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\, d}{Vz - V_{CR}}$	s =	-62.33	cm
		$S_1 =$	17	cm

Hc

La mayor separación de:

1.- s = Dim. mayor (C_1 ó C_2)	s =	70.00	cm
2.- $s = H_{Libre} / 6$	s =	30.00	cm
3.- s = 60 cm.	s =	60.00	cm
	Hc =	70	cm

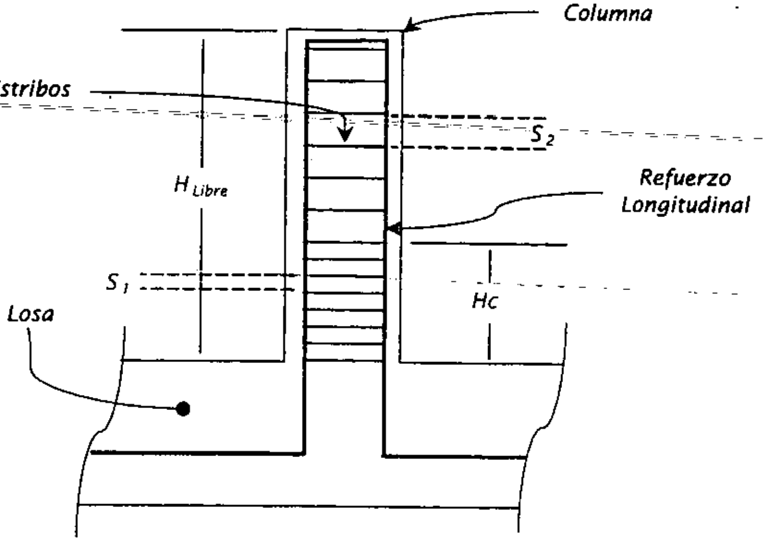


Fig. IV. 2. 15. Esquema representativo de la separación de estribos

El cortante que resiste el acero es:

$$V_{SR} = \frac{F_R\ Av\ fy\ d}{s} \qquad V_{SR} = 8893 \text{ kg}$$

Cortante que actúa en la columna: Vz = 17608 kg

El cotante total que resiste el elemento es:

$$V_R = V_{CR} + V_{SR} \qquad V_R = 31494 \text{ kg}$$

Como V_{CR} > Vz, entónces no hay problemas por cortante.

Por lo tanto se aceptan las dimensiones propuestas para la columna (dados).

Revisión de Columnas (Nodos 1 y 3)

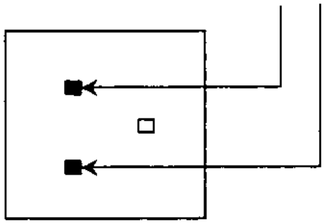


Fig. Iv. 2. 16. Losa vista en planta

Acero de refuerzo por flexotensión:

Constantes de cálculo:

Resistencia del concreto a compresión a los 28 días:	$f'c$ =	350	Kg/cm²
Esfuerzo de fluencia del acero de refuerzo:	fy =	4200	Kg/cm²

$f^*c = 0.8\, f'c$	f^*c =	280	Kg/cm²	
$f''c = [1.05 - (f^*c/1250)](f^*c)$	$f''c$ =	231.28	Kg/cm²	Si $f^*c > 250$ kg/cm²
$f''c = 0.85\, f^*c$	$f''c$ =	238	Kg/cm²	Si $f^*c \leq 250$ kg/cm²
Definitivo	$f''c$ =	231.28	Kg/cm²	

Sección de la columna.

h =	70	cm
b =	70	cm
r =	5	cm
d =	65	cm

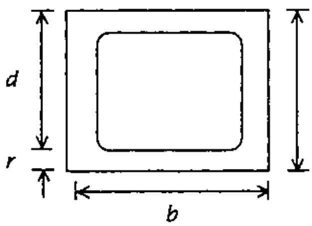


Fig. Iv. 2. 17. Columna vista en planta

$e = Mu / Pu$ e = 0.31 m.

$e / h = 0.45$ $d / h = 0.93$

$$K = \frac{Pu}{F_R\, b h\, f''c}$$ K = 0.41

$$R = \frac{Mu}{F_R\, b h^2\, f''c}$$ R = 0.18

Con los valores calculados entramos a diagrámas de interación, para obtener "q"

q = 0.79

Sustituyendo en:

$$\rho = q\frac{f''c}{fy} \qquad \rho = 0.04350$$

$$\rho_{min} = \frac{20}{fy} = \quad 0.00476 \quad \leq \quad 0.043503 \quad \leq \quad \rho_{máx} = 0.06$$

Diseño del acero longitudinal de la columna.

$\rho = 0.04350$

$As = \rho\, bh$ $As =$ 213.16 cm^2

Varilla que se utilizará   1 3/8 "   *Barra del No.*   11

Área de la barra: $as =$ 9.58 cm^2

No. de Varillas $= \frac{As}{as}$; *No. de Varillas* = 22.25   24

Utilizar   24   *varillas de*   1 3/8 "

Revisión por Cortante

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} = \left[F_R bd(0.2+30\rho)\sqrt{f^*c}\right]\left[1-0.03\left(\frac{Pu}{Ag}\right)\right]$

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} = 0.5F_R bd\sqrt{f^*c}\left[1-0.03\left(\frac{Pu}{Ag}\right)\right]$

$As =$ 213.16 cm^2 ; $Ag =$ 4900 cm^2

$Pu =$ 368431 kg ; $0.7f^*cAg+2000As =$ 1386726 ton

Si $\rho < 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} =$ -48568.8 kg

Si $\rho \geq 0.01$ *y* $Pu \leq 0.7f^*cAg+2000As$ $V_{CR} =$ -38241.6 kg

De los parámetros anteriores se obtiene que el cortante que resiste el concreto es: $V_{CR} =$ 0 kg

Diseño del acero transversal (estribos) para la columna.

Los estribos serán de: 3/8 " *Estribos del No.* 3

Separación de estribos.

S_2

La menor separación de:

1.-	$S = \frac{850}{\sqrt{fy}}\phi b$	s =	45.81	cm
2.-	s = 48 diámetros del estribo.	s =	45.72	cm
3.-	$s = b_{Columna} / 2$	s =	35.00	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\ d}{Vz - V_{CR}}$	s =	7.84	cm
		$S_2 =$	7	cm

S_1

La menor separación de:

1.-	$S = \frac{425}{\sqrt{fy}}\phi b$	s =	22.90	cm
2.-	s = 20 cm.	s =	20.00	cm
3.-	$s = b_{Columna} / 4$	s =	17.50	cm
4.-	Por cortante $s = \frac{F_R\ Av\ fy\ d}{Vz - V_{CR}}$	s =	7.84	cm
		$S_1 =$	7	cm

Hc

La mayor separación de:

1.-	s = Dim. mayor (C_1 ó C_2)	s =	70.00	cm
2.-	$s = H_{Libre} / 6$	s =	30.00	cm
3.-	s = 60 cm.	s =	60.00	cm
		Hc =	70	cm

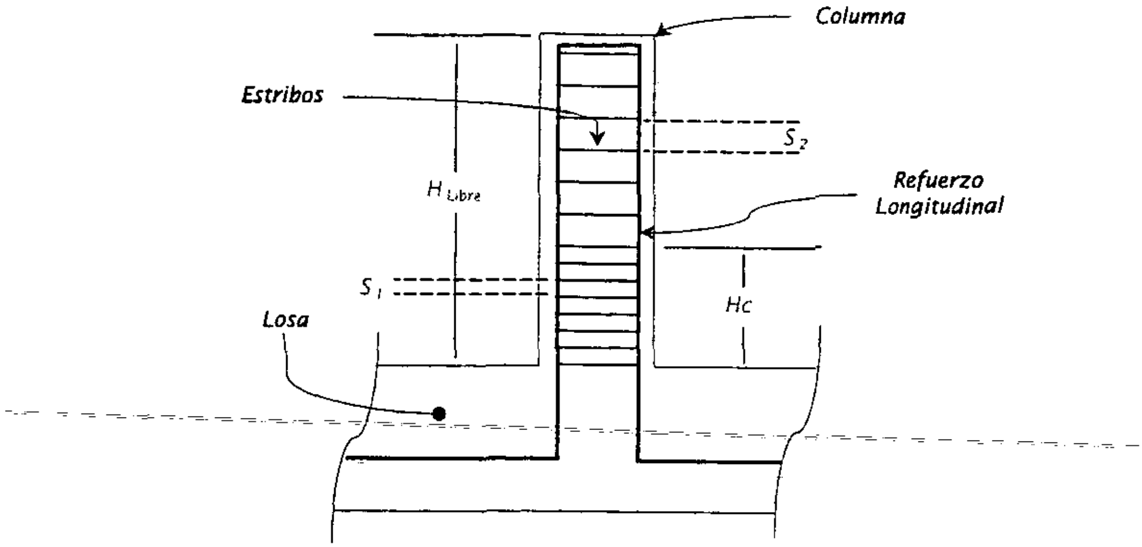


Fig. IV. 2. 18. Esquema representativo de la separación de estribos

El cortante que resiste el acero es:

$$V_{SR} = \frac{F_R \, Av \, fy \, d}{s} \qquad V_{SR} = 44464 \text{ kg}$$

Cortante que actúa en la columna: $Vz =$ 39686 kg

El cotante total que resiste el elemento es:

$V_R = V_{CR} + V_{SR}$ $\qquad V_R =$ 44464 kg

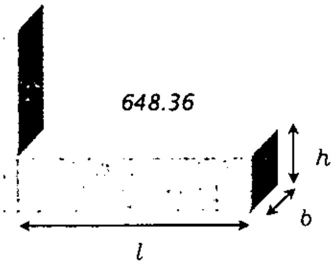
Como $V_{CR} > Vz$, entónces no hay problemas por cortante.

Por lo tanto se aceptan las dimensiones propuestas para la columna (dados).

Datos:

$f'c =$	350	kg/cm^2	$p' =$	0.00451	
$b =$	100	cm	$w =$	45.27	kg/cm
$h =$	100	cm			

Sección más crítica: l = 648.36 cm



$$Ec = 14000\sqrt{f'c}$$ $Ec =$ 261916 kg/cm^2

$$I = \frac{b\,h^3}{12}$$ I = 8333333 cm^4

$$\Delta i = \frac{w\,l^4}{8\,Ec\,I}$$ $\Delta i =$ 0.46 cm

$$\Delta d = \frac{2}{1+50p'}\Delta i$$ $\Delta d =$ 0.75 cm

$$\Delta_{TOTAL} = \Delta i + \Delta d$$

Δ_{TOTAL} =	1.2	cm

Desplazamiento máximo permitido.

$$\Delta_{MÁX} = \frac{2\,l}{240} + 0.5$$

$\Delta_{MÁX}$ =	5.9	cm

Como: $\Delta_{MÁX} >> \Delta_{TOTAL}$ *entónces el dimensionamiento es correcto.*

ARMADO DE LOSA Y COLUMNAS

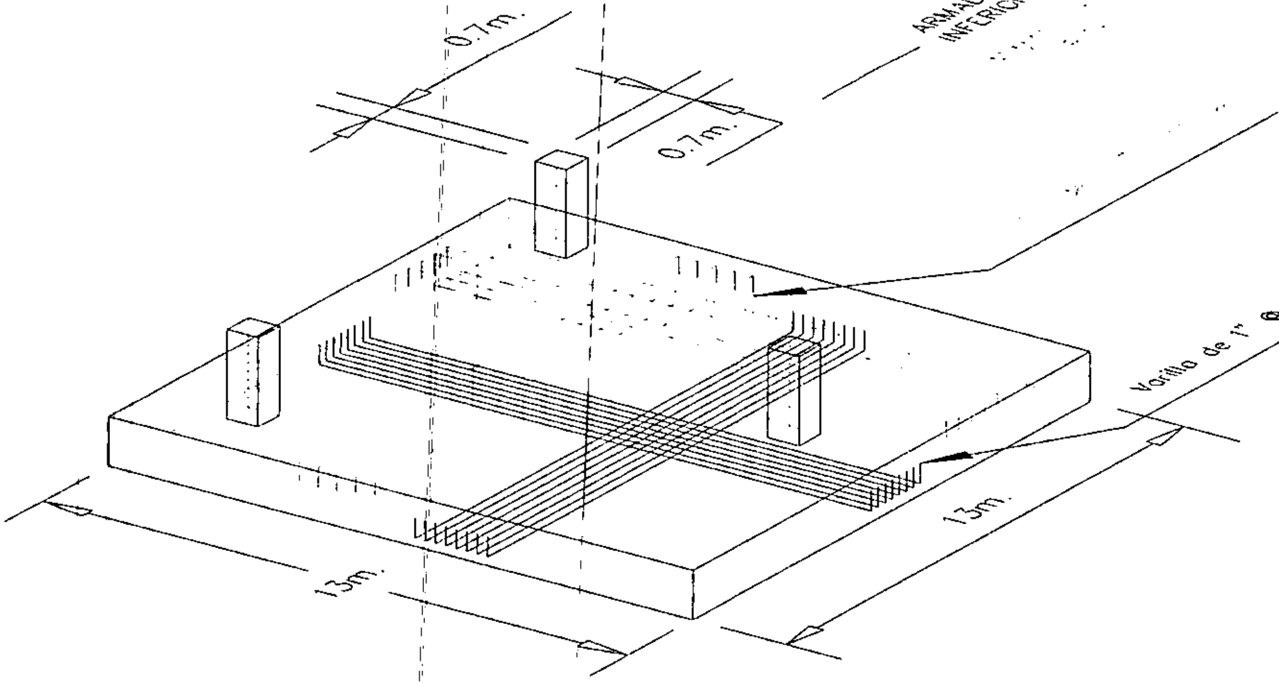


Fig. IV. 2. 19. Armado de Losa.

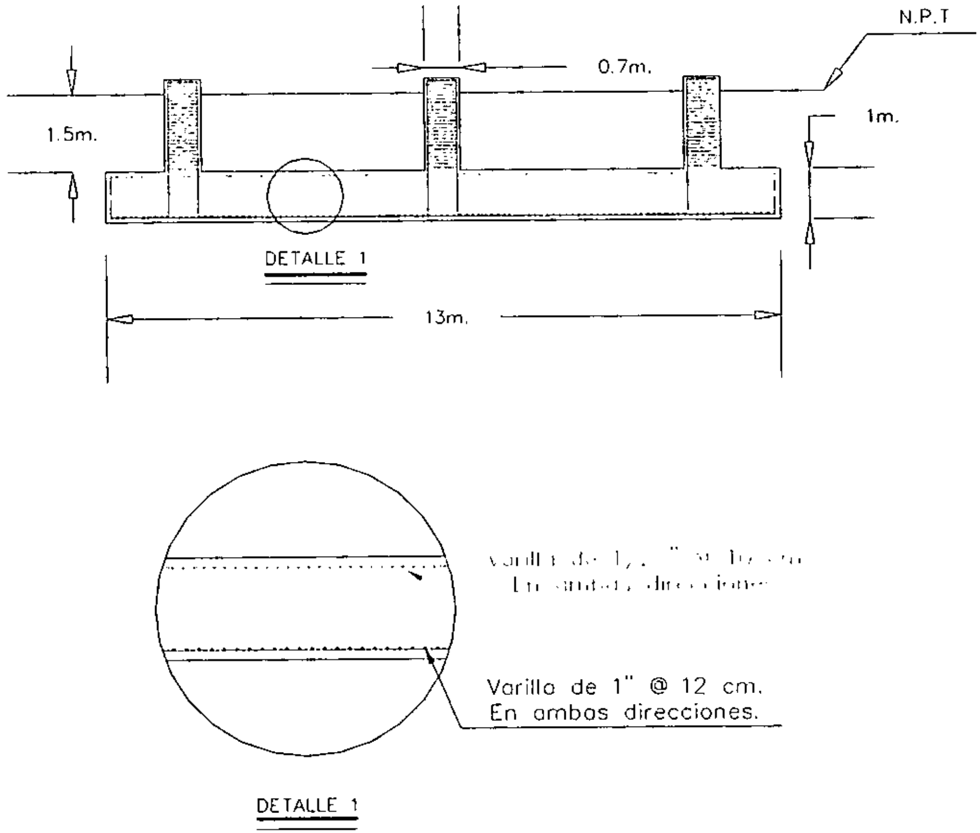


Fig. IV. 2. 20. Armado de Losa y Columnas.

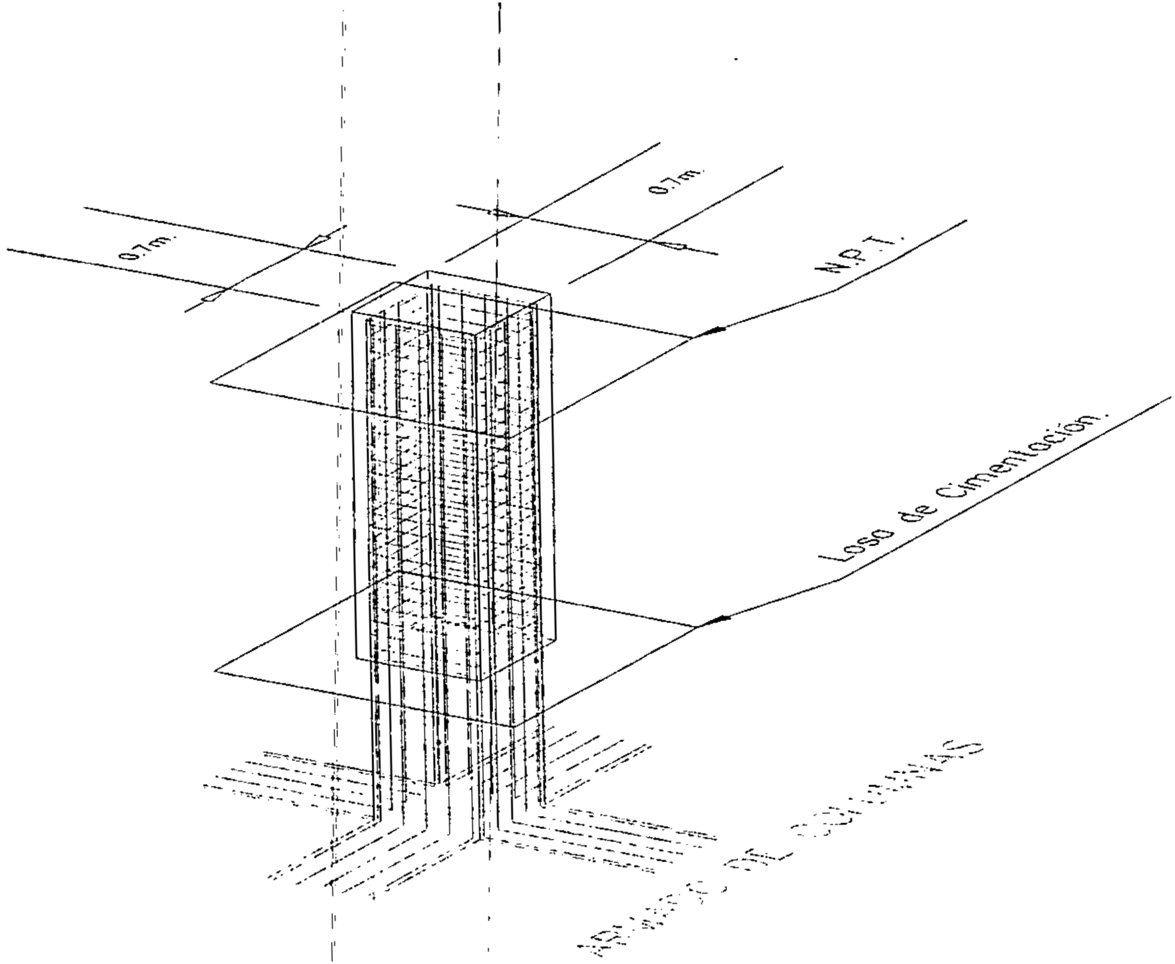
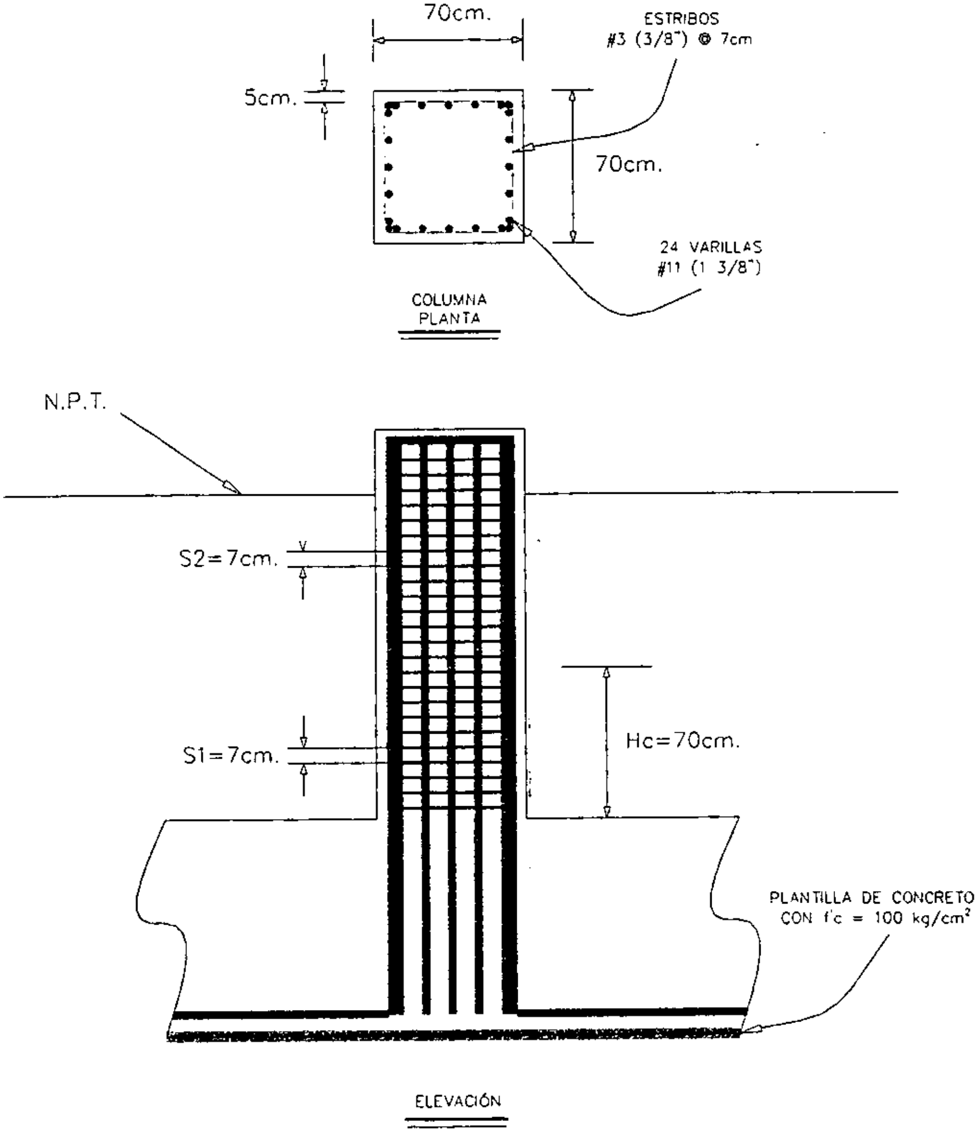


Fig. IV. 2. 21. Armado de Columnas.



ARMADO DE COLUMNAS A ESCALA

Fig. IV. 2. 22. Armado de Columnas.

V. Instalación de la estructura.

V. 1. Tolerancias en el montaje.

El montaje debe efectuarse con equipo apropiado, que ofrezca la mayor seguridad posible. Durante la carga, transporte y descarga del material, y durante el montaje, se adoptarán las precauciones necesarias para no producir deformaciones ni esfuerzos excesivos. Si a pesar de ello algunas de las piezas se maltratan y deforman, deben ser enderezadas o repuestas, según el caso, antes de montarlas.

Plomada: La distancia horizontal medida entre el punto inferior de la vertical en cuestión y un punto cualquiera en la misma horizontal, no excederá del 0.25 % de la distancia vertical tomada entre dos elevaciones.

Torsión: La torsión (rotación angular en el plano horizontal) entre dos puntos de elevación no excederá de 0.5° en una altura de 3 m (10 pies), por otro lado, la torsión total en la estructura no deberá exceder de 5°.

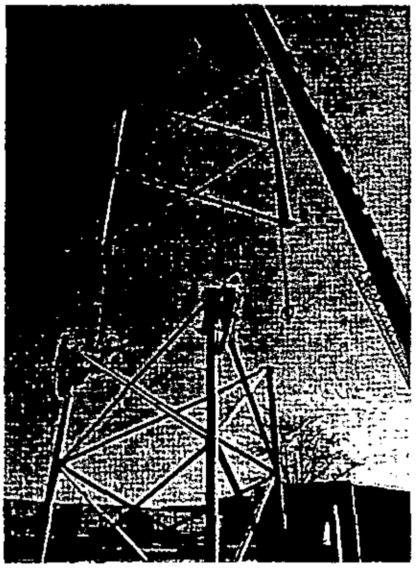


Figura: V. 1. 1. Montaje de Torre Autosoportada.

Existe un método para torres triangulares mediante el cual se puede determinar el desplazamiento de la estructura, este método se describe a continuación:

Se requiere de tres tránsitos, uno en cada larguero, esto es indispensable para la obtención de las siguientes longitudes:

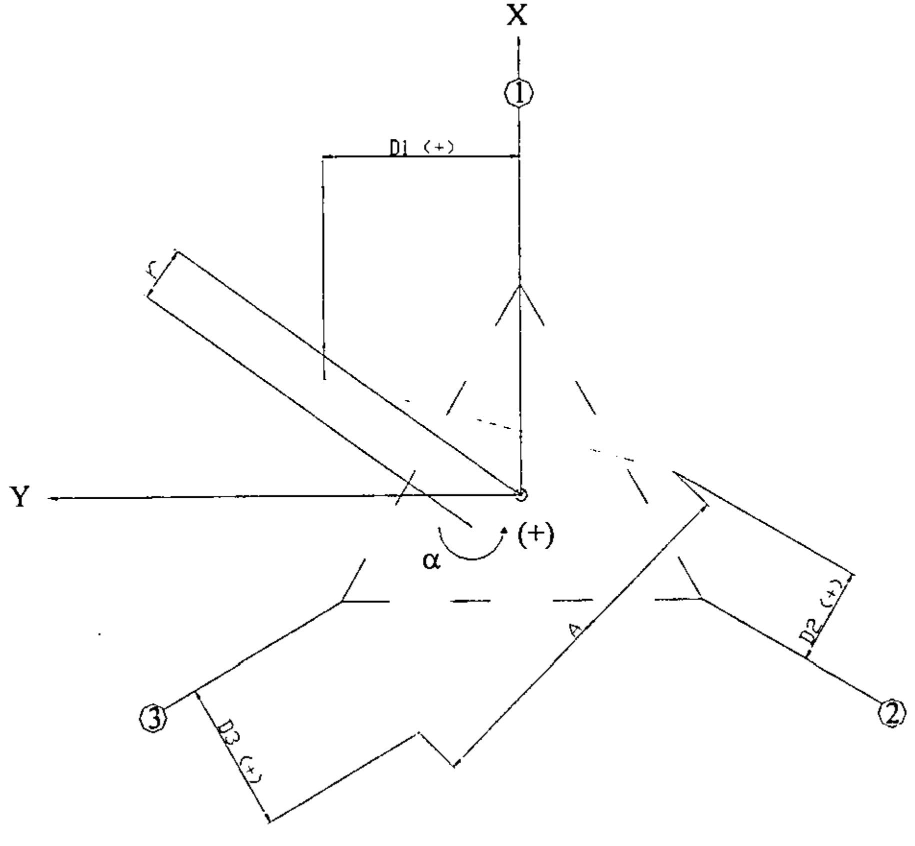


Figura: V. 1. 2. Determinación de torsión y plomada en torres triangulares.

Las dimensiones a obtener son: D1, D2, D3 y A.

Con estos parámetros y aplicando las siguientes ecuaciones, obtenemos los desplazamientos en torsión y plomada.

$$d = \frac{(D1 + D2 + D3)}{3}$$

$$e = \frac{d\sqrt{3}}{A}$$

$$\alpha = arcsen(e)$$

$$x = \frac{D2 - D3}{\sqrt{3}}$$

$$y = \frac{(2D1 - D2 - D3)}{3}$$

$$r = \sqrt{x^2 + y^2}$$

Estos resultados se pueden presentar en una tabulación para diferentes elevaciones.

Datos					Torsión Calculada			Plomada Calculada (desplazamiento).		
Elev. (m).	A. (m).	D1 (m).	D2 (m)	D3 (m).	d (m).	e	α (Grados).	x (m).	y (m).	r (m).

Tabla: V. 1. 3. Resultados de la determinación de torsión y plomada en torres triangulares.

V. 2. Inspección y mantenimiento.

Los propietarios de las torres deben llevar a cabo una inspección inicial, y periódicamente un mantenimiento e inspección, para garantizar la integridad de la estructura y extender su período de servicio. Es recomendable que las inspecciones sean realizadas a un mínimo de 3 años en torres arriostradas y a cada 5 años en torres autosoportadas.

Períodos de inspección cortos deberán ser considerados para estructuras que se *localizan en ambientes agresivos, como en las costas. Esta rutina también se deberá llevar a* cabo en zonas sujetas a frecuente vandalismo.

Además es recomendable que las estructuras sean inspeccionadas después de vientos severos y/o grandes nevadas u otras condiciones de carga extrema.

VI. Conclusiones.

Para mayor objetividad en la presentación de conclusiones y comentarios, se llevará a cabo una enumeración de los puntos relevantes:

1.- En este trabajo se presenta el Análisis y Diseño de una Torre Autosoportada de Comunicación. Para la realización de este proyecto, se emplearon las bases y criterios de diseño estructural que usualmente se llevan a cabo en la práctica profesional. Se consideraron los efectos a los cuales comúnmente son sometidas este tipo de estructuras, por esto podemos concluir que se llevaron a cabo los objetivos marcados al inicio de este trabajo.

2.- La realización de este proyecto estuvo apegada en su totalidad a reglamentos, normas y especificaciones.

3.- Debido principalmente a la altura de la torre, se puede concluir que los efectos provocados por el viento, son en gran medida mayores que los efectos provocados por sismo.

4.- Las fuerzas eólicas ejercidas sobre las antenas parabólicas son de gran magnitud, esto se debe a su forma cóncava. De lo anterior se concluye que las fuerzas de viento ejercidas sobre antenas parabólicas, contribuyen en gran medida a la flexión de la estructura, provocando mayores desplazamientos laterales.

5.- Debido a los grandes esfuerzos a los cuales fue sometida la losa de cimentación, se tuvo la necesidad de contemplar una mayor resistencia del concreto ($f'c = 350\ kg/cm^2$), con el fin de reducir las dimensiones de la cimentación.

6.- La elevada cantidad de acero requerido para columnas (dados), fue debido a la gran tensión ejercida sobre ellas. (La cantidad de acero requerido se encuentra dentro de los límites establecidos por los reglamentos).

7.- En la realización de proyectos como este, resulta indispensable el empleo de computadoras y programas, estas herramientas son sin duda alguna de gran ayuda ya que de no utilizarlas, la realización de proyectos sería mucho más prolongada.

8.- En la realización de proyectos como este, los métodos empleados son aproximados a la realidad, por lo cual el seguimiento del riguroso análisis debe ser complementado con el conocimiento acumulado que da la experiencia profesional.

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APÉNDICE

"A"

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*                                            *
*          STAAD.Pro                         *
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*          Proprietary Program of            *
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*     USER ID: FI                            *
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 1. STAAD SPACE TORRE AUTOSOPORTADA
 2. START JOB INFORMATION
 3. JOB NAME TORRE AUTOSOPORTADA
 4. JOB NO 1
 5. JOB PART SELF-SUPPORTING TOWER
 6. ENGINEER NAME O.G.S.
 7. CHECKER NAME C.M.B.
 8. ENGINEER DATE 16-AUG-01
 9. CHECKER DATE 16-AUG-01
10. END JOB INFORMATION
11. INPUT WIDTH 72
12. UNIT METER KG
13. JOINT COORDINATES
14. 1 -5 0 -2.887; 2 0 0 5.773; 3 5 0 -2.887; 4 -3.5 29.95 -2.021
15. 5 0 29.95 4.042; 6 3.5 29.95 -2.021; 7 0 5.99 5.427; 8 0 11.98 5.081
16. 9 0 17.97 4.734; 10 0 23.96 4.388; 11 4.7 5.99 -2.714
17. 12 4.4 11.98 -2.54; 13 4.1 17.97 -2.367; 14 3.8 23.96 -2.194
18. 15 -4.7 5.99 -2.714; 16 -4.4 11.98 -2.54; 17 -4.1 17.97 -2.367
19. 18 -3.8 23.96 -2.194; 19 2.35 5.99 1.357; 20 0 5.99 -2.714
20. 21 -2.35 5.99 1.357; 22 0 0.998 5.716; 23 0 1.997 5.658; 24 0 2.995 5.6
21. 25 0 3.993 5.543; 26 0 4.992 5.485; 27 4.95 0.998 -2.858
22. 28 4.9 1.997 -2.829; 29 4.85 2.995 -2.8; 30 4.8 3.993 -2.771
23. 31 4.75 4.992 -2.742; 32 -4.95 0.998 -2.858; 33 -4.9 1.997 -2.829
24. 34 -4.85 2.995 -2.8; 35 -4.8 3.993 -2.771; 36 -4.75 4.992 -2.742
25. 37 0.392 0.998 5.037; 38 0.783 1.997 4.301; 39 1.175 2.995 3.565
26. 40 1.567 3.993 2.829; 41 1.958 4.992 2.093; 42 2.792 4.992 0.649
27. 43 3.233 3.993 -0.058; 44 3.675 2.995 -0.765; 45 4.117 1.997 -1.472
28. 46 4.558 0.998 -2.18; 47 4.167 0.998 -2.858; 48 3.333 1.997 -2.829
29. 49 2.5 2.995 -2.8; 50 1.667 3.993 -2.771; 51 0.833 4.992 -2.742
30. 52 -0.833 4.992 -2.742; 53 -1.667 3.993 -2.771; 54 -2.5 2.995 -2.8
31. 55 -3.333 1.997 -2.829; 56 -4.167 0.998 -2.858; 57 -1.958 4.992 2.093
32. 58 -1.567 3.993 2.829; 59 -1.175 2.995 3.565; 60 -0.783 1.997 4.301
33. 61 -0.392 0.998 5.037; 62 -4.558 0.998 -2.18; 63 -4.117 1.997 -1.472
34. 64 -3.675 2.995 -0.765; 65 -3.233 3.993 -0.058; 66 -2.792 4.992 0.65
35. 68 0.834 5.99 -2.714; 69 2.767 5.99 -2.714; 71 -0.834 5.99 -2.714
36. 72 -2.767 5.99 -2.714; 74 2.766 4.992 -2.742; 76 -2.767 4.992 -2.742
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42. 111 0 11.98 -2.54; 112 4.65 6.988 -2.685; 113 4.6 7.987 -2.656
43. 114 4.55 8.985 -2.627; 115 4.5 9.983 -2.598; 116 4.45 10.982 -2.569
44. 117 -4.65 6.988 -2.685; 118 -4.6 7.987 -2.656; 119 -4.55 8.985 -2.627
45. 120 -4.5 9.983 -2.598; 121 -4.45 10.982 -2.569; 122 3.917 6.988 -2.685
46. 123 3.133 7.987 -2.656; 124 2.35 8.985 -2.627; 125 1.567 9.983 -2.598
47. 126 0.783 10.982 -2.569; 127 -0.783 10.982 -2.569
48. 128 -1.567 9.983 -2.598; 129 -2.35 8.985 -2.627
49. 130 -3.133 7.987 -2.656; 131 -3.917 6.988 -2.685; 144 0.784 11.98 -2.54
50. 145 2.592 11.98 -2.54; 147 -0.784 11.98 -2.54; 148 -2.592 11.98 -2.54
51. 150 2.592 10.982 -2.569; 152 -2.592 10.982 -2.569; 153 0 8.985 -2.627
52. 154 -2.2 11.98 1.27; 155 0 6.988 5.369; 156 0 7.987 5.312
53. 157 0 8.985 5.254; 158 0 9.983 5.196; 159 0 10.982 5.138
54. 160 -2.617 10.982 0.606; 161 -3.033 9.983 -0.058
55. 162 -3.45 8.985 -0.722; 163 -3.867 7.987 -1.386; 164 -4.283 6.988 -2.05
56. 165 -0.367 6.988 4.734; 166 -0.733 7.987 4.041; 167 -1.1 8.985 3.349
57. 168 -1.467 9.983 2.656; 169 -1.833 10.982 1.963; 170 -2.275 8.985 1.313
58. 172 -1.808 11.98 1.949; 173 -0.904 11.98 3.515; 175 -2.592 11.98 0.592
59. 176 -3.496 11.98 -0.974; 178 -0.929 10.982 3.529
60. 180 -3.521 10.982 -0.96; 181 2.2 11.98 1.27; 182 4.283 6.988 -2.05
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62. 186 2.617 10.982 0.606; 187 1.833 10.982 1.963; 188 1.467 9.983 2.656
63. 189 1.1 8.985 3.349; 190 0.733 7.987 4.041; 191 0.367 6.988 4.734
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65. 198 0.904 11.98 3.515; 200 3.521 10.982 -0.96; 202 0.929 10.982 3.529
66. 203 2.275 8.985 1.313; 204 2.05 17.97 1.184; 205 0 17.97 -2.367
67. 206 -2.05 17.97 1.184; 207 0 12.978 5.023; 208 0 13.977 4.965
68. 209 0 14.975 4.908; 210 0 15.973 4.85; 211 0 16.972 4.792
69. 212 -4.35 12.978 -2.511; 213 -4.3 13.977 -2.483
70. 214 -4.25 14.975 -2.454; 215 -4.2 15.973 -2.425
71. 216 -4.15 16.972 -2.396; 217 4.35 12.978 -2.511; 218 4.3 13.977 -2.483
72. 219 4.25 14.975 -2.454; 220 4.2 15.973 -2.425; 221 4.15 16.972 -2.396
73. 222 -0.342 12.978 4.431; 223 -0.683 13.977 3.782
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80. 242 -3.283 16.972 -0.895; 243 -2.125 14.975 1.227
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82. 247 1.367 15.973 2.483; 248 1.708 16.972 1.833; 249 2.442 16.972 0.563
83. 250 2.833 15.973 -0.058; 251 3.225 14.975 -0.678
84. 252 3.617 13.977 -1.299; 253 4.008 12.978 -1.92; 254 2.125 14.975 1.227
85. 256 1.683 17.97 1.819; 257 0.842 17.97 3.277; 259 2.417 17.97 0.548
86. 260 3.258 17.97 -0.909; 262 0.867 16.972 3.291; 264 3.283 16.972 -0.895
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99. 300 -3.85 22.962 -2.223; 301 1.9 23.96 1.097; 302 0 23.96 -2.194
100. 303 -1.9 23.96 1.097; 304 0.317 18.968 4.128; 305 0.633 19.967 3.522
101. 306 0.95 20.965 2.916; 307 1.267 21.963 2.309; 308 1.583 22.962 1.703
102. 309 2.267 22.962 0.52; 310 2.633 21.963 -0.058; 311 3 20.965 -0.635
103. 312 3.367 19.967 -1.212; 313 3.733 18.968 -1.79
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121. 372 0 29.95 -2.021; 373 -1.75 29.95 1.01; 374 0 24.958 4.33
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123. 378 0 28.952 4.099; 379 -3.75 24.958 -2.165; 380 -3.7 25.957 -2.136
124. 381 -3.65 26.955 -2.107; 382 -3.6 27.953 -2.078; 383 -3.55 28.952 -2.05
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131. 399 -3.458 24.958 -1.66; 400 -3.117 25.957 -1.126
132. 401 -2.775 26.955 -0.592; 402 -2.433 27.953 -0.058
133. 403 -2.092 28.952 0.476; 404 -1.458 28.952 1.573
134. 405 -1.167 27.953 2.136; 406 -0.875 26.955 2.699
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141. 424 -2.067 29.95 0.462; 425 -2.783 29.95 -0.779
142. 427 -0.742 28.952 2.814; 429 -2.808 28.952 -0.765
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145. 440 2.808 28.952 -0.765; 441 0 26.955 -2.107; 443 0.634 29.95 -2.021
146. 444 2.067 29.95 -2.021; 446 -0.633 29.95 -2.021
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171. 531 0 46.922 3.06; 532 0 47.92 3.002; 533 0 48.918 2.944
172. 534 0 49.917 2.887; 535 0 50.915 2.829; 536 0 51.913 2.771
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182. 564 3.05 38.935 -1.761; 565 3.1 37.937 -1.79; 566 3.15 36.938 -1.819
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189. 583 -2.95 40.932 -1.703; 584 -2.9 41.93 -1.675; 585 -2.85 42.928 -1.646
190. 586 -2.8 43.927 -1.617; 587 -2.75 44.925 -1.588; 588 -2.7 45.923 -1.559
191. 589 -2.65 46.922 -1.53; 590 -2.6 47.92 -1.501; 591 -2.55 48.918 -1.473
192. 592 -2.5 49.917 -1.444; 593 -2.45 50.915 -1.415; 594 -2.4 51.913 -1.386
193. 595 -2.35 52.912 -1.357; 596 -2.3 53.91 -1.328; 597 -2.25 54.908 -1.299
194. 598 -2.2 55.907 -1.27; 599 -2.15 56.905 -1.242; 600 -2.1 57.903 -1.213
195. 601 -2.05 58.902 -1.184; 602 1.675 32.945 0.967; 603 0 32.945 -1.934
196. 604 -1.675 32.945 0.967; 605 1.6 35.94 0.924; 606 0 35.94 -1.848
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199. 613 -1.45 41.93 0.837; 614 1.375 44.925 0.794; 615 0 44.925 -1.588
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203. 625 -1.15 53.91 0.664; 626 1.075 56.905 0.62; 627 0 56.905 -1.242
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205. 631 -1 59.9 0.577; 632 1.433 57.903 -1.213; 633 0.717 58.902 -1.184

210. 642 -0.817 52.912 -1.357; 643 -1.633 51.913 -1.366
211. 644 0.867 49.917 -1.444; 645 1.733 48.918 -1.473
212. 646 -1.733 48.918 -1.473; 647 -0.867 49.917 -1.444
213. 648 1.833 45.923 -1.559; 649 0.917 46.922 -1.53
214. 650 -0.917 46.922 -1.53; 651 -1.833 45.923 -1.559
215. 652 1.933 42.928 -1.646; 653 0.967 43.927 -1.617
216. 654 -0.967 43.927 -1.617; 655 -1.933 42.928 -1.646
217. 656 -1.017 40.932 -1.703; 657 -2.033 39.933 -1.732
218. 658 2.033 39.933 -1.732; 659 1.017 40.932 -1.703
219. 660 2.133 36.938 -1.819; 661 1.067 37.937 -1.79
220. 662 -1.067 37.937 -1.79; 663 -2.133 36.938 -1.819
221. 664 2.233 33.943 -1.906; 665 1.117 34.942 -1.877
222. 666 -1.117 34.942 -1.877; 667 -2.233 33.943 -1.906
223. 668 2.333 30.948 -1.992; 669 1.167 31.947 -1.963
224. 670 -1.167 31.947 -1.963; 671 -2.333 30.948 -1.992
225. 672 -0.667 58.902 1.212; 673 -0.333 57.903 1.847
226. 674 -1.767 57.903 -0.635; 675 -1.383 58.902 -0.029
227. 676 -0.717 55.907 1.299; 677 -0.358 54.908 1.977
228. 678 -1.892 54.908 -0.679; 679 -1.483 55.907 -0.029
229. 680 -0.767 52.912 1.385; 681 -0.383 51.913 2.107
230. 682 -2.017 51.913 -0.722; 683 -1.583 52.912 -0.029
231. 684 -0.817 49.917 1.472; 685 -0.408 48.918 2.237
232. 686 -2.142 48.918 -0.765; 687 -1.683 49.917 -0.029
233. 688 -0.867 46.922 1.559; 689 -0.433 45.923 2.367
234. 690 -2.267 45.923 -0.809; 691 -1.783 46.922 -0.029
235. 692 -0.917 43.927 1.645; 693 -0.458 42.928 2.497
236. 694 -2.392 42.928 -0.852; 695 -1.883 43.927 -0.029
237. 696 -0.967 40.932 1.732; 697 -0.483 39.933 2.627
238. 698 -2.517 39.933 -0.895; 699 -1.983 40.932 -0.029
239. 700 -0.508 36.938 2.757; 701 -1.017 37.937 1.819
240. 702 -2.083 37.937 -0.029; 703 -2.642 36.938 -0.938
241. 704 -1.067 34.942 1.905; 705 -0.533 33.943 2.887
242. 706 -2.767 33.943 -0.982; 707 -2.183 34.942 -0.029
243. 708 -0.558 30.948 3.017; 709 -1.117 31.947 1.992
244. 710 -2.283 31.947 -0.029; 711 -2.892 30.948 -1.025
245. 712 2.892 30.948 -1.025; 713 2.283 31.947 -0.029
246. 714 1.117 31.947 1.992; 715 0.558 30.948 3.017; 716 2.767 33.943 -0.982
247. 717 2.183 34.942 -0.029; 718 1.067 34.942 1.905; 719 0.533 33.943 2.887
248. 720 2.642 36.938 -0.938; 721 2.083 37.937 -0.029
249. 722 1.017 37.937 1.819; 723 0.508 36.938 2.757; 724 2.517 39.933 -0.895
250. 725 1.983 40.932 -0.029; 726 0.967 40.932 1.732; 727 0.483 39.933 2.627
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START USER TABLE
TABLE 1
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PIPE
PIPX180
0.457 0.41 0.0325 0.0325
TABLE 2
UNIT METER KG
PIPE
PIPX140
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MEMBER PROPERTY AMERICAN
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9 47 TO 51 UPTABLE 1 PIPX180
7 37 TO 41 UPTABLE 1 PIPX180
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133 135 137 147 148 150 151 153 155 172 TO 174 183 185 186 188 189 -
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295 301 TO 312 321 TO 323 332 333 335 336 338 339 341 343 -
352 TO 364 373 TO 375 384 387 388 390 391 393 395 396 405 TO 409 -
410 TABLE LD L404010 SP 0.01
*CELOSIA SECUNDARIA
245 TO 252 256 TO 263 286 TO 293 313 TO 320 324 TO 331 344 TO 351 -
365 TO 372 376 TO 383 397 TO 404 TABLE LD L30308 SP 0.01
*TRAMO 3(6M.)
*LARGUEROS
11 15 19 414 TO 428 UPTABLE 1 PIPX180
*CELOSIA PRINCIPAL Y DIAFRAGMAS
28 TO 30 411 TO 413 429 TO 440 449 TO 451 460 462 463 465 466 468 -
470 471 480 TO 493 502 TO 504 513 514 516 517 519 520 522 524 533 -
534 TO 542 551 TO 553 562 563 565 566 568 569 571 573 582 TO 586 -
587 TABLE LD L404010 SP 0.01
*CELOSIA SECUNDARIA
441 TO 448 452 TO 459 472 TO 479 494 TO 501 505 TO 512 525 TO 532 -
543 TO 550 554 TO 561 574 TO 581 TABLE LD L30308 SP 0.01
*TRAMO 4(6M.)
*LARGUEROS
12 16 20 588 TO 602 UPTABLE 1 PIPX180
*CELOSIA PRINCIPAL Y DIAFRAGMAS
31 TO 33 603 TO 641 650 TO 652 661 663 664 666 667 669 671 -
688 TO 690 699 701 TO 703 705 706 708 710 727 TO 729 738 740 741 -
743 TO 745 747 749 758 TO 764 TABLE LD L404010 SP 0.01
*CELOSIA SECUNDARIA
642 TO 649 653 TO 660 672 TO 687 691 TO 698 711 TO 726 730 TO 737 -
750 TO 757 TABLE LD L30308 SP 0.01
*TRAMO 5(6M.)
*LARGUEROS
13 17 21 768 TO 782 UPTABLE 1 PIPX180
*CELOSIA PRINCIPAL Y DIAFRAGMAS
4 TO 6 765 TO 767 783 TO 818 827 TO 829 838 848 849 858 867 TO 869 -
878 879 881 882 884 885 887 889 898 900 901 903 TO 905 907 909 918 -
920 921 923 924 926 928 937 TO 939 978 981 988 991 993 996 -
2583 TO 2585 TABLE LD L404010 SP 0.01
*CELOSIA SECUNDARIA
819 TO 826 830 TO 837 839 TO 846 850 TO 857 859 TO 866 870 TO 877 -
890 TO 897 910 TO 917 929 TO 936 TABLE LD L30308 SP 0.01
*PLATAFORMA I
949 TO 951 973 TO 977 983 TO 987 998 TO 1004 1006 TO 1009 -
1011 TO 1014 1016 1017 1027 TO 1080 2562 TO 2572 -
2573 TABLE LD L30305 SP 0.01
*TRAMO 6(3M.)
*LARGUEROS
1225 1226 1280 1281 1283 1284 2575 2578 2581 UPTABLE 2 PIPX140
*CELOSIA PRINCIPAL Y DIAFRAGMA
1312 TO 1314 1339 TO 1341 1370 1425 TO 1427 1510 1565 TO 1567 1650 -
1669 TO 1671 1791 1794 1797 2574 2576 2577 2579 2580 -
2582 TABLE LD L30308 SP 0.01
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882. *LARGUEROS
883. 1227 TO 1232 1274 TO 1279 1285 TO 1290 UPTABLE 2 PIPX140
884. *CELOSIA PRINCIPAL Y DIAFRAGMAS
885. 1315 TO 1320 1342 TO 1347 1371 TO 1374 1417 TO 1424 1511 TO 1514 -
886. 1557 TO 1564 1651 TO 1654 1673 TO 1680 1789 1790 1792 1793 1795 -
887. 1796 TABLE LD L30308 SP 0.01
888. *CELOSIA SECUNDARIA
889. 1437 TO 1452 1577 TO 1592 1713 TO 1720 1753 TO 1759 -
890. 1760 TABLE LD L30307 SP 0.01
891. *TRAMOS 9(3M.) Y 10(3M.)
892. *LARGUEROS
893. 1233 TO 1238 1268 TO 1273 1291 TO 1296 UPTABLE 2 PIPX140
894. *CELOSIA PRINCIPAL Y DIAFRAGMAS
895. 1321 TO 1326 1348 TO 1353 1375 TO 1378 1409 TO 1416 1515 TO 1518 -
896. 1549 TO 1556 1655 TO 1658 1681 TO 1688 1798 1799 1802 1803 1805 -
897. 1806 TABLE LD L30308 SP 0.01
898. *CELOSIA SECUNDARIA
899. 1453 TO 1468 1593 TO 1608 1721 TO 1728 1761 TO 1767 -
900. 1768 TABLE LD L30307 SP 0.01
901. *TRAMOS 11(3M), 12(3M.) Y 13(3M.)
902. *LARGUEROS
903. 1239 TO 1247 1259 TO 1267 1297 TO 1305 UPTABLE 2 PIPX140
904. *CELOSIA PRINCIPAL Y DIAFRAGMAS
905. 1327 TO 1335 1354 TO 1362 1379 TO 1384 1397 TO 1408 1519 TO 1524 -
906. 1537 TO 1548 1659 TO 1664 1689 TO 1700 1800 1801 1804 1807 TO 1811 -
907. 1812 TABLE LD L30308 SP 0.01
908. *CELOSIA SECUNDARIA
909. 1469 TO 1492 1609 TO 1632 1729 TO 1740 1769 TO 1779 -
910. 1780 TABLE LD L30307 SP 0.01
911. *TRAMOS 14(3M.) Y 15(3M.)
912. *LARGUEROS
913. 1223 1248 TO 1258 1306 TO 1311 UPTABLE 2 PIPX140
914. *CELOSIA PRINCIPAL Y DIAFRAGMAS
915. 1081 TO 1083 1336 TO 1338 1363 TO 1368 1385 TO 1396 1525 TO 1536 -
916. 1665 TO 1668 1701 TO 1708 1813 TO 1818 1914 1915 1919 TO 1921 -
917. 1922 TABLE LD L30308 SP 0.01
918. *CELOSIA SECUNDARIA
919. 1493 TO 1508 1633 TO 1648 1741 TO 1748 1781 TO 1787 -
920. 1788 TABLE LD L30307 SP 0.01
921. *PLATAFORMA 2
922. 1908 TO 1913 1916 TO 1918 1923 TO 1979 TABLE LD L30305 SP 0.01
923. *TRAMOS 16(3M.) Y 17(3M.)
924. *LARGUEROS
925. 1841 TO 1846 1858 TO 1863 1875 TO 1880 TABLE ST PIPX100
926. *CELOSIA PRINCIPAL Y DIAFRAGMAS
927. 1881 TO 1886 1984 1985 1992 TO 1995 2010 TO 2017 2070 2071 -
928. 2084 TO 2089 2098 TO 2103 2155 TO 2160 2183 TO 2190 2239 TO 2243 -
929. 2244 TABLE LD L30307 SP 0.006
930. *CELOSIA SECUNDARIA
931. 2050 TO 2065 2137 TO 2152 2191 TO 2206 TABLE LD L30306 SP 0.006
932. *TRAMOS 18(3M.) Y 19(3M.)
933. *LARGUEROS
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938. 2246 TO 2250 TABLE LD L30307 SP 0.006
939. *CELOSIA SECUNDARIA
940. 2034 TO 2049 2121 TO 2136 2207 TO 2222 TABLE LD L30306 SP 0.006
941. *TRAMOS 20(3M.) Y 21(3M.)
942. *LARGUEROS
943. 1827 TO 1834 1847 TO 1851 1864 TO 1868 TABLE ST PIPX100
944. *CELOSIA PRINCIPAL Y DIAFRAGMAS
945. 1821 1825 1826 1893 TO 1907 1980 1981 1986 1987 1996 TO 2001 2066 -
946. 2067 2072 TO 2079 2165 TO 2174 2251 TO 2255 -
947. 2256 TABLE LD L30307 SP 0.006
948. *CELOSIA SECUNDARIA
949. 2018 TO 2033 2104 TO 2115 2117 TO 2120 2223 TO 2237 -
950. 2238 TABLE LD L30306 SP 0.006
951. *TRAMOS 22(3M.) Y 23(3M.)
952. *LARGUEROS
953. 2275 2288 2301 2322 2324 2326 2364 2366 2412 2517 TO 2519 -
954. 2526 TO 2529 2536 2537 TABLE ST PIPS80
955. *CELOSIA PRINCIPAL Y DIAFRAGMAS
956. 2493 TO 2495 2499 TO 2501 2520 TO 2525 2530 TO 2534 -
957. 2535 TABLE LD L30306 SP 0.006
958. *CELOSIA SECUNDARIA
959. 2328 TO 2363 2376 TO 2378 2403 TO 2411 2418 TO 2420 2427 TO 2433 -
960. 2435 2454 TO 2456 2464 TO 2469 2538 TO 2540 -
961. 2541 TABLE LD L30305 SP 0.006
962. *TRAMOS 24(3M.) Y 25(3M.)
963. *LARGUEROS
964. 2368 2370 2372 TO 2375 2414 2416 2417 2542 TO 2544 2551 TO 2553 2558 -
965. 2559 TO 2560 TABLE ST PIPS80
966. *CELOSIA PRINCIPAL Y DIAFRAGMAS
967. 2505 TO 2516 2545 TO 2550 TABLE LD L30306 SP 0.006
968. *CELOSIA SECUNDARIA
969. 2379 TO 2402 2421 TO 2426 2437 TO 2442 2444 2446 TO 2453 -
970. 2458 TO 2462 2473 TO 2489 2554 TO 2557 -
971. 2561 TABLE LD L30305 SP 0.006
972. CONSTANTS
973. E STEEL ALL
974. DENSITY STEEL ALL
975. POISSON STEEL ALL
976. CUT OFF MODE SHAPE 25
977. SUPPORTS
978. 1 TO 3 FIXED
979. *
980. LOAD 1 CARGA MUERTA
981. *ESTRUCTURA
982. SELFWEIGHT Y -1
983. *PARABOLAS (3M DIAM).
984. JOINT LOAD
985. 4 TO 6 FY -200
986. 512 TO 514 FY -200
987. 953 TO 955 FY -200
988. CALCULATE NATURAL FREQUENCY
989. *
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994. CALCULATE NATURAL FREQUENCY
995. *
996. *VIENTO
997. LOAD 3 VIENTO EN Z-Z
998. JOINT LOAD
999. *VIENTO SOBRE ESTRUCTURA Z-Z
1000. 953 954 FZ 175.16
1001. 998 1000 FZ 174.41
1002. 997 999 FZ 173.65
1003. 950 951 FZ 172.89
1004. 994 996 FZ 172.13
1005. 993 995 FZ 171.35
1006. 947 948 FZ 170.58
1007. 990 992 FZ 169.8
1008. 989 991 FZ 169.01
1009. 944 945 FZ 168.21
1010. 977 979 FZ 167.41
1011. 976 978 FZ 166.61
1012. 752 754 826 FZ 120.25
1013. 773 807 864 867 FZ 89.74
1014. 774 808 865 866 FZ 89.29
1015. 775 809 828 FZ 118.45
1016. 776 810 868 871 FZ 88.38
1017. 777 811 869 870 FZ 87.92
1018. 778 812 860 FZ 130.68
1019. 779 813 872 875 FZ 97.49
1020. 780 814 873 874 FZ 96.96
1021. 781 815 861 FZ 128.56
1022. 782 816 877 878 FZ 95.88
1023. 783 817 876 879 FZ 95.34
1024. 784 818 862 FZ 142.69
1025. 785 819 880 883 FZ 106.39
1026. 786 820 881 882 FZ 105.76
1027. 787 821 863 FZ 140.17
1028. 788 822 884 887 FZ 104.48
1029. 789 823 885 886 FZ 103.83
1030. 512 514 630 FZ 161.65
1031. 544 601 633 634 FZ 120.46
1032. 545 600 632 635 FZ 119.67
1033. 546 599 627 FZ 158.5
1034. 547 598 637 638 FZ 118.07
1035. 548 597 636 639 FZ 117.25
1036. 549 596 624 FZ 168.89
1037. 550 595 641 642 FZ 125.76
1038. 551 594 640 643 FZ 124.84
1039. 552 593 621 FZ 165.22
1040. 553 592 644 647 FZ 122.98
1041. 554 591 645 646 FZ 122.03
1042. 555 590 618 FZ 174.25
1043. 556 589 649 650 FZ 129.64
1044. 557 588 648 651 FZ 128.57
1045. 558 587 615 FZ 169.99
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1050. 563 582 657 658 FZ 131.51
1051. 564 581 609 FZ 173.65
1052. 565 580 661 662 FZ 128.95
1053. 566 579 660 663 FZ 127.63
1054. 567 578 606 FZ 179.67
1055. 568 577 665 666 FZ 133.3
1056. 569 576 664 667 FZ 131.83
1057. 570 575 603 FZ 173.76
1058. 571 574 669 670 FZ 128.79
1059. 572 573 668 671 FZ 127.23
1060. 4 6 372 443 444 446 447 FZ 90.69
1061. 383 388 393 394 449 451 FZ 104.44
1062. 382 387 392 395 FZ 154.56
1063. 381 386 391 396 FZ 152.42
1064. 380 385 390 397 FZ 150.23
1065. 379 384 389 398 FZ 147.98
1066. 14 18 302 360 361 363 364 FZ 87.48
1067. 295 300 318 319 367 369 FZ 100.41
1068. 294 299 317 320 FZ 148.07
1069. 293 298 316 321 FZ 145.45
1070. 292 297 315 322 FZ 142.75
1071. 291 296 314 323 FZ 139.96
1072. 13 17 205 277 278 280 281 FZ 82.28
1073. 216 221 265 274 283 285 FZ 93.9
1074. 215 220 266 273 FZ 137.61
1075. 214 219 267 272 FZ 134.25
1076. 213 218 268 271 FZ 130.74
1077. 212 217 269 270 FZ 127.07
1078. 12 16 111 144 145 147 148 FZ 74.47
1079. 116 121 126 127 150 152 FZ 84.03
1080. 115 120 125 128 FZ 121.52
1081. 114 119 124 129 FZ 116.7
1082. 113 118 123 130 FZ 111.54
1083. 112 117 122 131 FZ 105.96
1084. 11 15 20 68 69 71 72 FZ 59.88
1085. 31 36 51 52 74 76 FZ 65.14
1086. 30 35 50 53 FZ 89.68
1087. 29 34 49 54 FZ 80.3
1088. 28 33 48 55 FZ 68.72
1089. 27 32 47 56 FZ 52.66
1090. *VIENTO SOBRE LINEAS Z-Z
1091. 953 954 FZ 20.51
1092. 998 1000 FZ 20.43
1093. 997 999 FZ 20.34
1094. 950 951 FZ 20.25
1095. 994 996 FZ 20.16
1096. 993 995 FZ 20.07
1097. 947 948 FZ 19.98
1098. 990 992 FZ 19.88
1099. 989 991 FZ 19.79
1100. 944 945 FZ 19.7
1101. 977 979 FZ 19.61
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1106. 775 809 828 FZ 12.75
1107. 776 810 868 871 FZ 9.51
1108. 777 811 869 870 FZ 9.46
1109. 778 812 860 FZ 12.55
1110. 779 813 872 875 FZ 9.36
1111. 780 814 873 874 FZ 9.31
1112. 781 815 861 FZ 12.35
1113. 782 816 877 878 FZ 9.21
1114. 783 817 876 879 FZ 9.16
1115. 784 818 862 FZ 12.14
1116. 785 819 880 883 FZ 9.05
1117. 786 820 881 882 FZ 9
1118. 787 821 863 FZ 11.92
1119. 788 822 884 887 FZ 8.89
1120. 789 823 885 886 FZ 8.83
1121. 512 514 630 FZ 23.41
1122. 544 601 633 634 FZ 17.44
1123. 545 600 632 635 FZ 17.33
1124. 546 599 627 FZ 22.95
1125. 547 598 637 638 FZ 17.1
1126. 548 597 636 639 FZ 16.98
1127. 549 596 624 FZ 22.48
1128. 550 595 641 642 FZ 16.74
1129. 551 594 640 643 FZ 16.62
1130. 552 593 621 FZ 21.99
1131. 553 592 644 647 FZ 16.37
1132. 554 591 645 646 FZ 16.24
1133. 555 590 618 FZ 21.48
1134. 556 589 649 650 FZ 15.98
1135. 557 588 648 651 FZ 15.85
1136. 558 587 615 FZ 20.96
1137. 559 586 653 654 FZ 15.58
1138. 560 585 652 655 FZ 15.45
1139. 561 584 612 FZ 20.41
1140. 562 583 656 659 FZ 15.17
1141. 563 582 657 658 FZ 15.02
1142. 564 581 609 FZ 19.84
1143. 565 580 661 662 FZ 14.73
1144. 566 579 660 663 FZ 14.58
1145. 567 578 606 FZ 19.24
1146. 568 577 665 666 FZ 14.27
1147. 569 576 664 667 FZ 14.12
1148. 570 575 603 FZ 18.61
1149. 571 574 669 670 FZ 13.79
1150. 572 573 668 671 FZ 13.62
1151. 4 6 372 443 444 446 447 FZ 11.53
1152. 383 388 393 394 449 451 FZ 13.28
1153. 382 387 392 395 FZ 19.65
1154. 381 386 391 396 FZ 19.38
1155. 380 385 390 397 FZ 19.1
1156. 379 384 389 398 FZ 18.81
1157. 14 18 302 360 361 363 364 FZ 10.58
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1162. 291 296 314 323 FZ 16.93
1163. 13 17 205 277 278 280 281 FZ 9.48
1164. 216 221 265 274 283 285 FZ 10.82
1165. 215 220 266 273 FZ 15.85
1166. 214 219 267 272 FZ 15.46
1167. 213 218 268 271 FZ 15.06
1168. 212 217 269 270 FZ 14.64
1169. 12 16 111 144 145 147 148 FZ 8.11
1170. 116 121 126 127 150 152 FZ 9.15
1171. 115 120 125 128 FZ 13.23
1172. 114 119 124 129 FZ 12.71
1173. 113 118 123 130 FZ 12.15
1174. 112 117 122 131 FZ 11.54
1175. 11 15 20 68 69 71 72 FZ 6.22
1176. 31 36 51 52 74 76 FZ 6.76
1177. 30 35 50 53 FZ 9.31
1178. 29 34 49 54 FZ 8.33
1179. 28 33 48 55 FZ 7.13
1180. 27 32 47 56 FZ 5.47
1181. *VIENTO SOBRE PARABOLAS (3M DIAM) Z-Z
1182. 953 FZ 2689.17
1183. 954 FZ 2689.17
1184. 955 FZ 1828.91
1185. 512 FZ 2395.01
1186. 513 FZ 2395.01
1187. 514 FZ 1628.85
1188. 4 FZ 1964.71
1189. 5 FZ 1964.71
1190. 6 FZ 1336.2
1191. *VIENTO SOBRE PLATAFORMAS
1192. 459 460 489 TO 493 495 496 507 TO 511 FZ 93.66
1193. 830 832 845 TO 848 850 857 TO 859 FZ 111.89
1194. CALCULATE NATURAL FREQUENCY
1195. *
1196. LOAD 4 VIENTO EN X-X
1197. JOINT LOAD
1198. *VIENTO SOBRE ESTRUCTURA X-X
1199. 953 955 FX 137.73
1200. 998 1015 FX 137.14
1201. 997 1014 FX 136.54
1202. 950 952 FX 135.94
1203. 994 1013 FX 135.34
1204. 993 1012 FX 134.74
1205. 947 949 FX 134.13
1206. 990 1011 FX 133.51
1207. 989 1010 FX 132.89
1208. 944 946 FX 132.26
1209. 975 979 FX 131.64
1210. 974 978 FX 131
1211. 752 755 825 FX 98.72
1212. 790 807 892 895 FX 73.68
1213. 791 808 893 894 FX 73.31
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1218. 796 813 902 905 FX 78.91
1219. 797 814 903 904 FX 78.48
1220. 798 815 889 FX 104.06
1221. 799 816 906 909 FX 77.61
1222. 800 817 907 908 FX 77.17
1223. 801 818 890 FX 111.88
1224. 802 819 910 913 FX 83.42
1225. 803 820 911 912 FX 82.93
1226. 804 821 891 FX 109.9
1227. 805 822 900 915 FX 81.92
1228. 806 823 901 914 FX 81.41
1229. 512 513 631 FX 127.79
1230. 543 601 672 675 FX 95.22
1231. 542 600 673 674 FX 94.6
1232. 541 599 628 FX 125.29
1233. 540 598 676 679 FX 93.33
1234. 539 597 677 678 FX 92.69
1235. 538 596 625 FX 131.02
1236. 537 595 680 683 FX 97.56
1237. 536 594 681 682 FX 96.85
1238. 535 593 622 FX 128.18
1239. 534 592 684 687 FX 95.4
1240. 533 591 685 686 FX 94.67
1241. 532 590 619 FX 135.88
1242. 531 589 688 691 FX 101.09
1243. 530 588 689 690 FX 100.26
1244. 529 587 616 FX 132.55
1245. 528 586 692 695 FX 98.56
1246. 527 585 693 694 FX 97.69
1247. 526 584 613 FX 138.65
1248. 525 583 696 699 FX 103.03
1249. 524 582 697 698 FX 102.05
1250. 523 581 610 FX 134.76
1251. 522 580 701 702 FX 100.06
1252. 521 579 700 703 FX 99.04
1253. 520 578 607 FX 138.81
1254. 519 577 704 707 FX 102.99
1255. 518 576 705 706 FX 101.85
1256. 517 575 604 FX 134.25
1257. 516 574 709 710 FX 99.51
1258. 515 573 708 711 FX 98.3
1259. 4 5 373 421 422 424 425 FX 69.75
1260. 378 383 403 404 427 429 FX 80.32
1261. 377 382 402 405 FX 118.87
1262. 376 381 401 406 FX 117.22
1263. 375 380 400 407 FX 115.53
1264. 374 379 399 408 FX 120.47
1265. 10 18 303 339 340 342 343 FX 67.06
1266. 290 300 328 329 345 347 FX 76.97
1267. 289 299 327 330 FX 113.5
1268. 288 298 326 331 FX 111.49
1269. 287 297 325 332 FX 109.42

1274. 209 214 224 229 FX 104.51
1275. 208 213 223 230 FX 101.77
1276. 207 212 222 231 FX 98.92
1277. 8 16 154 172 173 175 176 FX 57.34
1278. 121 159 160 169 178 180 FX 64.7
1279. 120 158 161 168 FX 93.56
1280. 119 157 162 167 FX 89.85
1281. 118 156 163 166 FX 85.87
1282. 117 155 164 165 FX 81.58
1283. 7 15 21 88 89 91 92 FX 45.97
1284. 26 36 57 66 94 96 FX 50.01
1285. 25 35 58 65 FX 68.85
1286. 24 34 59 64 FX 61.65
1287. 23 33 60 63 FX 52.76
1288. 22 32 61 62 FX 40.43
1289. *VIENTO SOBRE LINEAS X-X
1290. 953 955 FX 5.85
1291. 998 1015 FX 5.82
1292. 997 1014 FX 5.8
1293. 950 952 FX 5.77
1294. 994 1013 FX 5.75
1295. 993 1012 FX 5.72
1296. 947 949 FX 5.69
1297. 990 1011 FX 5.67
1298. 989 1010 FX 5.64
1299. 944 946 FX 5.62
1300. 975 979 FX 5.59
1301. 974 978 FX 5.56
1302. 752 755 825 FX 3.69
1303. 790 807 892 895 FX 2.75
1304. 791 808 893 894 FX 2.74
1305. 792 809 829 FX 3.63
1306. 793 810 896 899 FX 2.71
1307. 794 811 897 898 FX 2.7
1308. 795 812 888 FX 3.58
1309. 796 813 902 905 FX 2.67
1310. 797 814 903 904 FX 2.65
1311. 798 815 889 FX 3.52
1312. 799 816 906 909 FX 2.63
1313. 800 817 907 908 FX 2.61
1314. 801 818 890 FX 3.46
1315. 802 819 910 913 FX 2.58
1316. 803 820 911 912 FX 2.56
1317. 804 821 891 FX 3.4
1318. 805 822 900 915 FX 2.53
1319. 806 823 901 914 FX 2.52
1320. 512 513 631 FX 3.34
1321. 543 601 672 675 FX 2.49
1322. 542 600 673 674 FX 2.47
1323. 541 599 628 FX 3.27
1324. 540 598 676 679 FX 2.44
1325. 539 597 677 678 FX 2.42

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534 592 684 687 FX 2.33
533 591 685 686 FX 2.31
532 590 619 FX 3.06
531 589 688 691 FX 2.28
530 588 689 690 FX 2.26
529 587 616 FX 2.99
528 586 692 695 FX 2.22
527 585 693 694 FX 2.2
526 584 613 FX 2.91
525 583 696 699 FX 2.16
524 582 697 698 FX 2.14
523 581 610 FX 2.83
522 580 701 702 FX 2.1
521 579 700 703 FX 2.08
520 578 607 FX 2.74
519 577 704 707 FX 2.03
518 576 705 706 FX 2.01
517 575 604 FX 2.65
516 574 709 710 FX 1.97
515 573 708 711 FX 1.94
4 5 373 421 422 424 425 FX 1.1
378 383 403 404 427 429 FX 1.26
377 382 402 405 FX 1.87
376 381 401 406 FX 1.84
375 380 400 407 FX 1.81
374 379 399 408 FX 1.79
10 18 303 339 340 342 343 FX 1.01
290 300 328 329 345 347 FX 1.15
289 299 327 330 FX 1.7
288 298 326 331 FX 1.67
287 297 325 332 FX 1.64
286 296 324 333 FX 1.61
9 17 206 234 235 237 238 FX 0.9
211 216 226 227 240 242 FX 1.03
210 215 225 228 FX 1.51
209 214 224 229 FX 1.47
208 213 223 230 FX 1.43
207 212 222 231 FX 1.39
8 16 154 172 173 175 176 FX 0.77
121 159 160 169 178 180 FX 0.87
120 158 161 168 FX 1.26
119 157 162 167 FX 1.21
118 156 163 166 FX 1.15
117 155 164 165 FX 1.1
7 15 21 88 89 91 92 FX 0.59
26 36 57 66 94 96 FX 0.64
25 35 58 65 FX 0.88
24 34 59 64 FX 0.79
23 33 60 63 FX 0.68
22 32 61 62 FX 0.52
*VIENTO SOBRE PARABOLAS (3M DIAM) X-X
953 FX 596.06 FZ -20.32 MY -682.78
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514 FX 530.88 FZ -18.1 MY -608.09
4 FX 435.5 FZ -14.85 MY -608.09
5 FX 435.5 FZ 14.85 MY 498.84
6 FX 435.5 FZ -14.85 MY -498.84
*VIENTO SOBRE PLATAFORMAS
458 460 464 TO 468 494 496 TO 501 FX 77.79
830 831 842 TO 844 848 849 854 TO 856 FX 92.33
CALCULATE NATURAL FREQUENCY
*
*SISMO
*
LOAD 5 SISMO EN Z-Z
SELFWEIGHT X 1
SELFWEIGHT Y 1
SELFWEIGHT Z 1
JOINT LOAD
4 TO 6 FX 200
512 TO 514 FX 200
953 TO 955 FX 200
4 TO 6 FY 200
512 TO 514 FY 200
953 TO 955 FY 200
4 TO 6 FZ 200
512 TO 514 FZ 200
953 TO 955 FZ 200
*GRUPO A, ORDENADAS ESPECTRALES MULTIPLICADAS POR 1.5
SPECTRUM SRSS Z 1 ACC SCALE 9.81
0 0.06; 0.05 0.08; 0.1 0.09; 0.15 0.1; 0.2 0.11; 0.25 0.11; 0.3 0.12
0.5 0.12; 0.7 0.12; 0.9 0.12; 1.1 0.12; 1.3 0.12; 1.5 0.12; 1.6 0.11
1.9 0.1; 2.2 0.09; 2.5 0.09; 2.8 0.08; 3.1 0.07; 3.4 0.07; 3.7 0.07
4 0.06; 4.3 0.06; 4.6 0.06; 4.9 0.05; 5.2 0.05; 5.5 0.05; 5.8 0.05
6.1 0.05; 6.4 0.05; 6.7 0.04; 7 0.04; 7.3 0.04; 7.6 0.04; 7.9 0.04
8.2 0.04
CALCULATE NATURAL FREQUENCY
*
LOAD 6 SISMO EN X-X
*GRUPO A, ORDENADAS ESPECTRALES MULTIPLICADAS POR 1.5
SPECTRUM SRSS X 1 ACC SCALE 9.81
0 0.06; 0.05 0.08; 0.1 0.09; 0.15 0.1; 0.2 0.11; 0.25 0.11; 0.3 0.12
0.5 0.12; 0.7 0.12; 0.9 0.12; 1.1 0.12; 1.3 0.12; 1.5 0.12; 1.6 0.11
1.9 0.1; 2.2 0.09; 2.5 0.09; 2.8 0.08; 3.1 0.07; 3.4 0.07; 3.7 0.07
4 0.06; 4.3 0.06; 4.6 0.06; 4.9 0.05; 5.2 0.05; 5.5 0.05; 5.8 0.05
6.1 0.05; 6.4 0.05; 6.7 0.04; 7 0.04; 7.3 0.04; 7.6 0.04; 7.9 0.04
8.2 0.04
CALCULATE NATURAL FREQUENCY
*
*CIMENTACION
LOAD COMB 7 (CM + CV)*1
1 1.0 2 1.0
LOAD COMB 8 (CM + CV + VZ)*1
1 1.0 2 1.0 3 1.0
LOAD COMB 9 (CM + CV - VZ)*1
```

```
1442. 1 1.0 2 1.0 4 -1.0
1443. LOAD COMB 12 (CM + CV + 100% SZ + 30% SX)*1
1444. 1 1.0 2 1.0 5 2.151 6 0.6453
1445. LOAD COMB 13 (CM + CV + 100% SZ - 30% SX)*1
1446. 1 1.0 2 1.0 5 2.151 6 -0.6453
1447. LOAD COMB 14 (CM + CV - 100% SZ + 30% SX)*1
1448. 1 1.0 2 1.0 5 -2.151 6 0.6453
1449. LOAD COMB 15 (CM + CV - 100% SZ - 30% SX)*1
1450. 1 1.0 2 1.0 5 -2.151 6 -0.6453
1451. LOAD COMB 16 (CM + CV + 30% SZ + 100% SX)*1
1452. 1 1.0 2 1.0 5 0.6453 6 2.151
1453. LOAD COMB 17 (CM + CV + 30% SZ - 100% SX)*1
1454. 1 1.0 2 1.0 5 0.6453 6 -2.151
1455. LOAD COMB 18 (CM + CV - 30% SZ + 100% SX)*1
1456. 1 1.0 2 1.0 5 -0.6453 6 2.151
1457. LOAD COMB 19 (CM + CV - 30% SZ - 100% SX)*1
1458. 1 1.0 2 1.0 5 -0.6453 6 -2.151
1459. *DISEÑO
1460. LOAD COMB 20 (CM + CV)*1
1461. 1 1 2 1
1462. LOAD COMB 21 (CM + CV + VZ)*0.75
1463. 1 0.75 2 0.75 3 0.75
1464. LOAD COMB 22 (CM + CV - VZ)*0.75
1465. 1 0.75 2 0.75 3 -0.75
1466. LOAD COMB 23 (CM + CV + VX)*0.75
1467. 1 0.75 2 0.75 4 0.75
1468. LOAD COMB 24 (CM + CV - VX)*0.75
1469. 1 0.75 2 0.75 4 -0.75
1470. LOAD COMB 25 (CM + CV + 100% SZ + 30% SX)*0.75
1471. 1 0.75 2 0.75 5 1.61325 6 0.48397
1472. LOAD COMB 26 (CM + CV + 100% SZ - 30% SX)*0.75
1473. 1 0.75 2 0.75 5 1.61325 6 -0.48397
1474. LOAD COMB 27 (CM + CV - 100% SZ + 30% SX)*0.75
1475. 1 0.75 2 0.75 5 -1.61325 6 0.48397
1476. LOAD COMB 28 (CM + CV - 100% SZ - 30% SX)*0.75
1477. 1 0.75 2 0.75 5 -1.61325 6 -0.48397
1478. LOAD COMB 29 (CM + CV + 30% SZ + 100% SX)*0.75
1479. 1 0.75 2 0.75 5 0.48397 6 1.61325
1480. LOAD COMB 30 (CM + CV + 30% SZ - 100% SX)*0.75
1481. 1 0.75 2 0.75 5 0.48397 6 -1.61325
1482. LOAD COMB 31 (CM + CV - 30% SZ + 100% SX)*0.75
1483. 1 0.75 2 0.75 5 -0.48397 6 1.61325
1484. LOAD COMB 32 (CM + CV - 30% SZ - 100% SX)*0.75
1485. 1 0.75 2 0.75 5 -0.48397 6 -1.61325
1486. PERFORM ANALYSIS
```



```
P R O B L E M   S T A T I S T I C S
-----------------------------------

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =   909/  2205/     3
ORIGINAL/FINAL BAND-WIDTH=   610/    31/    192 DOF
TOTAL PRIMARY LOAD CASES =    6, TOTAL DEGREES OF FREEDOM =   5436
SIZE OF STIFFNESS MATRIX =    1044 DOUBLE  KILO-WORDS
REQRD/AVAIL. DISK SPACE  =    33.2/   817.6 MB,  EXMEM =  821.4 MB

 ++ Processing Element Stiffness Matrix.              15:39:25
 ++ Processing Global Stiffness Matrix.               15:39:26
 ++ Processing Triangular Factorization.              15:39:28
 ++ Calculating Joint Displacements.                  15:39:39
 ++ Calculating Eigensolution.                        15:39:41
NUMBER OF MODES REQUESTED              =    25
NUMBER OF EXISTING MASSES IN THE MODEL =  2718
NUMBER OF MODES THAT WILL BE USED      =    25
```

CALCULATED FREQUENCIES FOR LOAD CASE 5

MODE	FREQUENCY(CYCLES/SEC)	PERIOD(SEC)	ACCURACY
1	1.058	0.94545	1.287E-15
2	1.058	0.94542	4.826E-16
3	2.820	0.35466	9.056E-16
4	2.820	0.35466	5.433E-16
5	3.213	0.31124	4.185E-16
6	5.011	0.19956	6.881E-16
7	5.011	0.19955	0.000E+00
8	5.808	0.17218	3.415E-16
9	8.123	0.12311	4.831E-13
10	8.124	0.12310	1.239E-14
11	8.437	0.11852	2.945E-14
12	9.085	0.11007	3.324E-10
13	9.241	0.10821	3.250E-10
14	9.782	0.10223	2.473E-09
15	9.850	0.10152	3.243E-09
16	10.260	0.09747	3.806E-12
17	10.365	0.09647	1.243E-07
18	10.400	0.09615	8.979E-12
19	10.400	0.09615	2.081E-12
20	10.431	0.09587	1.097E-08
21	10.840	0.09225	1.779E-08
22	11.043	0.09055	1.937E-08
23	11.044	0.09054	3.719E-07
24	11.169	0.08953	7.900E-07
25	11.563	0.08648	3.803E-07

The following Frequencies are estimates that were calculated. These are for information only and will not be used. Remaining values are either above the cut off mode/freq values or are of low accuracy. To use these frequencies, rerun with a higher cutoff mode (or mode + freq) value.

CALCULATED FREQUENCIES FOR LOAD CASE 5

MODE	FREQUENCY(CYCLES/SEC)	PERIOD(SEC)	ACCURACY
26	11.734	0.08522	3.818E-08
27	11.735	0.08521	5.336E-09
28	11.823	0.08458	3.855E-06
29	11.848	0.08440	9.772E-07
30	12.010	0.08326	1.033E-05
31	12.838	0.07789	1.253E-05
32	13.186	0.07584	1.770E-06
33	13.354	0.07489	1.321E-07
34	13.355	0.07488	4.262E-06

++ Calculating Response Spectrum Displacements. 15:42:16

RESPONSE LOAD CASE 5

SRSS MODAL COMBINATION METHOD USED.
DYNAMIC WEIGHT X Y Z 1.310851E+05 1.310851E+05 1.310851E+05 KG
MISSING WEIGHT X Y Z -1.097115E+04 -7.980802E+04 -1.094511E+04 KG
MODAL WEIGHT X Y Z 1.201140E+05 5.127711E+04 1.201400E+05 KG

MODE	FACTOR	ACCELERATION-G	DAMPING
1	-2.504550E+00	0.12004	0.05000
2	-1.748659E+01	0.12004	0.05000
3	1.909156E+00	0.12004	0.05000
4	-7.496955E-01	0.12004	0.05000
5	2.592907E-05	0.12004	0.05000
6	8.090446E-03	0.10995	0.05000
7	-4.913834E-01	0.10995	0.05000
8	4.022795E-05	0.10447	0.05000
9	-1.879372E-03	0.09465	0.05000
10	9.405508E-02	0.09465	0.05000
11	-1.672854E-05	0.09374	0.05000
12	-5.032998E-05	0.09205	0.05000
13	1.301167E-02	0.09167	0.05000
14	2.555634E-03	0.09048	0.05000

MODE	FACTOR	ACCELERATION-G	DAMPING
19	4.538234E-06	0.08926	0.05000
20	4.179594E-07	0.08920	0.05000
21	-3.934828E-05	0.08848	0.05000
22	-3.923928E-02	0.08814	0.05000
23	-8.335582E-04	0.08814	0.05000
24	4.610525E-03	0.08794	0.05000
25	-8.145158E-04	0.08733	0.05000

	MASS PARTICIPATION FACTORS IN PERCENT						BASE SHEAR IN KG		
MODE	X	Y	Z	SUMM-X	SUMM-Y	SUMM-Z	X	Y	Z
1	37.10	0.00	0.76	37.101	0.000	0.761	0.00	0.00	119.75
2	0.76	0.00	37.10	37.862	0.000	37.863	0.00	0.00	5838.29
3	3.44	0.00	22.33	41.305	0.000	60.194	0.00	0.00	3513.93
4	22.33	0.00	3.44	63.635	0.000	63.638	0.00	0.00	541.86
5	0.00	0.00	0.00	63.635	0.000	63.638	0.00	0.00	0.00
6	17.59	0.00	0.00	81.229	0.000	63.643	0.00	0.00	0.69
7	0.00	0.00	17.59	81.233	0.000	81.238	0.00	0.00	2535.87
8	0.00	0.00	0.00	81.233	0.000	81.238	0.00	0.00	0.00
9	5.99	0.00	0.00	87.221	0.000	81.240	0.00	0.00	0.30
10	0.00	0.00	6.01	87.223	0.000	87.247	0.00	0.00	745.29
11	0.00	0.00	0.00	87.223	0.000	87.247	0.00	0.00	0.00
12	0.23	0.00	0.00	87.449	0.000	87.247	0.00	0.00	0.00
13	0.00	0.04	0.21	87.449	0.040	87.452	0.00	0.00	24.66
14	0.00	1.61	0.01	87.449	1.652	87.462	0.00	0.00	1.21
15	0.00	0.00	0.00	87.449	1.652	87.462	0.00	0.00	0.00
16	0.00	1.02	0.00	87.449	2.673	87.462	0.00	0.00	0.00
17	0.00	0.01	0.01	87.449	2.684	87.468	0.00	0.00	0.68
18	0.00	0.00	0.00	87.449	2.684	87.469	0.00	0.00	0.11
19	0.00	0.00	0.00	87.450	2.684	87.469	0.00	0.00	0.00
20	0.02	0.00	0.00	87.474	2.684	87.469	0.00	0.00	0.00
21	0.00	0.00	0.00	87.475	2.684	87.469	0.00	0.00	0.00
22	0.00	0.26	4.12	87.476	2.948	91.587	0.00	0.00	475.74
23	4.15	0.00	0.00	91.630	2.948	91.588	0.00	0.00	0.21
24	0.00	35.23	0.06	91.630	38.179	91.648	0.00	0.00	6.89
25	0.00	0.94	0.00	91.630	39.117	91.650	0.00	0.00	0.25
				TOTAL SRSS		SHEAR	0.00	0.00	7345.36
				TOTAL 10PCT		SHEAR	0.00	0.00	7692.37
				TOTAL ABS		SHEAR	0.00	0.00	13805.74

RESPONSE LOAD CASE 6

SRSS MODAL COMBINATION METHOD USED.
DYNAMIC WEIGHT X Y Z 1.310851E+05 1.310851E+05 1.310851E+05 KG
MISSING WEIGHT X Y Z -1.097115E+04 -7.980802E+04 -1.094511E+04 KG
MODAL WEIGHT X Y Z 1.201140E+05 5.127711E+04 1.201400E+05 KG

MODE	FACTOR	ACCELERATION-G	DAMPING
1	1.748752E+01	0.12004	0.05000
2	-2.504266E+00	0.12004	0.05000
3	-7.496876E-01	0.12004	0.05000
4	-1.909086E+00	0.12004	0.05000
5	4.625283E-04	0.12004	0.05000
6	-4.914216E-01	0.10995	0.05000
7	-8.089690E-03	0.10995	0.05000
8	-1.170080E-04	0.10447	0.05000
9	9.392180E-02	0.09465	0.05000
10	1.875267E-03	0.09465	0.05000
11	5.209473E-05	0.09374	0.05000
12	1.416715E-02	0.09205	0.05000
13	4.391877E-05	0.09167	0.05000
14	-6.832391E-06	0.09048	0.05000
15	-3.777133E-04	0.09034	0.05000
16	-1.786517E-07	0.08952	0.05000
17	3.660508E-06	0.08933	0.05000
18	-4.436472E-06	0.08926	0.05000
19	7.365212E-04	0.08926	0.05000
20	-3.431059E-03	0.08920	0.05000
21	2.436054E-04	0.08848	0.05000
22	8.204440E-04	0.08814	0.05000
23	-3.940540E-02	0.08814	0.05000
24	-7.945924E-05	0.08794	0.05000
25	1.644346E-05	0.08733	0.05000

MODE	MASS PARTICIPATION FACTORS IN PERCENT X	Y	Z	SUMM-X	SUMM-Y	SUMM-Z	BASE SHEAR IN KG X	Y	Z
1	37.10	0.00	0.76	37.101	0.000	0.761	5838.07	0.00	0.00
2	0.76	0.00	37.10	37.862	0.000	37.863	119.74	0.00	0.00
3	3.44	0.00	22.33	41.305	0.000	60.194	541.84	0.00	0.00
4	22.33	0.00	3.44	63.635	0.000	63.638	3513.75	0.00	0.00
5	0.00	0.00	0.00	63.635	0.000	63.638	0.00	0.00	0.00
6	17.59	0.00	0.00	81.229	0.000	63.643	2535.69	0.00	0.00
7	0.00	0.00	17.59	81.233	0.000	81.238	0.69	0.00	0.00
8	0.00	0.00	0.00	81.233	0.000	81.238	0.00	0.00	0.00
9	5.99	0.00	0.00	87.221	0.000	81.240	742.92	0.00	0.00
10	0.00	0.00	6.01	87.223	0.000	87.247	0.30	0.00	0.00
11	0.00	0.00	0.00	87.223	0.000	87.247	0.00	0.00	0.00
12	0.23	0.00	0.00	87.449	0.000	87.247	27.20	0.00	0.00
13	0.00	0.04	0.21	87.449	0.040	87.452	0.00	0.00	0.00
14	0.00	1.61	0.01	87.449	1.652	87.462	0.00	0.00	0.00
15	0.00	0.00	0.00	87.449	1.652	87.462	0.03	0.00	0.00
16	0.00	1.02	0.00	87.449	2.673	87.462	0.00	0.00	0.00
17	0.00	0.01	0.01	87.449	2.684	87.468	0.00	0.00	0.00
18	0.00	0.00	0.00	87.449	2.684	87.469	0.00	0.00	0.00
19	0.00	0.00	0.00	87.450	2.684	87.469	0.13	0.00	0.00
20	0.02	0.00	0.00	87.474	2.684	87.469	2.86	0.00	0.00
21	0.00	0.00	0.00	87.475	2.684	87.469	0.02	0.00	0.00
22	0.00	0.26	4.12	87.476	2.948	91.587	0.21	0.00	0.00
23	4.15	0.00	0.00	91.630	2.948	91.588	479.95	0.00	0.00
24	0.00	35.23	0.06	91.630	38.179	91.648	0.00	0.00	0.00
25	0.00	0.94	0.00	91.630	39.117	91.650	0.00	0.00	0.00
						TOTAL SRSS SHEAR	7345.08	0.00	0.00
						TOTAL 10PCT SHEAR	7691.76	0.00	0.00
						TOTAL ABS SHEAR	13803.39	0.00	0.00

```
**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     1 =  11.75776 CPS    *
* MAX DEFLECTION =  0.40373 CM   GLO Y, AT JOINT   473   *
*                                                        *
**********************************************************
```



```
**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     2 =  47.38115 CPS    *
* MAX DEFLECTION =  0.01339 CM   GLO Y, AT JOINT   494   *
*                                                        *
**********************************************************

**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     3 =   0.88768 CPS    *
* MAX DEFLECTION = 48.78820 CM   GLO Z, AT JOINT   953   *
*                                                        *
**********************************************************

**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     4 =   1.31056 CPS    *
* MAX DEFLECTION = 24.61527 CM   GLO X, AT JOINT   955   *
*                                                        *
**********************************************************

**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     5 =   3.42775 CPS    *
* MAX DEFLECTION =  5.61904 CM   GLO Z, AT JOINT   954   *
*                                                        *
**********************************************************

**********************************************************
*                                                        *
* NATURAL FREQUENCY FOR LOADING     6 =   0.00000 CPS    *
* MAX DEFLECTION =  5.61934 CM   GLO X, AT JOINT   955   *
*                                                        *
```

SUPPORT REACTIONS -UNIT KG METE STRUCTURE TYPE = SPACE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	7	3884.91	44079.19	2244.19	-694.64	-0.09	1192.98
	8	-11707.10	-145431.11	-11518.53	-3162.48	696.23	-3523.98
	9	19477.05	233589.47	16006.91	1773.21	-696.40	5909.93
	10	-13868.30	-137964.25	-8123.60	459.37	-485.26	-577.94
	11	21638.25	226172.62	12611.97	-1848.65	485.09	2963.89
	12	10637.54	123558.52	6824.48	1098.79	145.12	3340.16
	13	6287.25	78614.34	4577.36	323.76	103.78	2158.20
	14	1482.70	9544.04	-89.98	-1713.04	-103.96	227.75
	15	-2867.59	-35400.14	-2336.10	-2488.07	-145.29	-954.21
	16	12508.69	136088.31	7026.41	1018.85	106.17	3629.77
	17	-1992.79	-13725.60	-464.00	-1564.58	-31.62	-310.10
	18	9762.24	101883.97	4952.37	175.30	31.44	2696.05
	19	-4738.74	-47929.94	-2538.04	-2408.13	-106.34	-1243.82
2	7	0.06	44083.37	-4488.47	1360.47	0.01	-0.15
	8	-214.43	423103.78	-45054.86	7110.71	-16.72	205.32
	9	214.54	-334937.06	36077.92	-4389.78	16.74	-205.62
	10	-4535.85	43696.27	-4461.43	1353.29	354.85	4725.17
	11	4535.96	44470.46	-4515.52	1367.65	-354.83	-4725.47
	12	927.98	142204.67	5800.52	4223.11	78.09	951.97
	13	108.40	129056.95	4122.08	3856.55	-4.15	105.68
	14	-108.29	-40890.21	-13099.03	-1135.61	4.17	-105.98
	15	-927.87	-54037.94	-14777.46	-1502.17	-78.07	-952.27
	16	1521.47	93460.49	1143.84	2775.22	148.17	1569.03
	17	-1210.47	49634.71	-4450.92	1553.34	-125.97	-1251.95
	18	1210.59	38532.02	-4526.02	1167.60	125.99	1251.64
	19	-1521.36	-5293.75	-10120.79	-54.28	-148.14	-1569.33
3	7	-3885.03	44080.25	2244.28	-694.87	0.08	-1193.04
	8	11921.54	-145429.91	-11146.63	-2805.77	-730.42	3317.73
	9	-19691.60	233590.41	15635.20	1416.04	730.57	-5703.81
	10	-21547.15	226510.78	12638.29	-1838.99	-178.80	-3094.57
	11	13777.09	-138350.27	-8149.73	449.25	178.96	708.49
	12	2365.30	110291.64	6700.53	1034.51	140.49	585.84
	13	-2194.61	59380.69	4363.88	202.96	90.64	-767.47
	14	-5575.45	28779.81	124.69	-1592.70	-90.48	-1618.61
	15	-10135.36	-22131.14	-2211.96	-2424.25	-140.34	-2971.92
	16	4905.94	141158.62	7125.08	1085.13	117.82	1393.13
	17	-10293.78	-28544.57	-663.76	-1686.71	-48.37	-3117.88
	18	2523.72	116705.06	5152.33	296.97	48.52	731.80
	19	-12676.00	-52998.11	-2636.51	-2474.87	-117.66	-3779.21

************** END OF LATEST ANALYSIS RESULT **************

STEEL TAKE-OFF

PROFILE	LENGTH(METE)	WEIGHT(KG)
LD L40 4010	669.02	31167.051
UP PIPX180	90.00	22563.201
LD L30 308	1109.09	30828.047
LD L30 305	418.98	7538.065
UP PIPX140	90.00	14357.633
LD L30 307	558.33	13747.378
ST PIP X100	54.00	4393.796
LD L30 306	174.48	3719.359
ST PIP S80	36.00	1528.271
	TOTAL =	129842.797

************ END OF DATA FROM INTERNAL STORAGE ************

1490. PARAMETER
1491. CODE AISC
1492. *RATIO 1.02 ALL
1493. BEAM 1 ALL
1494. LOAD LIST 20 TO 32
1495. CHECK CODE ALL

STAAD.Pro CODE CHECKING - (AISC)
****

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
4	LD L40 4010	PASS	AISC- H1-3	0.134	21
		6703.58 C	-67.70	-15.10	0.00
5	LD L40 4010	PASS	AISC- H1-3	0.126	22
		5970.32 C	24.67	43.84	0.00
6	LD L40 4010	PASS	AISC- H2-1	0.073	22
		236.87 T	-41.69	-57.93	0.00
7	UPT PIPX180	PASS	AISC- H1-2	0.677	21
		276983.22 C	0.00	5923.48	1.00
8	UPT PIPX180	PASS	AISC- H1-2	0.392	22
		152882.08 C	0.00	4266.04	0.00
9	UPT PIPX180	PASS	AISC- H1-2	0.396	22
		152881.44 C	0.00	4484.87	0.00
10	UPT PIPX180	PASS	AISC- H1-2	0.629	21
		253803.91 C	0.00	5903.89	1.00
11	UPT PIPX180	PASS	AISC- H1-2	0.572	21
		229564.92 C	0.00	5481.98	1.00
12	UPT PIPX180	PASS	AISC- H1-2	0.512	21
		205066.44 C	0.00	4982.73	1.00
13	UPT PIPX180	PASS	AISC- H1-2	0.453	21
		180411.98 C	0.00	4505.34	1.00
14	UPT PIPX180	PASS	AISC- H1-2	0.351	22
		139471.55 C	0.00	3524.99	0.00
15	UPT PIPX180	PASS	AISC- H1-2	0.319	22
		125604.79 C	0.00	3313.46	0.00
16	UPT PIPX180	PASS	AISC- H1-2	0.287	22
		111744.96 C	0.00	3126.30	0.00
17	UPT PIPX180	PASS	AISC- H1-2	0.254	22
		97700.97 C	0.00	2923.10	0.00
18	UPT PIPX180	PASS	AISC- H1-2	0.352	22
		139471.22 C	0.00	3593.50	0.00
19	UPT PIPX180	PASS	AISC- H1-2	0.320	22
		125603.95 C	0.00	3409.96	0.00
20	UPT PIPX180	PASS	AISC- H1-2	0.289	22
		111743.76 C	0.00	3246.02	0.00
21	UPT PIPX180	PASS	AISC- H1-2	0.258	22
		97700.02 C	0.00	3117.56	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
25	LD L40 4010	PASS	AISC- H1-3	0.153	22
		6901.40 C	16.19	59.64	0.00
26	LD L40 4010	PASS	AISC- H2-1	0.082	22
		1435.04 T	-50.82	46.95	1.81
27	LD L40 4010	PASS	AISC- H1-3	0.121	21
		6516.31 C	-46.79	-9.23	0.30
28	LD L40 4010	PASS	AISC- H1-3	0.147	22
		6752.40 C	19.76	55.76	0.00
29	LD L40 4010	PASS	AISC- H2-1	0.086	22
		1441.87 T	-33.89	-62.90	0.00
30	LD L40 4010	PASS	AISC- H1-3	0.126	21
		6437.98 C	-62.84	-8.62	0.00
31	LD L40 4010	PASS	AISC- H1-3	0.138	22
		6585.64 C	17.46	51.17	0.00
32	LD L40 4010	PASS	AISC- H2-1	0.090	22
		1565.61 T	-37.95	-63.39	0.00
33	LD L40 4010	PASS	AISC- H1-3	0.129	21
		6285.76 C	-65.31	-14.77	0.00
34	LD L40 4010	PASS	AISC- H2-1	0.141	22
		6397.29 T	-4.39	80.70	0.83
35	LD L40 4010	PASS	AISC- H2-1	0.109	24
		5280.54 T	1.67	59.09	0.83
36	LD L40 4010	PASS	AISC- H2-1	0.209	21
		10542.18 T	9.43	104.58	0.83
37	UPT PIPX180	PASS	AISC- H1-2	0.679	21
		277800.44 C	0.00	5946.44	0.00
38	UPT PIPX180	PASS	AISC- H1-1	0.637	21
		288830.72 C	0.00	2232.31	0.00
39	UPT PIPX180	PASS	AISC- H1-1	0.621	21
		291105.69 C	0.00	944.41	0.00
40	UPT PIPX180	PASS	AISC- H1-1	0.626	21
		292407.25 C	0.00	1082.56	1.00
41	UPT PIPX180	PASS	AISC- H1-2	0.685	21
		293161.16 C	0.00	4488.70	1.00
42	UPT PIPX180	PASS	AISC- H1-2	0.377	22
		153149.44 C	0.00	3416.17	0.00
43	UPT PIPX180	PASS	AISC- H1-1	0.352	22
		159168.59 C	0.00	1337.17	0.00
44	UPT PIPX180	PASS	AISC- H1-1	0.350	22
		160178.02 C	0.00	1073.15	1.00
45	UPT PIPX180	PASS	AISC- H1-1	0.353	22
		161136.28 C	0.00	1101.32	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
48 UPT	PIPX180	PASS	AISC- H1-1	0.353	22
		159167.81 C	0.00	1348.45	0.00
49 UPT	PIPX180	PASS	AISC- H1-1	0.351	22
		160177.23 C	0.00	1081.35	1.00
50 UPT	PIPX180	PASS	AISC- H1-1	0.353	22
		160963.14 C	0.00	1143.06	0.92
51 UPT	PIPX180	PASS	AISC- H1-2	0.398	22
		161230.16 C	0.00	3663.64	1.00
52 LD	L40 4010	PASS	AISC- H1-1	0.441	21
		25785.36 C	-9.33	144.96	0.00
53 LD	L40 4010	PASS	AISC- H1-3	0.207	22
		11840.74 C	-59.35	32.06	0.00
54 LD	L40 4010	PASS	AISC- H1-1	0.261	22
		13115.40 C	54.27	95.45	0.00
55 LD	L40 4010	PASS	AISC- H1-3	0.139	24
		6924.69 C	-66.78	20.38	0.00
56 LD	L40 4010	PASS	AISC- H1-1	0.271	22
		15780.01 C	-47.28	67.40	0.00
57 LD	L40 4010	PASS	AISC- H1-1	0.204	21
		12246.56 C	-58.30	30.79	0.00
58 LD	L40 4010	PASS	AISC- H1-1	0.269	21
		18361.44 C	12.19	-42.48	0.22
59 LD	L40 4010	PASS	AISC- H1-1	0.264	21
		16579.51 C	14.07	65.02	1.30
60 LD	L40 4010	PASS	AISC- H1-1	0.234	21
		15003.32 C	14.00	-51.18	0.00
61 LD	L40 4010	PASS	AISC- H1-1	0.212	21
		14281.43 C	-8.08	38.26	0.00
62 LD	L40 4010	PASS	AISC- H1-3	0.205	21
		11782.69 C	-58.87	30.11	1.30
63 LD	L40 4010	PASS	AISC- H1-1	0.177	22
		12274.79 C	2.33	28.94	1.30
64 LD	L40 4010	PASS	AISC- H1-1	0.207	22
		12305.82 C	1.73	-69.39	1.30
65 LD	L40 4010	PASS	AISC- H1-1	0.207	22
		12416.46 C	5.52	65.04	0.00
66 LD	L40 4010	PASS	AISC- H1-1	0.180	22
		12686.91 C	0.19	-26.78	1.08
67 LD	L40 4010	PASS	AISC- H1-1	0.269	22
		15607.80 C	-45.70	68.82	1.30
68 LD	L40 4010	PASS	AISC- H1-3	0.152	23
		10258.52 C	5.15	-23.67	0.54

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
71 LD	L40 4010	PASS	AISC- H1-3	0.136	23
		8171.23 C	-6.24	35.03	0.00
72 LD	L40 4010	PASS	AISC- H1-3	0.134	23
		6918.56 C	-56.19	20.58	1.30
73 LD	L40 4010	PASS	AISC- H1-3	0.135	24
		8149.18 C	-3.58	35.91	1.30
74 LD	L40 4010	PASS	AISC- H1-3	0.158	24
		8540.11 C	5.35	-56.38	1.30
75 LD	L40 4010	PASS	AISC- H1-3	0.175	24
		9352.89 C	7.54	64.15	0.00
76 LD	L40 4010	PASS	AISC- H1-3	0.152	24
		10229.71 C	6.65	-23.38	0.54
77 LD	L40 4010	PASS	AISC- H1-1	0.260	22
		12943.17 C	55.72	96.87	1.30
78 LD	L40 4010	PASS	AISC- H1-1	0.217	21
		14720.18 C	-7.24	37.31	1.30
79 LD	L40 4010	PASS	AISC- H1-1	0.240	21
		15413.11 C	14.65	-51.79	1.30
80 LD	L40 4010	PASS	AISC- H1-1	0.270	21
		16949.42 C	14.69	65.91	0.00
81 LD	L40 4010	PASS	AISC- H1-1	0.273	21
		18658.16 C	12.73	-42.33	0.98
82 LD	L40 4010	PASS	AISC- H1-1	0.443	21
		25958.31 C	-10.77	143.54	1.30
83 LD	L40 4010	PASS	AISC- H1-1	0.184	22
		12988.98 C	-0.07	-27.08	0.11
84 LD	L40 4010	PASS	AISC- H1-1	0.213	22
		12785.88 C	6.76	65.88	1.30
85 LD	L40 4010	PASS	AISC- H1-1	0.213	22
		12715.58 C	3.02	-70.08	0.00
86 LD	L40 4010	PASS	AISC- H1-1	0.184	22
		12681.93 C	-27.23	16.08	1.30
87 LD	L40 4010	PASS	AISC- H1-1	0.206	22
		12299.56 C	-57.32	32.86	1.30
88 LD	L30 308	PASS	AISC- H2-1	0.206	21
		8730.09 T	17.79	12.83	0.00
89 LD	L30 308	PASS	AISC- H1-1	0.285	21
		7100.29 C	-15.25	66.13	0.00
90 LD	L30 308	PASS	AISC- H2-1	0.088	21
		3050.06 T	0.87	16.15	0.00
91 LD	L30 308	PASS	AISC- H1-3	0.106	21
		2386.08 C	-2.81	21.87	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
94	LD	L30 308	PASS	AISC- H1-3	0.096	24
			866.64 C	5.24	24.36	0.00
95	LD	L30 308	PASS	AISC- H1-3	0.120	21
			1259.03 C	-0.85	27.23	0.00
96	LD	L40 4010	PASS	AISC- H2-1	0.080	21
			4831.19 T	2.09	30.72	0.00
97	LD	L40 4010	PASS	AISC- H1-3	0.105	21
			1696.16 C	2.33	97.61	0.00
98	LD	L40 4010	PASS	AISC- H2-1	0.065	23
			1326.17 T	2.76	57.92	0.00
99	LD	L30 308	PASS	AISC- H1-3	0.082	23
			758.47 C	-0.24	21.43	3.24
100	LD	L30 308	PASS	AISC- H1-3	0.069	22
			327.69 C	7.85	23.35	3.13
101	LD	L30 308	PASS	AISC- H1-3	0.122	23
			1586.73 C	2.88	34.31	2.51
102	LD	L30 308	PASS	AISC- H2-1	0.067	20
			242.75 T	-1.64	32.52	0.00
103	LD	L30 308	PASS	AISC- H1-3	0.056	23
			1251.55 C	-1.01	11.71	1.82
104	LD	L30 308	PASS	AISC- H2-1	0.054	23
			1572.61 T	1.18	12.53	1.57
105	LD	L30 308	PASS	AISC- H1-3	0.157	23
			3633.86 C	-6.89	36.42	1.24
106	LD	L30 308	PASS	AISC- H2-1	0.108	23
			4489.02 T	7.42	8.72	0.78
107	LD	L30 308	PASS	AISC- H2-1	0.155	22
			6270.39 T	33.48	-0.53	0.00
108	LD	L30 308	PASS	AISC- H1-3	0.196	22
			5045.95 C	-5.69	40.95	0.00
109	LD	L30 308	PASS	AISC- H1-3	0.098	21
			2274.31 C	-23.28	8.74	0.00
110	LD	L30 308	PASS	AISC- H1-3	0.095	22
			2403.68 C	-1.44	16.29	0.00
111	LD	L30 308	PASS	AISC- H2-1	0.136	22
			1521.98 T	-43.27	31.67	2.35
112	LD	L30 308	PASS	AISC- H1-3	0.236	22
			3160.78 C	47.68	39.18	0.00
113	LD	L30 308	PASS	AISC- H1-3	0.140	21
			1632.83 C	-7.57	26.24	0.00
114	LD	L30 308	PASS	AISC- H1-3	0.154	22
			1812.56 C	-2.60	27.99	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
117	LD	L40 4010	PASS	AISC- H2-1	0.084	22
			2359.22 T	-3.56	66.71	0.00
118	LD	L30 308	PASS	AISC- H1-3	0.158	22
			1877.97 C	-2.67	28.39	3.24
119	LD	L30 308	PASS	AISC- H1-3	0.146	21
			1715.93 C	-7.83	26.68	3.13
120	LD	L30 308	PASS	AISC- H1-3	0.238	22
			3239.29 C	47.31	39.39	2.51
121	LD	L30 308	PASS	AISC- H2-1	0.138	22
			1618.87 T	-43.01	31.91	0.00
122	LD	L30 308	PASS	AISC- H1-3	0.098	22
			2499.15 C	-1.46	16.67	1.82
123	LD	L30 308	PASS	AISC- H1-3	0.102	21
			2399.13 C	-23.16	9.36	1.57
124	LD	L30 308	PASS	AISC- H1-3	0.199	22
			5164.41 C	-5.86	41.21	1.24
125	LD	L30 308	PASS	AISC- H2-1	0.159	22
			6420.64 T	32.82	-1.38	0.78
126	LD	L40 4010	PASS	AISC- H1-3	0.204	20
			814.52 C	5.31	225.18	0.00
127	LD	L40 4010	PASS	AISC- H1-3	0.242	22
			2713.44 C	-106.01	171.12	0.00
129	LD	L40 4010	PASS	AISC- H2-1	0.109	23
			5164.59 T	5.73	58.53	0.00
130	LD	L40 4010	PASS	AISC- H2-1	0.107	22
			5018.19 T	13.63	52.62	1.93
132	LD	L40 4010	PASS	AISC- H2-1	0.103	22
			4718.88 T	14.02	51.51	0.00
133	LD	L40 4010	PASS	AISC- H2-1	0.078	24
			4242.13 T	10.46	30.41	0.00
135	LD	L40 4010	PASS	AISC- H2-1	0.083	22
			2283.98 T	-3.73	67.01	1.93
137	LD	L40 4010	PASS	AISC- H1-3	0.095	21
			4094.78 C	-28.83	26.63	1.98
138	LD	L30 308	PASS	AISC- H1-3	0.042	22
			153.34 C	-14.94	11.75	1.00
139	LD	L30 308	PASS	AISC- H1-3	0.156	22
			3788.33 C	-8.27	18.26	0.00
140	LD	L30 308	PASS	AISC- H2-1	0.110	22
			1624.70 T	62.63	5.02	0.00
141	LD	L30 308	PASS	AISC- H1-3	0.142	22
			3395.36 C	-5.61	18.89	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
144 LD	L30 308	PASS	AISC- H2-1	0.107	22
		1654.42 T	-62.91	3.14	0.00
145 LD	L30 308	PASS	AISC- H1-3	0.144	22
		3458.65 C	5.56	18.79	0.00
147 LD	L40 4010	PASS	AISC- H2-1	0.204	21
		10248.31 T	10.02	101.78	0.00
148 LD	L40 4010	PASS	AISC- H2-1	0.185	21
		10287.85 T	9.46	79.19	1.93
150 LD	L40 4010	PASS	AISC- H2-1	0.121	23
		6543.37 T	7.45	53.69	0.00
151 LD	L40 4010	PASS	AISC- H1-3	0.109	21
		6055.46 C	-29.89	-10.51	1.45
153 LD	L40 4010	PASS	AISC- H2-1	0.050	22
		80.27 T	28.39	40.84	1.98
155 LD	L40 4010	PASS	AISC- H2-1	0.103	21
		2386.13 T	5.55	87.66	1.93
156 LD	L30 308	PASS	AISC- H2-1	0.054	21
		60.04 T	-46.39	-0.30	0.00
157 LD	L30 308	PASS	AISC- H1-3	0.095	23
		2072.45 C	0.20	17.72	0.00
158 LD	L30 308	PASS	AISC- H2-1	0.069	23
		855.46 T	-45.17	1.30	0.00
159 LD	L30 308	PASS	AISC- H1-3	0.087	23
		1718.64 C	3.68	17.21	0.00
160 LD	L30 308	PASS	AISC- H2-1	0.041	22
		115.44 T	33.21	0.77	0.00
161 LD	L30 308	PASS	AISC- H1-3	0.134	21
		2920.83 C	-2.92	23.80	0.00
162 LD	L30 308	PASS	AISC- H2-1	0.109	21
		1243.07 T	71.18	3.10	0.00
163 LD	L30 308	PASS	AISC- H1-3	0.132	21
		2633.29 C	-6.47	24.73	0.00
164 LD	L30 308	PASS	AISC- H2-1	0.206	21
		8580.04 T	-18.43	13.68	0.00
165 LD	L30 308	PASS	AISC- H1-1	0.282	21
		6981.77 C	15.09	65.86	0.00
166 LD	L30 308	PASS	AISC- H2-1	0.087	21
		2925.19 T	-0.94	16.77	0.00
167 LD	L30 308	PASS	AISC- H1-3	0.103	21
		2290.77 C	2.80	21.48	0.00
168 LD	L30 308	PASS	AISC- H2-1	0.104	24
		1113.58 T	25.71	28.94	2.35

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
171 LD	L30 308	PASS	AISC- H1-3	0.116	21
		1193.46 C	0.79	26.84	0.00
172 LD	L40 4010	PASS	AISC- H2-1	0.079	21
		4701.06 T	-1.42	31.15	0.00
173 LD	L40 4010	PASS	AISC- H1-3	0.108	21
		1691.78 C	-1.68	101.23	0.00
174 LD	L40 4010	PASS	AISC- H2-1	0.065	24
		1326.24 T	2.35	58.19	0.00
175 LD	L30 308	PASS	AISC- H1-3	0.084	24
		777.90 C	1.27	21.43	3.24
176 LD	L30 308	PASS	AISC- H1-3	0.074	22
		412.96 C	-7.56	23.78	3.13
177 LD	L30 308	PASS	AISC- H1-3	0.153	24
		1583.23 C	-30.28	34.63	2.51
178 LD	L30 308	PASS	AISC- H2-1	0.093	24
		619.70 T	27.59	27.17	0.00
179 LD	L30 308	PASS	AISC- H1-3	0.056	24
		1261.91 C	1.31	11.73	1.82
180 LD	L30 308	PASS	AISC- H2-1	0.070	24
		1566.67 T	-15.73	12.33	1.57
181 LD	L30 308	PASS	AISC- H1-3	0.155	24
		3627.63 C	4.83	36.38	1.24
182 LD	L30 308	PASS	AISC- H2-1	0.128	24
		4466.72 T	-26.21	8.56	0.78
183 LD	L40 4010	PASS	AISC- H1-3	0.204	20
		814.62 C	5.25	225.24	0.00
185 LD	L40 4010	PASS	AISC- H2-1	0.189	21
		10584.33 T	8.81	80.34	0.00
186 LD	L40 4010	PASS	AISC- H1-3	0.162	22
		7276.30 C	15.41	62.57	1.93
188 LD	L40 4010	PASS	AISC- H2-1	0.146	22
		6690.04 T	-4.90	83.41	0.00
189 LD	L40 4010	PASS	AISC- H2-1	0.122	24
		6577.28 T	7.40	53.74	1.93
191 LD	L40 4010	PASS	AISC- H2-1	0.102	21
		2314.03 T	-5.35	87.93	1.93
193 LD	L40 4010	PASS	AISC- H2-1	0.062	24
		2911.47 T	-27.78	18.43	1.98
194 LD	L30 308	PASS	AISC- H1-3	0.043	24
		45.02 C	20.94	9.98	1.00
195 LD	L30 308	PASS	AISC- H1-3	0.132	21
		2853.34 C	2.40	23.95	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
198	LD	L30 308	PASS	AISC- H2-1	0.057	21
			65.11 T	47.92	1.09	0.00
199	LD	L30 308	PASS	AISC- H1-3	0.098	24
			2084.53 C	-2.97	17.75	0.00
200	LD	L30 308	PASS	AISC- H2-1	0.070	24
			860.42 T	45.30	1.45	0.00
201	LD	L30 308	PASS	AISC- H1-3	0.088	24
			1728.63 C	-4.02	17.18	0.00
202	LD	L40 4010	PASS	AISC- H1-3	0.241	22
			2713.61 C	-105.31	170.07	2.50
203	LD	L40 4010	PASS	AISC- H1-3	0.204	20
			814.70 C	5.25	225.25	2.50
204	LD	L40 4010	PASS	AISC- H1-3	0.211	24
			1606.78 C	66.68	180.08	2.50
205	LD	L40 4010	PASS	AISC- H2-1	0.111	20
			4.37 T	-0.01	-132.96	2.42
206	LD	L40 4010	PASS	AISC- H2-1	0.111	20
			4.34 T	-0.01	-132.96	2.42
207	LD	L40 4010	PASS	AISC- H2-1	0.111	20
			4.70 T	0.02	-132.96	2.42
208	LD	L40 4010	PASS	AISC- H1-3	0.069	21
			235.23 C	1.40	70.87	0.00
209	LD	L40 4010	PASS	AISC- H1-3	0.065	23
			157.14 C	1.63	69.60	0.00
210	LD	L40 4010	PASS	AISC- H1-3	0.068	21
			235.51 C	1.22	70.15	4.70
222	LD	L40 4010	PASS	AISC- H2-1	0.106	22
			4271.03 T	105.81	-4.10	0.00
223	UPT	PIPX180	PASS	AISC- H1-2	0.346	22
			139694.02 C	0.00	3203.87	0.00
224	UPT	PIPX180	PASS	AISC- H1-1	0.322	22
			145687.58 C	0.00	1205.31	0.00
225	UPT	PIPX180	PASS	AISC- H1-1	0.319	22
			146686.42 C	0.00	839.44	1.00
226	UPT	PIPX180	PASS	AISC- H1-1	0.323	22
			147383.92 C	0.00	1039.14	1.00
227	UPT	PIPX180	PASS	AISC- H1-2	0.345	22
			147623.39 C	0.00	3380.43	1.00
228	UPT	PIPX180	PASS	AISC- H1-2	0.345	22
			139693.67 C	0.00	3197.08	0.00
229	UPT	PIPX180	PASS	AISC- H1-1	0.322	22
			145686.77 C	0.00	1195.04	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
232	UPT	PIPX180	PASS	AISC- H1-2	0.367	22
			147622.47 C	0.00	3475.56	1.00
233	LD	L40 4010	PASS	AISC- H1-1	0.249	22
			12482.23 C	63.62	85.15	0.00
234	LD	L40 4010	PASS	AISC- H1-3	0.136	24
			6950.38 C	-59.12	21.24	0.00
235	LD	L40 4010	PASS	AISC- H1-3	0.145	23
			9993.43 C	1.56	-22.75	0.53
236	LD	L40 4010	PASS	AISC- H1-3	0.167	23
			9200.47 C	5.86	57.64	1.27
237	LD	L40 4010	PASS	AISC- H1-3	0.150	23
			8449.08 C	4.61	-49.92	0.00
238	LD	L40 4010	PASS	AISC- H1-3	0.130	23
			8116.39 C	-5.77	29.55	0.00
239	LD	L40 4010	PASS	AISC- H1-3	0.128	23
			6941.29 C	-44.50	21.38	1.27
240	LD	L40 4010	PASS	AISC- H1-3	0.128	24
			8083.12 C	-2.07	30.82	1.27
241	LD	L40 4010	PASS	AISC- H1-3	0.150	24
			8436.55 C	2.33	-51.04	1.27
242	LD	L40 4010	PASS	AISC- H1-3	0.165	24
			9137.11 C	6.22	56.18	0.00
243	LD	L40 4010	PASS	AISC- H1-3	0.149	24
			9966.55 C	9.25	-22.30	0.64
244	LD	L40 4010	PASS	AISC- H1-1	0.244	22
			12142.69 C	63.21	85.56	1.27
245	LD	L30 308	PASS	AISC- H2-1	0.164	22
			5787.06 T	50.22	0.19	0.00
246	LD	L30 308	PASS	AISC- H1-3	0.186	22
			4866.00 C	-6.59	37.63	0.00
247	LD	L30 308	PASS	AISC- H1-3	0.097	21
			2078.85 C	-30.84	7.13	0.00
248	LD	L30 308	PASS	AISC- H1-3	0.090	22
			2215.15 C	-4.61	15.04	0.00
249	LD	L30 308	PASS	AISC- H2-1	0.150	22
			1367.09 T	-64.38	27.90	2.20
250	LD	L30 308	PASS	AISC- H1-3	0.231	22
			2789.55 C	66.80	35.38	0.00
251	LD	L30 308	PASS	AISC- H1-3	0.118	21
			1515.13 C	-6.62	23.13	0.00
252	LD	L30 308	PASS	AISC- H1-3	0.128	22
			1630.79 C	-3.01	24.84	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
255	LD	L40 4010	PASS	AISC- H2-1	0.077	22
			2050.41 T	-4.68	61.74	0.00
256	LD	L30 308	PASS	AISC- H1-3	0.132	22
			1684.67 C	-3.08	25.16	3.05
257	LD	L30 308	PASS	AISC- H1-3	0.122	21
			1583.83 C	-6.92	23.51	2.93
258	LD	L30 308	PASS	AISC- H1-3	0.233	22
			2849.71 C	66.44	35.41	2.37
259	LD	L30 308	PASS	AISC- H2-1	0.151	22
			1440.00 T	-64.13	27.99	0.00
260	LD	L30 308	PASS	AISC- H1-3	0.092	22
			2288.97 C	-4.62	15.28	1.73
261	LD	L30 308	PASS	AISC- H1-3	0.100	21
			2173.75 C	-30.78	7.72	1.47
262	LD	L30 308	PASS	AISC- H1-3	0.188	22
			4966.85 C	-6.61	37.73	1.21
263	LD	L30 308	PASS	AISC- H2-1	0.167	22
			5910.74 T	49.67	-0.87	0.73
264	LD	L40 4010	PASS	AISC- H1-3	0.239	22
			2336.15 C	150.35	148.70	0.00
277	LD	L40 4010	PASS	AISC- H2-1	0.111	22
			4627.40 T	105.08	-5.86	0.78
278	LD	L40 4010	PASS	AISC- H2-1	0.100	22
			4598.16 T	17.87	47.93	1.81
280	LD	L40 4010	PASS	AISC- H2-1	0.095	22
			4238.51 T	18.40	46.28	0.00
281	LD	L40 4010	PASS	AISC- H1-3	0.077	23
			3552.33 C	-25.20	18.64	1.81
283	LD	L40 4010	PASS	AISC- H2-1	0.077	22
			1986.21 T	-4.71	62.36	1.81
285	LD	L40 4010	PASS	AISC- H1-3	0.086	21
			3773.66 C	51.13	8.60	0.00
286	LD	L30 308	PASS	AISC- H1-3	0.041	22
			147.96 C	-14.06	11.55	1.00
287	LD	L30 308	PASS	AISC- H1-3	0.140	22
			3508.76 C	-9.83	15.85	0.00
288	LD	L30 308	PASS	AISC- H2-1	0.099	22
			1584.94 T	56.83	3.32	0.00
289	LD	L30 308	PASS	AISC- H1-3	0.128	22
			3161.79 C	-5.57	17.29	0.00
290	LD	L30 308	PASS	AISC- H1-3	0.042	22
			140.04 C	15.32	11.56	1.00

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293	LD	L30 308	PASS	AISC- H1-3	0.130	22
			3218.96 C	5.80	17.16	0.00
294	LD	L40 4010	PASS	AISC- H1-3	0.241	22
			2335.94 C	151.00	150.21	2.35
295	LD	L40 4010	PASS	AISC- H2-1	0.210	21
			10215.60 T	13.92	107.28	0.78
296	UPT	PIPX180	PASS	AISC- H1-2	0.631	21
			254539.72 C	0.00	5933.20	0.00
297	UPT	PIPX180	PASS	AISC- H1-1	0.587	21
			265422.34 C	0.00	2156.99	0.00
298	UPT	PIPX180	PASS	AISC- H1-1	0.572	21
			267649.84 C	0.00	887.48	0.00
299	UPT	PIPX180	PASS	AISC- H1-1	0.578	21
			268929.34 C	0.00	1135.49	1.00
300	UPT	PIPX180	PASS	AISC- H1-2	0.628	21
			269598.59 C	0.00	4016.94	1.00
301	LD	L40 4010	PASS	AISC- H1-1	0.431	21
			25824.96 C	11.46	132.08	0.00
302	LD	L40 4010	PASS	AISC- H1-1	0.212	22
			12724.11 C	55.59	35.78	0.00
303	LD	L40 4010	PASS	AISC- H1-1	0.186	22
			13093.44 C	20.21	16.99	0.00
304	LD	L40 4010	PASS	AISC- H1-1	0.212	22
			13124.09 C	-2.19	-63.37	1.27
305	LD	L40 4010	PASS	AISC- H1-1	0.213	22
			13184.01 C	-9.16	59.33	0.00
306	LD	L40 4010	PASS	AISC- H1-1	0.195	22
			13429.04 C	-15.81	-26.05	1.16
307	LD	L40 4010	PASS	AISC- H1-1	0.268	22
			16200.82 C	34.75	64.66	1.27
308	LD	L40 4010	PASS	AISC- H1-1	0.275	21
			18803.05 C	-13.31	-43.30	0.11
309	LD	L40 4010	PASS	AISC- H1-1	0.265	21
			17152.67 C	-13.03	59.09	1.27
310	LD	L40 4010	PASS	AISC- H1-1	0.238	21
			15693.39 C	-13.05	-46.90	0.00
311	LD	L40 4010	PASS	AISC- H1-1	0.215	21
			15053.55 C	6.88	30.66	0.00
312	LD	L40 4010	PASS	AISC- H1-1	0.205	21
			12672.62 C	47.02	33.57	1.27
313	LD	L30 308	PASS	AISC- H2-1	0.197	21
			7918.79 T	-15.64	17.47	0.00

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316 LD	L30 308	PASS	AISC- H1-3	0.096	21
		2147.01 C	2.47	20.68	0.00
317 LD	L30 308	PASS	AISC- H2-1	0.106	24
		873.53 T	38.55	24.92	2.20
318 LD	L30 308	PASS	AISC- H1-3	0.144	24
		1577.25 C	-40.51	25.41	0.00
319 LD	L30 308	PASS	AISC- H1-3	0.078	23
		746.99 C	4.25	21.50	0.00
320 LD	L30 308	PASS	AISC- H1-3	0.098	21
		1081.74 C	0.70	24.09	0.00
321 LD	L40 4010	PASS	AISC- H2-1	0.075	21
		4147.79 T	0.11	35.12	0.00
322 LD	L40 4010	PASS	AISC- H1-3	0.115	21
		1628.29 C	-7.89	106.92	0.00
323 LD	L40 4010	PASS	AISC- H2-1	0.062	24
		1192.82 T	2.98	56.09	0.00
324 LD	L30 308	PASS	AISC- H1-3	0.075	24
		758.98 C	1.60	19.37	3.05
325 LD	L30 308	PASS	AISC- H1-3	0.073	22
		369.73 C	-14.58	21.50	2.93
326 LD	L30 308	PASS	AISC- H1-3	0.153	24
		1463.58 C	-40.90	32.26	2.37
327 LD	L30 308	PASS	AISC- H2-1	0.103	24
		678.07 T	39.43	24.64	0.00
328 LD	L30 308	PASS	AISC- H1-3	0.058	24
		1281.14 C	3.22	11.66	1.73
329 LD	L30 308	PASS	AISC- H2-1	0.074	24
		1545.75 T	-20.25	12.13	1.47
330 LD	L30 308	PASS	AISC- H1-3	0.151	24
		3598.06 C	6.04	34.26	1.21
331 LD	L30 308	PASS	AISC- H2-1	0.139	24
		4227.90 T	-36.43	10.28	0.73
332 LD	L40 4010	PASS	AISC- H1-3	0.204	24
		1339.25 C	-91.79	161.65	0.00
333 LD	L40 4010	PASS	AISC- H2-1	0.184	23
		392.58 T	85.32	161.12	2.35
335 LD	L40 4010	PASS	AISC- H2-1	0.186	21
		10264.99 T	13.17	78.48	0.00
336 LD	L40 4010	PASS	AISC- H1-3	0.158	22
		7313.23 C	16.58	58.69	1.81
338 LD	L40 4010	PASS	AISC- H2-1	0.151	22
		6656.03 T	-6.29	88.13	0.00

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343 LD	L40 4010	PASS	AISC- H2-1	0.060	24
		2687.51 T	-27.77	18.99	1.86
344 LD	L30 308	PASS	AISC- H2-1	0.047	22
		149.46 T	-37.75	0.78	0.00
345 LD	L30 308	PASS	AISC- H1-3	0.119	21
		2587.81 C	3.90	21.89	0.00
346 LD	L30 308	PASS	AISC- H2-1	0.100	21
		1161.29 T	-65.09	2.80	0.00
347 LD	L30 308	PASS	AISC- H1-3	0.117	21
		2362.29 C	5.90	23.27	0.00
348 LD	L30 308	PASS	AISC- H2-1	0.059	21
		96.86 T	50.16	-0.46	0.00
349 LD	L30 308	PASS	AISC- H1-3	0.091	24
		1968.33 C	-4.27	16.19	0.00
350 LD	L30 308	PASS	AISC- H2-1	0.067	24
		861.56 T	42.33	1.66	0.00
351 LD	L30 308	PASS	AISC- H1-3	0.082	24
		1664.88 C	-4.25	15.78	0.00
352 LD	L40 4010	PASS	AISC- H2-1	0.143	22
		6299.42 T	-5.89	84.44	0.78
353 LD	L40 4010	PASS	AISC- H1-1	0.264	22
		15861.83 C	35.13	65.07	0.00
354 LD	L40 4010	PASS	AISC- H1-1	0.197	21
		12095.19 C	47.56	32.44	0.00
355 LD	L40 4010	PASS	AISC- H1-1	0.189	22
		12983.72 C	-14.57	-25.77	0.00
356 LD	L40 4010	PASS	AISC- H1-1	0.206	22
		12679.81 C	-7.86	58.29	1.27
357 LD	L40 4010	PASS	AISC- H1-1	0.205	22
		12588.91 C	-0.79	-62.78	0.00
358 LD	L40 4010	PASS	AISC- H1-1	0.179	22
		12568.14 C	-6.08	25.30	0.00
359 LD	L40 4010	PASS	AISC- H1-1	0.204	22
		12146.70 C	56.17	34.65	1.27
360 LD	L40 4010	PASS	AISC- H1-1	0.209	21
		14493.32 C	7.60	31.48	1.27
361 LD	L40 4010	PASS	AISC- H1-1	0.230	21
		15158.18 C	-11.70	-46.30	1.27
362 LD	L40 4010	PASS	AISC- H1-1	0.258	21
		16648.67 C	-11.80	58.04	0.00
363 LD	L40 4010	PASS	AISC- H1-1	0.268	21
		18351.82 C	-13.17	-42.57	1.06

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366	LD L30 308	PASS	AISC- H1-3	0.153	23
		3595.63 C	7.53	34.31	0.00
367	LD L30 308	PASS	AISC- H2-1	0.055	22
		382.10 T	-13.71	17.57	0.00
368	LD L30 308	PASS	AISC- H1-3	0.055	23
		1258.86 C	1.00	11.63	0.00
369	LD L30 308	PASS	AISC- H1-3	0.062	29
		305.89 C	8.52	23.11	2.20
370	LD L30 308	PASS	AISC- H1-3	0.109	23
		1471.87 C	-1.65	31.79	0.00
371	LD L30 308	PASS	AISC- H1-3	0.070	22
		301.24 C	-14.88	21.13	0.00
372	LD L30 308	PASS	AISC- H1-3	0.072	23
		739.39 C	0.13	19.40	0.00
373	LD L40 4010	PASS	AISC- H2-1	0.058	22
		69.26 T	-44.97	40.40	0.00
374	LD L40 4010	PASS	AISC- H1-3	0.111	21
		1628.30 C	-8.28	102.32	1.57
375	LD L40 4010	PASS	AISC- H2-1	0.097	21
		2051.91 T	-8.12	84.03	0.00
376	LD L30 308	PASS	AISC- H1-3	0.101	21
		1135.96 C	0.78	24.42	3.05
377	LD L30 308	PASS	AISC- H1-3	0.083	24
		723.03 C	-9.44	21.30	2.93
378	LD L30 308	PASS	AISC- H1-3	0.143	21
		2140.75 C	-1.04	39.21	2.37
379	LD L30 308	PASS	AISC- H2-1	0.070	21
		1277.75 T	0.42	24.67	0.00
380	LD L30 308	PASS	AISC- H1-3	0.098	21
		2220.75 C	2.49	20.92	1.73
381	LD L30 308	PASS	AISC- H2-1	0.086	21
		2794.10 T	0.99	17.84	1.47
382	LD L30 308	PASS	AISC- H1-1	0.272	21
		6839.50 C	15.92	62.12	1.21
383	LD L30 308	PASS	AISC- H2-1	0.197	21
		8042.34 T	-15.09	16.40	0.73
384	LD L40 4010	PASS	AISC- H1-3	0.177	20
		631.95 C	-3.76	198.23	0.00
387	LD L40 4010	PASS	AISC- H2-1	0.118	23
		6261.88 T	9.35	52.05	0.00
388	LD L40 4010	PASS	AISC- H1-3	0.115	21
		6104.44 C	-44.44	-10.13	1.36

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393	LD L40 4010	PASS	AISC- H2-1	0.062	23
		1198.67 T	-4.43	55.82	1.81
395	LD L40 4010	PASS	AISC- H2-1	0.077	21
		4261.68 T	-0.51	34.90	1.86
396	LD L40 4010	PASS	AISC- H1-3	0.177	20
		631.96 C	-3.56	198.27	2.35
397	LD L30 308	PASS	AISC- H2-1	0.057	21
		88.91 T	-48.14	-0.43	0.00
398	LD L30 308	PASS	AISC- H1-3	0.087	23
		1951.78 C	0.93	16.19	0.00
399	LD L30 308	PASS	AISC- H2-1	0.066	23
		853.89 T	-42.15	1.42	0.00
400	LD L30 308	PASS	AISC- H1-3	0.081	23
		1650.10 C	3.73	15.81	0.00
401	LD L30 308	PASS	AISC- H2-1	0.044	22
		141.52 T	35.73	0.76	0.00
402	LD L30 308	PASS	AISC- H1-3	0.120	21
		2647.85 C	-4.29	21.63	0.00
403	LD L30 308	PASS	AISC- H2-1	0.100	21
		1188.80 T	64.78	2.96	0.00
404	LD L30 308	PASS	AISC- H1-3	0.119	21
		2419.30 C	-6.12	23.14	0.00
405	LD L40 4010	PASS	AISC- H2-1	0.098	20
		3.24 T	0.01	-117.04	2.27
406	LD L40 4010	PASS	AISC- H2-1	0.098	20
		3.24 T	0.01	-117.04	2.27
407	LD L40 4010	PASS	AISC- H2-1	0.098	20
		3.25 T	-0.01	-117.06	2.28
408	LD L40 4010	PASS	AISC- H1-3	0.076	21
		296.01 C	3.57	77.22	0.00
409	LD L40 4010	PASS	AISC- H1-3	0.068	23
		190.39 C	3.81	71.47	0.00
410	LD L40 4010	PASS	AISC- H1-3	0.075	21
		295.95 C	3.18	76.05	4.40
411	LD L40 4010	PASS	AISC- H2-1	0.143	22
		6028.86 T	-7.64	86.68	0.73
412	LD L40 4010	PASS	AISC- H2-1	0.109	22
		4187.62 T	112.74	-3.52	0.00
413	LD L40 4010	PASS	AISC- H2-1	0.209	21
		9915.30 T	12.71	110.16	0.73
414	UPT PIPX180	PASS	AISC- H1-2	0.574	21
		230219.31 C	0.00	5517.95	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
417	UPT	PIPX180	PASS	AISC- H1-1	0.526	21
			244550.16 C	0.00	1062.72	1.00
418	UPT	PIPX180	PASS	AISC- H1-2	0.565	21
			245241.95 C	0.00	3335.57	1.00
419	UPT	PIPX180	PASS	AISC- H1-2	0.314	22
			125770.91 C	0.00	3024.34	0.00
420	UPT	PIPX180	PASS	AISC- H1-1	0.291	22
			131655.38 C	0.00	1094.61	0.00
421	UPT	PIPX180	PASS	AISC- H1-1	0.288	22
			132655.03 C	0.00	757.18	1.00
422	UPT	PIPX180	PASS	AISC- H1-1	0.294	22
			133408.94 C	0.00	1029.44	1.00
423	UPT	PIPX180	PASS	AISC- H1-2	0.335	22
			133663.55 C	0.00	3302.18	1.00
424	UPT	PIPX180	PASS	AISC- H1-2	0.314	22
			125771.79 C	0.00	3031.26	0.00
425	UPT	PIPX180	PASS	AISC- H1-1	0.291	22
			131656.38 C	0.00	1102.71	0.00
426	UPT	PIPX180	PASS	AISC- H1-1	0.288	22
			132655.88 C	0.00	772.98	1.00
427	UPT	PIPX180	PASS	AISC- H1-1	0.294	22
			133409.88 C	0.00	1006.98	1.00
428	UPT	PIPX180	PASS	AISC- H1-2	0.333	22
			133664.64 C	0.00	3183.91	1.00
429	LD	L40 4010	PASS	AISC- H1-1	0.419	21
			25673.26 C	11.34	121.37	0.00
430	LD	L40 4010	PASS	AISC- H1-1	0.213	22
			12909.21 C	50.44	39.30	0.00
431	LD	L40 4010	PASS	AISC- H1-1	0.275	21
			18081.88 C	-13.77	-43.04	0.00
432	LD	L40 4010	PASS	AISC- H1-1	0.265	21
			17324.43 C	-17.29	54.28	1.24
433	LD	L40 4010	PASS	AISC- H1-1	0.236	21
			15863.23 C	-16.38	-40.97	0.00
434	LD	L40 4010	PASS	AISC- H1-1	0.213	21
			15234.94 C	7.82	25.75	0.00
435	LD	L40 4010	PASS	AISC- H1-1	0.206	21
			12843.49 C	40.86	36.88	1.24
436	LD	L40 4010	PASS	AISC- H1-1	0.186	22
			13192.13 C	15.77	18.83	0.00
437	LD	L40 4010	PASS	AISC- H1-1	0.209	22
			13176.03 C	4.07	-57.72	1.24

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
440	LD	L40 4010	PASS	AISC- H1-1	0.257	22
			15897.95 C	35.02	56.87	1.24
441	LD	L30 308	PASS	AISC- H2-1	0.194	21
			7312.17 T	-15.80	21.42	0.00
442	LD	L30 308	PASS	AISC- H1-3	0.270	21
			6529.16 C	15.84	57.66	0.00
443	LD	L30 308	PASS	AISC- H2-1	0.083	21
			2423.89 T	0.23	20.13	0.00
444	LD	L30 308	PASS	AISC- H1-3	0.090	21
			1997.49 C	3.10	19.68	0.00
445	LD	L30 308	PASS	AISC- H2-1	0.107	24
			834.98 T	43.57	22.73	2.05
446	LD	L30 308	PASS	AISC- H1-3	0.142	24
			1603.90 C	-44.51	22.98	0.00
447	LD	L30 308	PASS	AISC- H1-3	0.072	23
			783.50 C	4.37	19.61	0.00
448	LD	L30 308	PASS	AISC- H1-3	0.088	21
			1075.67 C	0.53	22.16	0.00
449	LD	L40 4010	PASS	AISC- H2-1	0.075	21
			3860.70 T	1.60	37.24	0.00
450	LD	L40 4010	PASS	AISC- H1-3	0.121	21
			1632.09 C	-11.90	112.34	0.00
451	LD	L40 4010	PASS	AISC- H2-1	0.060	24
			1078.16 T	4.57	54.33	0.00
452	LD	L30 308	PASS	AISC- H1-3	0.067	24
			772.37 C	1.51	17.60	2.86
453	LD	L30 308	PASS	AISC- H1-3	0.075	22
			434.98 C	-17.96	19.98	2.73
454	LD	L30 308	PASS	AISC- H1-3	0.150	24
			1457.11 C	-44.74	29.75	2.24
455	LD	L30 308	PASS	AISC- H2-1	0.102	24
			601.39 T	44.51	21.99	0.00
456	LD	L30 308	PASS	AISC- H1-3	0.055	24
			1205.99 C	4.03	10.98	1.65
457	LD	L30 308	PASS	AISC- H2-1	0.075	24
			1411.93 T	-22.07	12.64	1.37
458	LD	L30 308	PASS	AISC- H1-3	0.141	24
			3395.21 C	6.08	31.41	1.18
459	LD	L30 308	PASS	AISC- H2-1	0.138	24
			3775.28 T	-39.31	12.49	0.68
460	LD	L40 4010	PASS	AISC- H1-3	0.193	24
			1362.33 C	-100.99	143.59	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
465	LD	L40 4010	PASS	AISC- H2-1	0.151	22
			6408.67 T	-8.17	90.88	0.00
466	LD	L40 4010	PASS	AISC- H2-1	0.116	22
			6488.17 T	-9.44	46.43	1.68
468	LD	L40 4010	PASS	AISC- H2-1	0.095	21
			1791.68 T	-10.05	83.25	1.68
470	LD	L40 4010	PASS	AISC- H1-3	0.066	22
			281.36 C	-51.69	41.74	1.73
471	LD	L40 4010	PASS	AISC- H2-1	0.176	23
			444.09 T	97.37	143.12	2.20
472	LD	L30 308	PASS	AISC- H2-1	0.050	22
			179.70 T	-39.96	0.79	0.00
473	LD	L30 308	PASS	AISC- H1-3	0.110	21
			2473.38 C	4.37	20.18	0.00
474	LD	L30 308	PASS	AISC- H2-1	0.096	21
			1179.94 T	-61.18	2.62	0.00
475	LD	L30 308	PASS	AISC- H1-3	0.110	21
			2307.94 C	5.74	21.72	0.00
476	LD	L30 308	PASS	AISC- H2-1	0.063	21
			122.86 T	52.38	1.01	0.00
477	LD	L30 308	PASS	AISC- H1-3	0.084	24
			1900.18 C	-4.49	14.66	0.00
478	LD	L30 308	PASS	AISC- H2-1	0.065	24
			884.72 T	40.02	1.77	0.00
479	LD	L30 308	PASS	AISC- H1-3	0.077	24
			1644.98 C	-4.11	14.52	0.00
480	LD	L40 4010	PASS	AISC- H1-1	0.415	21
			25320.68 C	-11.53	121.95	0.00
481	LD	L40 4010	PASS	AISC- H1-1	0.205	22
			12268.55 C	-51.03	37.86	0.00
482	LD	L40 4010	PASS	AISC- H1-1	0.243	22
			12474.32 C	64.38	78.50	0.00
483	LD	L40 4010	PASS	AISC- H1-3	0.133	24
			6957.19 C	-51.94	22.61	0.00
484	LD	L40 4010	PASS	AISC- H1-1	0.268	21
			18402.46 C	12.57	-42.72	0.00
485	LD	L40 4010	PASS	AISC- H1-1	0.256	21
			16776.80 C	15.69	53.05	1.24
486	LD	L40 4010	PASS	AISC- H1-1	0.227	21
			15277.37 C	14.66	-40.24	0.00
487	LD	L40 4010	PASS	AISC- H1-1	0.204	21
			14618.33 C	-8.66	26.68	0.00

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490	LD	L40 4010	PASS	AISC- H1-1	0.202	22
			12590.27 C	-5.63	-56.99	1.24
491	LD	L40 4010	PASS	AISC- H1-1	0.198	22
			12618.35 C	3.69	52.44	0.00
492	LD	L40 4010	PASS	AISC- H1-1	0.189	22
			12867.94 C	20.60	-26.11	1.24
493	LD	L40 4010	PASS	AISC- H1-1	0.253	22
			15545.54 C	-35.09	57.45	1.24
494	LD	L30 308	PASS	AISC- H2-1	0.193	21
			7449.20 T	15.13	20.14	0.00
495	LD	L30 308	PASS	AISC- H1-3	0.273	21
			6646.83 C	-15.88	57.76	0.00
496	LD	L30 308	PASS	AISC- H2-1	0.084	21
			2534.92 T	-0.34	19.41	0.00
497	LD	L30 308	PASS	AISC- H1-3	0.093	21
			2085.19 C	-3.13	19.97	0.00
498	LD	L30 308	PASS	AISC- H2-1	0.065	23
			819.29 T	-7.44	22.31	2.05
499	LD	L30 308	PASS	AISC- H1-3	0.133	21
			2107.21 C	-0.15	36.58	0.00
500	LD	L30 308	PASS	AISC- H1-3	0.078	24
			755.98 C	11.09	19.38	0.00
501	LD	L30 308	PASS	AISC- H1-3	0.091	21
			1140.00 C	-0.63	22.55	0.00
502	LD	L40 4010	PASS	AISC- H2-1	0.076	21
			4001.41 T	-1.06	36.89	0.00
503	LD	L40 4010	PASS	AISC- H1-3	0.117	21
			1631.49 C	12.29	107.04	0.00
504	LD	L40 4010	PASS	AISC- H2-1	0.060	23
			1082.59 T	4.85	53.98	0.00
505	LD	L30 308	PASS	AISC- H1-3	0.065	23
			749.58 C	0.00	17.64	2.86
506	LD	L30 308	PASS	AISC- H1-3	0.071	22
			354.19 C	18.27	19.53	2.73
507	LD	L30 308	PASS	AISC- H1-3	0.100	23
			1468.30 C	0.84	29.20	2.24
508	LD	L30 308	PASS	AISC- H2-1	0.060	21
			140.95 T	-13.57	22.44	0.00
509	LD	L30 308	PASS	AISC- H1-3	0.051	23
			1176.90 C	-0.84	10.95	1.65
510	LD	L30 308	PASS	AISC- H2-1	0.059	22
			279.02 T	17.65	18.35	1.37

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MEMBER	TABLE		RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
513	LD	L40 4010	PASS	AISC- H1-3	0.155	20
			613.36 C	2.14	173.14	0.00
514	LD	L40 4010	PASS	AISC- H1-3	0.155	20
			613.13 C	1.97	173.12	2.20
516	LD	L40 4010	PASS	AISC- H2-1	0.201	21
			9536.16 T	13.37	105.95	0.00
517	LD	L40 4010	PASS	AISC- H2-1	0.177	21
			9586.67 T	12.60	76.30	1.68
519	LD	L40 4010	PASS	AISC- H2-1	0.113	23
			5983.73 T	8.44	50.46	0.00
520	LD	L40 4010	PASS	AISC- H1-3	0.119	21
			5990.37 C	-59.56	-9.58	1.54
522	LD	L40 4010	PASS	AISC- H2-1	0.095	21
			1872.09 T	10.03	82.67	1.68
524	LD	L40 4010	PASS	AISC- H1-3	0.064	22
			141.07 C	52.34	41.39	1.73
525	LD	L30 308	PASS	AISC- H2-1	0.047	22
			169.89 T	37.60	0.76	0.00
526	LD	L30 308	PASS	AISC- H1-3	0.112	21
			2547.76 C	-4.85	19.91	0.00
527	LD	L30 308	PASS	AISC- H2-1	0.096	21
			1215.88 T	61.03	2.82	0.00
528	LD	L30 308	PASS	AISC- H1-3	0.112	21
			2378.44 C	-5.95	21.61	0.00
529	LD	L30 308	PASS	AISC- H2-1	0.060	21
			113.06 T	-50.02	0.97	0.00
530	LD	L30 308	PASS	AISC- H1-3	0.080	23
			1881.99 C	1.18	14.65	0.00
531	LD	L30 308	PASS	AISC- H2-1	0.063	23
			875.83 T	-39.80	1.32	0.00
532	LD	L30 308	PASS	AISC- H1-3	0.075	23
			1628.63 C	3.30	14.56	0.00
533	LD	L40 4010	PASS	AISC- H1-3	0.123	24
			8051.49 C	-1.54	26.31	1.24
534	LD	L40 4010	PASS	AISC- H1-3	0.143	24
			8377.79 C	-1.22	-44.72	1.24
535	LD	L40 4010	PASS	AISC- H1-3	0.157	24
			9059.71 C	3.67	49.69	0.00
536	LD	L40 4010	PASS	AISC- H1-3	0.148	24
			9871.70 C	12.73	-20.95	0.93
537	LD	L40 4010	PASS	AISC- H1-1	0.239	22
			12121.90 C	64.22	79.08	1.24

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540	LD	L40 4010	PASS	AISC- H1-3	0.143	23
			8399.74 C	3.18	-43.54	0.00
541	LD	L40 4010	PASS	AISC- H1-3	0.125	23
			8086.61 C	-5.76	24.90	0.00
542	LD	L40 4010	PASS	AISC- H1-3	0.125	23
			6946.49 C	-35.80	22.72	1.24
543	LD	L30 308	PASS	AISC- H2-1	0.163	22
			5360.64 T	53.60	1.82	0.00
544	LD	L30 308	PASS	AISC- H1-3	0.178	22
			4733.68 C	-7.11	34.77	0.00
545	LD	L30 308	PASS	AISC- H2-1	0.096	22
			2657.64 T	30.77	6.51	0.00
546	LD	L30 308	PASS	AISC- H1-3	0.088	22
			2169.73 C	-6.11	14.47	0.00
547	LD	L30 308	PASS	AISC- H2-1	0.154	22
			1266.72 T	-73.44	25.42	2.05
548	LD	L30 308	PASS	AISC- H1-3	0.231	22
			2830.32 C	74.07	32.91	0.00
549	LD	L30 308	PASS	AISC- H1-3	0.106	21
			1546.64 C	-5.97	20.93	0.00
550	LD	L30 308	PASS	AISC- H1-3	0.117	22
			1661.29 C	-2.95	23.21	0.00
551	LD	L40 4010	PASS	AISC- H1-3	0.085	21
			3628.73 C	56.19	8.28	1.73
552	LD	L40 4010	PASS	AISC- H1-3	0.059	23
			519.43 C	2.91	60.98	0.00
553	LD	L40 4010	PASS	AISC- H1-3	0.077	21
			1224.22 C	54.88	38.28	1.68
554	LD	L30 308	PASS	AISC- H1-3	0.121	22
			1725.34 C	-3.04	23.60	2.86
555	LD	L30 308	PASS	AISC- H1-3	0.110	21
			1627.40 C	-6.26	21.38	2.73
556	LD	L30 308	PASS	AISC- H1-3	0.232	22
			2901.98 C	73.66	32.96	2.24
557	LD	L30 308	PASS	AISC- H2-1	0.155	22
			1352.57 T	-73.14	25.55	0.00
558	LD	L30 308	PASS	AISC- H1-3	0.091	22
			2257.84 C	-6.12	14.77	1.65
559	LD	L30 308	PASS	AISC- H1-3	0.097	21
			2140.10 C	-31.92	6.54	1.37
560	LD	L30 308	PASS	AISC- H1-3	0.180	22
			4850.95 C	-7.17	34.87	1.18

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563	LD	L40 4010	PASS	AISC- H1-3	0.232	22
			2422.12 C	-167.41	129.68	2.20
565	LD	L40 4010	PASS	AISC- H2-1	0.114	22
			4566.76 T	111.83	-5.64	0.73
566	LD	L40 4010	PASS	AISC- H2-1	0.100	22
			4537.82 T	19.98	46.56	1.68
568	LD	L40 4010	PASS	AISC- H2-1	0.094	22
			4154.81 T	20.60	44.72	0.00
569	LD	L40 4010	PASS	AISC- H2-1	0.082	22
			995.27 T	-33.66	-64.17	1.68
571	LD	L40 4010	PASS	AISC- H1-3	0.088	21
			3768.34 C	55.74	8.85	0.00
573	LD	L40 4010	PASS	AISC- H1-3	0.076	21
			1144.81 C	55.55	37.75	0.00
574	LD	L30 308	PASS	AISC- H1-3	0.040	22
			148.59 C	-14.32	11.06	1.00
575	LD	L30 308	PASS	AISC- H1-3	0.134	22
			3495.70 C	-10.22	14.23	0.00
576	LD	L30 308	PASS	AISC- H2-1	0.101	22
			1673.59 T	55.77	3.67	0.00
577	LD	L30 308	PASS	AISC- H1-3	0.124	22
			3192.39 C	-5.62	16.14	0.00
578	LD	L30 308	PASS	AISC- H1-3	0.041	22
			138.81 C	15.83	11.07	1.00
579	LD	L30 308	PASS	AISC- H1-3	0.136	22
			3569.91 C	10.69	13.95	0.00
580	LD	L30 308	PASS	AISC- H2-1	0.101	22
			1709.45 T	-55.62	3.87	0.00
581	LD	L30 308	PASS	AISC- H1-3	0.126	22
			3262.72 C	5.86	16.02	0.00
582	LD	L40 4010	PASS	AISC- H2-1	0.085	20
			1.64 T	0.03	-102.14	2.12
583	LD	L40 4010	PASS	AISC- H2-1	0.085	20
			2.16 T	-0.01	-102.14	2.13
584	LD	L40 4010	PASS	AISC- H2-1	0.085	20
			2.16 T	-0.01	-102.14	2.13
585	LD	L40 4010	PASS	AISC- H1-3	0.074	21
			324.62 C	4.19	74.13	0.00
586	LD	L40 4010	PASS	AISC- H1-3	0.064	23
			207.11 C	3.98	66.76	0.00
587	LD	L40 4010	PASS	AISC- H1-3	0.072	21
			324.53 C	3.66	72.85	4.10

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590	UPT	PIPX180	PASS	AISC- H1-1	0.466	21
			218369.56 C	0.00	716.00	0.00
591	UPT	PIPX180	PASS	AISC- H1-1	0.473	21
			219774.19 C	0.00	976.16	1.00
592	UPT	PIPX180	PASS	AISC- H1-2	0.503	21
			220401.94 C	0.00	2741.15	1.00
593	UPT	PIPX180	PASS	AISC- H1-2	0.281	22
			111855.27 C	0.00	2780.40	0.00
594	UPT	PIPX180	PASS	AISC- H1-1	0.262	22
			117578.75 C	0.00	1065.09	0.00
595	UPT	PIPX180	PASS	AISC- H1-1	0.258	22
			118539.44 C	0.00	685.36	1.00
596	UPT	PIPX180	PASS	AISC- H1-1	0.264	22
			119305.47 C	0.00	962.22	1.00
597	UPT	PIPX180	PASS	AISC- H1-2	0.300	22
			119545.99 C	0.00	2971.82	1.00
598	UPT	PIPX180	PASS	AISC- H1-2	0.280	22
			111854.02 C	0.00	2772.83	0.00
599	UPT	PIPX180	PASS	AISC- H1-1	0.261	22
			117577.07 C	0.00	1052.99	0.00
600	UPT	PIPX180	PASS	AISC- H1-1	0.257	22
			118537.98 C	0.00	668.88	1.00
601	UPT	PIPX180	PASS	AISC- H1-1	0.264	22
			119305.20 C	0.00	992.60	1.00
602	UPT	PIPX180	PASS	AISC- H1-2	0.303	22
			119547.55 C	0.00	3165.50	1.00
603	LD	L40 4010	PASS	AISC- H2-1	0.142	22
			5712.57 T	-7.75	88.97	0.68
604	LD	L40 4010	PASS	AISC- H2-1	0.108	22
			4102.27 T	114.49	-3.08	0.00
605	LD	L40 4010	PASS	AISC- H2-1	0.209	21
			9576.69 T	15.79	112.99	0.68
606	LD	L40 4010	PASS	AISC- H1-1	0.396	21
			24916.29 C	-7.82	108.47	0.00
607	LD	L40 4010	PASS	AISC- H1-1	0.203	22
			12311.22 C	-42.26	41.62	0.00
608	LD	L40 4010	PASS	AISC- H1-1	0.236	22
			12328.97 C	65.09	71.34	0.00
609	LD	L40 4010	PASS	AISC- H1-3	0.129	24
			6900.71 C	-43.19	24.14	0.00
610	LD	L40 4010	PASS	AISC- H1-1	0.245	22
			15435.88 C	-35.29	49.23	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
613 LD	L40 4010	PASS	AISC- H1-1	0.249	21
		16698.75 C	10.66	48.48	1.21
614 LD	L40 4010	PASS	AISC- H1-1	0.220	21
		15232.50 C	9.36	-35.26	0.00
615 LD	L40 4010	PASS	AISC- H1-1	0.199	21
		14602.70 C	-3.72	21.02	0.00
616 LD	L40 4010	PASS	AISC- H1-1	0.196	21
		12249.73 C	-33.72	38.61	1.21
617 LD	L40 4010	PASS	AISC- H1-1	0.175	22
		12518.83 C	-14.66	17.61	0.00
618 LD	L40 4010	PASS	AISC- H1-1	0.197	22
		12479.57 C	-7.62	-51.69	1.21
619 LD	L40 4010	PASS	AISC- H1-1	0.191	22
		12420.02 C	3.16	47.88	0.00
620 LD	L40 4010	PASS	AISC- H1-1	0.186	22
		12569.57 C	21.91	-26.13	1.21
621 LD	L40 4010	PASS	AISC- H1-1	0.241	22
		15058.87 C	-35.14	49.96	1.21
622 LD	L40 4010	PASS	AISC- H1-3	0.137	23
		9676.73 C	-0.73	-19.29	0.10
623 LD	L40 4010	PASS	AISC- H1-3	0.150	23
		8948.88 C	0.91	45.87	1.21
624 LD	L40 4010	PASS	AISC- H1-3	0.135	23
		8258.89 C	0.14	-37.96	0.00
625 LD	L40 4010	PASS	AISC- H1-3	0.120	23
		7971.18 C	-7.50	20.55	0.00
626 LD	L40 4010	PASS	AISC- H1-3	0.120	23
		6890.94 C	-27.03	24.25	1.21
627 LD	L40 4010	PASS	AISC- H1-3	0.119	24
		7930.86 C	-3.11	22.02	1.21
628 LD	L40 4010	PASS	AISC- H1-3	0.138	24
		8232.96 C	-5.75	-39.18	1.21
629 LD	L40 4010	PASS	AISC- H1-3	0.148	24
		8872.31 C	-0.86	44.18	0.00
630 LD	L40 4010	PASS	AISC- H1-3	0.142	24
		9642.30 C	11.71	-19.29	0.71
631 LD	L40 4010	PASS	AISC- H1-3	0.243	22
		11952.06 C	65.21	72.05	1.21
632 LD	L40 4010	PASS	AISC- H1-1	0.193	22
		13094.03 C	23.62	-26.57	0.00
633 LD	L40 4010	PASS	AISC- H1-1	0.201	22
		13027.57 C	5.02	49.36	1.21

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636 LD	L40 4010	PASS	AISC- H1-1	0.213	22
		13037.64 C	-41.61	43.52	1.21
637 LD	L40 4010	PASS	AISC- H1-1	0.206	21
		15293.55 C	-2.30	19.93	1.21
638 LD	L40 4010	PASS	AISC- H1-1	0.230	21
		15885.24 C	11.20	-36.15	1.21
639 LD	L40 4010	PASS	AISC- H1-1	0.258	21
		17303.08 C	12.43	49.95	0.00
640 LD	L40 4010	PASS	AISC- H1-1	0.270	21
		18826.74 C	11.50	-40.79	1.21
641 LD	L40 4010	PASS	AISC- H1-1	0.400	21
		25290.81 C	-7.88	107.74	1.21
642 LD	L30 308	PASS	AISC- H2-1	0.191	21
		6599.72 T	-17.15	26.08	0.00
643 LD	L30 308	PASS	AISC- H1-3	0.254	21
		6246.52 C	16.00	52.97	0.00
644 LD	L30 308	PASS	AISC- H2-1	0.083	21
		2252.38 T	-0.17	21.78	0.00
645 LD	L30 308	PASS	AISC- H1-3	0.085	21
		1904.24 C	3.15	18.68	0.00
646 LD	L30 308	PASS	AISC- H2-1	0.103	24
		804.61 T	44.17	20.55	1.90
647 LD	L30 308	PASS	AISC- H1-3	0.134	24
		1586.91 C	-44.12	20.50	0.00
648 LD	L30 308	PASS	AISC- H1-3	0.068	23
		814.86 C	5.46	17.88	0.00
649 LD	L30 308	PASS	AISC- H1-3	0.074	21
		966.99 C	0.51	19.78	0.00
650 LD	L40 4010	PASS	AISC- H2-1	0.073	21
		3408.19 T	1.97	40.97	0.00
651 LD	L40 4010	PASS	AISC- H1-3	0.126	21
		1517.92 C	-13.97	118.76	0.00
652 LD	L40 4010	PASS	AISC- H2-1	0.058	24
		951.90 T	7.39	51.91	0.00
653 LD	L30 308	PASS	AISC- H1-3	0.060	21
		763.34 C	-14.42	8.17	0.00
654 LD	L30 308	PASS	AISC- H1-3	0.076	22
		537.31 C	-19.65	18.90	2.53
655 LD	L30 308	PASS	AISC- H1-3	0.140	24
		1391.74 C	-43.57	27.05	2.10
656 LD	L30 308	PASS	AISC- H2-1	0.095	24
		502.49 T	44.31	19.18	0.00

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659	LD	L30 308	PASS	AISC- H1-3	0.130	24
			3219.50 C	5.93	28.34	1.16
660	LD	L30 308	PASS	AISC- H2-1	0.135	24
			3375.99 T	-40.23	14.46	0.63
661	LD	L40 4010	PASS	AISC- H1-3	0.177	24
			1323.76 C	-98.39	126.85	0.00
663	LD	L40 4010	PASS	AISC- H2-1	0.179	21
			9636.85 T	14.84	77.29	0.00
664	LD	L40 4010	PASS	AISC- H1-3	0.143	22
			7088.34 C	16.24	49.39	1.56
666	LD	L40 4010	PASS	AISC- H2-1	0.151	22
			6117.52 T	-8.46	93.88	0.00
667	LD	L40 4010	PASS	AISC- H2-1	0.112	22
			6202.93 T	-9.85	45.89	1.56
669	LD	L40 4010	PASS	AISC- H2-1	0.090	21
			1541.26 T	-10.76	80.76	1.56
671	LD	L40 4010	PASS	AISC- H1-3	0.074	22
			625.41 C	-55.37	43.50	1.61
672	LD	L30 308	PASS	AISC- H2-1	0.053	22
			213.53 T	-42.54	0.77	0.00
673	LD	L30 308	PASS	AISC- H1-3	0.098	21
			2234.67 C	4.72	18.30	0.00
674	LD	L30 308	PASS	AISC- H2-1	0.085	21
			1132.55 T	-55.78	0.91	0.00
675	LD	L30 308	PASS	AISC- H1-3	0.099	21
			2129.72 C	4.60	20.14	0.00
676	LD	L30 308	PASS	AISC- H2-1	0.066	21
			153.53 T	54.83	0.99	0.00
677	LD	L30 308	PASS	AISC- H1-3	0.075	24
			1758.62 C	-3.78	13.04	0.00
678	LD	L30 308	PASS	AISC- H2-1	0.061	24
			869.69 T	36.66	2.19	0.00
679	LD	L30 308	PASS	AISC- H1-3	0.070	24
			1549.86 C	-4.30	13.14	0.00
680	LD	L30 308	PASS	AISC- H2-1	0.190	21
			6750.03 T	16.30	24.52	0.00
681	LD	L30 308	PASS	AISC- H1-3	0.258	21
			6382.09 C	-16.08	53.08	0.00
682	LD	L30 308	PASS	AISC- H2-1	0.083	21
			2380.60 T	-0.11	20.90	0.00
683	LD	L30 308	PASS	AISC- H1-3	0.088	21
			2008.72 C	-3.23	19.04	0.00

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686	LD	L30 308	PASS	AISC- H1-3	0.072	24
			784.33 C	10.71	17.64	0.00
687	LD	L30 308	PASS	AISC- H1-3	0.078	21
			1045.44 C	-0.65	20.26	0.00
688	LD	L40 4010	PASS	AISC- H2-1	0.075	21
			3582.35 T	-2.15	40.44	0.00
689	LD	L40 4010	PASS	AISC- H1-3	0.121	21
			1525.18 C	14.35	112.48	0.00
690	LD	L40 4010	PASS	AISC- H2-1	0.056	23
			960.11 T	3.69	51.53	0.00
691	LD	L30 308	PASS	AISC- H1-3	0.059	21
			685.48 C	14.93	8.68	0.00
692	LD	L30 308	PASS	AISC- H1-3	0.072	22
			440.48 C	19.75	18.35	2.53
693	LD	L30 308	PASS	AISC- H1-3	0.091	23
			1405.59 C	-0.78	26.47	2.10
694	LD	L30 308	PASS	AISC- H2-1	0.059	21
			178.72 T	-14.88	20.83	0.00
695	LD	L30 308	PASS	AISC- H1-3	0.045	23
			1060.92 C	-0.59	10.12	1.57
696	LD	L30 308	PASS	AISC- H2-1	0.061	22
			114.52 T	19.83	19.41	1.27
697	LD	L30 308	PASS	AISC- H1-3	0.131	23
			3213.14 C	-6.92	28.41	1.16
698	LD	L30 308	PASS	AISC- H2-1	0.113	22
			2517.47 T	20.89	22.96	0.63
699	LD	L40 4010	PASS	AISC- H2-1	0.137	22
			574.81 T	-32.67	135.39	0.00
701	LD	L40 4010	PASS	AISC- H2-1	0.200	21
			9159.83 T	16.54	108.04	0.00
702	LD	L40 4010	PASS	AISC- H2-1	0.173	21
			9215.26 T	15.67	75.19	1.56
703	LD	L40 4010	PASS	AISC- H1-3	0.138	21
			1659.65 C	-0.88	135.82	2.05
705	LD	L40 4010	PASS	AISC- H2-1	0.107	23
			5667.91 T	7.14	48.48	0.00
706	LD	L40 4010	PASS	AISC- H1-3	0.121	21
			5798.06 C	-64.40	-13.00	1.56
708	LD	L40 4010	PASS	AISC- H2-1	0.091	21
			1638.23 T	10.71	80.24	1.56
710	LD	L40 4010	PASS	AISC- H1-3	0.071	22
			444.01 C	55.30	42.95	1.61

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713	LD	L30 308	PASS	AISC- H2-1	0.087	21
			1181.93 T	55.85	1.13	0.00
714	LD	L30 308	PASS	AISC- H1-3	0.101	21
			2221.30 C	-4.83	20.03	0.00
715	LD	L30 308	PASS	AISC- H2-1	0.063	21
			141.09 T	-51.99	0.95	0.00
716	LD	L30 308	PASS	AISC- H1-3	0.071	23
			1738.34 C	0.70	13.03	0.00
717	LD	L30 308	PASS	AISC- H2-1	0.060	23
			859.15 T	-36.43	1.48	0.00
718	LD	L30 308	PASS	AISC- H1-3	0.069	23
			1531.42 C	3.19	13.19	0.00
719	LD	L30 308	PASS	AISC- H2-1	0.160	22
			4883.24 T	55.68	3.62	0.00
720	LD	L30 308	PASS	AISC- H1-3	0.168	22
			4557.21 C	-7.97	31.59	0.00
721	LD	L30 308	PASS	AISC- H2-1	0.093	22
			2532.56 T	30.02	6.71	0.00
722	LD	L30 308	PASS	AISC- H1-3	0.085	22
			2124.71 C	-7.05	13.86	0.00
723	LD	L30 308	PASS	AISC- H2-1	0.151	22
			1193.47 T	-76.59	22.84	1.90
724	LD	L30 308	PASS	AISC- H1-3	0.222	22
			2787.18 C	75.99	30.27	0.00
725	LD	L30 308	PASS	AISC- H1-3	0.096	21
			1553.99 C	-6.36	18.77	0.00
726	LD	L30 308	PASS	AISC- H1-3	0.105	22
			1657.52 C	-2.60	21.43	0.00
727	LD	L40 4010	PASS	AISC- H2-1	0.084	22
			4527.73 T	-54.59	-6.65	1.61
728	LD	L40 4010	PASS	AISC- H1-3	0.060	23
			475.08 C	3.25	63.02	0.00
729	LD	L40 4010	PASS	AISC- H1-3	0.078	21
			1266.56 C	55.21	38.40	1.56
730	LD	L30 306	PASS	AISC- H1-3	0.110	22
			1738.19 C	-2.75	21.95	2.68
731	LD	L30 308	PASS	AISC- H1-3	0.101	21
			1654.21 C	-6.42	19.34	2.53
732	LD	L30 308	PASS	AISC- H1-3	0.224	22
			2874.25 C	75.60	30.34	2.10
733	LD	L30 306	PASS	AISC- H2-1	0.153	22
			1296.34 T	-76.43	23.02	0.00

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736	LD	L30 308	PASS	AISC- H1-3	0.171	22
			4692.67 C	-8.05	31.69	1.16
737	LD	L30 308	PASS	AISC- H2-1	0.159	22
			5034.01 T	54.90	2.05	0.63
738	LD	L40 4010	PASS	AISC- H1-3	0.220	22
			2368.13 C	-172.28	113.87	0.00
740	LD	L40 4010	PASS	AISC- H2-1	0.114	22
			4519.45 T	113.07	-5.79	0.68
741	LD	L40 4010	PASS	AISC- H2-1	0.098	22
			4491.74 T	20.90	44.74	1.56
743	LD	L40 4010	PASS	AISC- H2-1	0.097	22
			4070.26 T	21.85	42.72	0.00
744	LD	L40 4010	PASS	AISC- H2-1	0.087	22
			1051.70 T	-39.06	-65.59	1.56
745	LD	L40 4010	PASS	AISC- H1-3	0.218	22
			2368.36 C	189.38	-100.95	0.00
747	LD	L40 4010	PASS	AISC- H2-1	0.076	22
			1824.97 T	-9.94	60.56	1.56
749	LD	L40 4010	PASS	AISC- H1-3	0.087	21
			3746.09 C	56.61	9.46	0.00
750	LD	L30 308	PASS	AISC- H1-3	0.039	22
			149.65 C	-14.10	10.45	1.00
751	LD	L30 308	PASS	AISC- H1-3	0.124	22
			3375.86 C	-10.21	12.48	0.00
752	LD	L30 308	PASS	AISC- H2-1	0.102	22
			1712.56 T	53.28	5.71	0.00
753	LD	L30 308	PASS	AISC- H1-3	0.117	22
			3116.56 C	-5.92	14.83	0.00
754	LD	L30 308	PASS	AISC- H1-3	0.040	22
			137.12 C	15.20	10.88	1.00
755	LD	L30 308	PASS	AISC- H1-3	0.126	22
			3482.95 C	10.59	12.18	0.00
756	LD	L30 308	PASS	AISC- H2-1	0.101	22
			1767.33 T	-53.85	4.34	0.00
757	LD	L30 308	PASS	AISC- H1-3	0.119	22
			3216.55 C	5.87	14.76	0.00
758	LD	L40 4010	PASS	AISC- H2-1	0.163	23
			467.77 T	98.26	126.50	2.05
759	LD	L40 4010	PASS	AISC- H2-1	0.074	20
			0.89 T	0.00	-88.24	1.98
760	LD	L40 4010	PASS	AISC- H2-1	0.074	20
			0.90 T	0.00	-88.24	1.98

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763	LD L40 4010	PASS	AISC- H1-3	0.066	21
		340.68 C	3.67	66.98	3.80
764	LD L40 4010	PASS	AISC- H1-3	0.068	21
		340.87 C	4.75	68.40	0.00
765	LD L40 4010	PASS	AISC- H2-1	0.136	22
		5322.08 T	-0.13	91.94	0.63
766	LD L40 4010	PASS	AISC- H2-1	0.096	24
		4028.78 T	4.10	59.43	0.63
767	LD L40 4010	PASS	AISC- H2-1	0.198	21
		8136.18 T	26.12	112.17	0.64
768	UPT PIPX180	PASS	AISC- H1-2	0.455	21
		180824.78 C	0.00	4559.34	0.00
769	UPT PIPX180	PASS	AISC- H1-1	0.425	21
		190767.28 C	0.00	1781.22	0.00
770	UPT PIPX180	PASS	AISC- H1-1	0.409	21
		192784.70 C	0.00	478.31	0.00
771	UPT PIPX180	PASS	AISC- H1-1	0.421	21
		194287.50 C	0.00	1027.16	1.00
772	UPT PIPX180	PASS	AISC- H1-1	0.427	21
		194101.45 C	0.00	1466.23	1.00
773	UPT PIPX180	PASS	AISC- H1-2	0.246	22
		97734.04 C	0.00	2471.90	0.00
774	UPT PIPX180	PASS	AISC- H1-1	0.229	22
		103102.45 C	0.00	895.88	0.00
775	UPT PIPX180	PASS	AISC- H1-1	0.226	22
		104014.85 C	0.00	564.19	1.00
776	UPT PIPX180	PASS	AISC- H1-1	0.231	22
		104839.90 C	0.00	774.49	1.00
777	UPT PIPX180	PASS	AISC- H1-2	0.250	22
		104244.10 C	0.00	1971.89	1.00
778	UPT PIPX180	PASS	AISC- H1-2	0.246	22
		97734.16 C	0.00	2480.26	0.00
779	UPT PIPX180	PASS	AISC- H1-1	0.229	22
		103092.64 C	0.00	910.33	0.00
780	UPT PIPX180	PASS	AISC- H1-1	0.227	22
		104003.96 C	0.00	647.59	1.00
781	UPT PIPX180	PASS	AISC- H1-1	0.230	22
		104839.12 C	0.00	773.33	1.00
782	UPT PIPX180	PASS	AISC- H1-2	0.249	22
		104281.77 C	0.00	1906.57	1.00
783	LD L40 4010	PASS	AISC- H1-1	0.229	22
		12317.31 C	65.17	62.84	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
786	LD L40 4010	PASS	AISC- H1-1	0.206	21
		13035.04 C	23.93	45.36	0.00
787	LD L40 4010	PASS	AISC- H1-1	0.375	21
		24276.09 C	-6.81	94.08	0.00
788	LD L40 4010	PASS	AISC- H1-1	0.188	22
		12298.00 C	6.43	44.47	0.00
789	LD L40 4010	PASS	AISC- H1-3	0.134	23
		9451.65 C	-3.73	-18.24	0.20
790	LD L40 4010	PASS	AISC- H1-3	0.145	23
		8795.79 C	-3.20	41.36	1.18
791	LD L40 4010	PASS	AISC- H1-3	0.131	23
		8136.48 C	-5.87	-32.29	0.00
792	LD L40 4010	PASS	AISC- H1-3	0.112	23
		7874.76 C	-3.51	15.39	0.00
793	LD L40 4010	PASS	AISC- H1-3	0.119	23
		6871.52 C	22.68	25.73	1.18
794	LD L40 4010	PASS	AISC- H1-3	0.113	24
		7886.77 C	0.58	17.45	1.18
795	LD L40 4010	PASS	AISC- H1-3	0.136	24
		8155.94 C	-13.16	-33.85	1.18
796	LD L40 4010	PASS	AISC- H1-3	0.145	24
		8746.90 C	-6.24	39.39	0.00
797	LD L40 4010	PASS	AISC- H1-3	0.136	24
		9458.79 C	7.02	-18.00	0.99
798	LD L40 4010	PASS	AISC- H1-3	0.237	22
		11962.34 C	66.23	64.08	1.18
799	LD L40 4010	PASS	AISC- H1-1	0.186	22
		12722.21 C	20.55	-26.19	0.00
800	LD L40 4010	PASS	AISC- H1-1	0.192	22
		12742.23 C	-1.61	45.26	1.18
801	LD L40 4010	PASS	AISC- H1-1	0.204	22
		12964.20 C	-15.31	-48.93	0.00
802	LD L40 4010	PASS	AISC- H1-1	0.182	22
		13096.74 C	9.93	20.51	1.18
803	LD L40 4010	PASS	AISC- H1-1	0.198	22
		13055.09 C	5.46	46.27	1.18
804	LD L40 4010	PASS	AISC- H1-1	0.201	21
		15348.28 C	4.62	11.00	0.00
805	LD L40 4010	PASS	AISC- H1-1	0.221	21
		15973.35 C	3.04	-29.63	1.18
806	LD L40 4010	PASS	AISC- H1-1	0.255	21
		17405.28 C	7.69	48.31	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
809 LD	L40 4010	PASS	AISC- H1-1	0.259	21
		18182.33 C	8.95	-38.84	0.00
810 LD	L40 4010	PASS	AISC- H1-1	0.244	21
		16718.60 C	5.39	46.43	1.18
811 LD	L40 4010	PASS	AISC- H1-1	0.211	21
		15235.69 C	1.03	-28.79	0.00
812 LD	L40 4010	PASS	AISC- H1-1	0.192	21
		14611.44 C	-2.86	13.39	0.00
813 LD	L40 4010	PASS	AISC- H1-1	0.194	21
		12271.16 C	23.40	42.97	1.18
814 LD	L40 4010	PASS	AISC- H1-1	0.170	22
		12389.07 C	8.08	16.94	0.00
815 LD	L40 4010	PASS	AISC- H1-1	0.196	22
		12294.94 C	-18.38	-47.75	1.18
816 LD	L40 4010	PASS	AISC- H1-1	0.184	22
		12123.40 C	-4.80	43.54	0.00
817 LD	L40 4010	PASS	AISC- H1-1	0.179	22
		12196.97 C	18.52	-25.59	1.18
818 LD	L40 4010	PASS	AISC- H1-1	0.225	22
		14422.52 C	-34.57	41.18	1.18
819 LD	L30 308	PASS	AISC- H2-1	0.157	22
		4262.89 T	57.78	6.91	0.00
820 LD	L30 308	PASS	AISC- H1-3	0.154	22
		4237.15 C	-7.87	28.14	0.00
821 LD	L30 308	PASS	AISC- H2-1	0.092	22
		2336.91 T	30.92	7.59	0.00
822 LD	L30 308	PASS	AISC- H1-3	0.082	22
		2030.56 C	-8.45	12.89	0.00
823 LD	L30 308	PASS	AISC- H2-1	0.140	22
		997.30 T	-73.72	20.70	1.75
824 LD	L30 308	PASS	AISC- H1-3	0.208	22
		2904.88 C	67.74	27.90	0.00
825 LD	L30 308	PASS	AISC- H1-3	0.091	21
		1609.41 C	-8.16	16.75	0.00
826 LD	L30 308	PASS	AISC- H1-3	0.097	22
		1695.76 C	-2.92	19.14	0.00
827 LD	L40 4010	PASS	AISC- H1-3	0.074	21
		2875.63 C	54.89	9.65	1.48
828 LD	L40 4010	PASS	AISC- H1-3	0.068	22
		3880.24 C	3.27	21.19	0.00
829 LD	L40 4010	PASS	AISC- H1-3	0.060	21
		555.72 C	44.67	34.60	1.73

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832 LD	L30 308	PASS	AISC- H1-3	0.209	22
		2978.47 C	66.95	27.62	1.97
833 LD	L30 308	PASS	AISC- H2-1	0.142	22
		1080.71 T	-73.83	20.65	0.00
834 LD	L30 308	PASS	AISC- H1-3	0.086	22
		2148.56 C	-8.84	13.28	1.50
835 LD	L30 308	PASS	AISC- H2-1	0.092	22
		2477.22 T	29.95	6.51	1.17
836 LD	L30 308	PASS	AISC- H1-3	0.158	22
		4396.40 C	-8.14	28.22	1.13
837 LD	L30 308	PASS	AISC- H2-1	0.155	22
		4429.65 T	56.78	5.04	0.58
838 LD	L40 4010	PASS	AISC- H1-3	0.203	22
		2632.65 C	-177.48	-87.16	1.90
839 LD	L30 308	PASS	AISC- H2-1	0.182	21
		5861.82 T	14.55	30.20	0.00
840 LD	L30 308	PASS	AISC- H1-3	0.236	21
		5913.89 C	-15.99	47.72	0.00
841 LD	L30 308	PASS	AISC- H2-1	0.083	21
		2040.49 T	-1.34	23.52	0.00
842 LD	L30 308	PASS	AISC- H1-3	0.080	21
		1789.53 C	-3.72	17.56	0.00
843 LD	L30 308	PASS	AISC- H1-3	0.050	29
		205.56 C	12.69	16.50	1.75
844 LD	L30 308	PASS	AISC- H1-3	0.119	21
		2008.05 C	-4.80	31.25	0.00
845 LD	L30 308	PASS	AISC- H1-3	0.061	24
		774.78 C	6.07	15.89	0.00
846 LD	L30 308	PASS	AISC- H1-3	0.070	21
		1045.83 C	-0.97	17.91	0.00
848 LD	L40 4010	PASS	AISC- H1-3	0.140	21
		2143.50 C	27.46	117.82	0.00
849 LD	L40 4010	PASS	AISC- H2-1	0.047	23
		306.61 T	7.72	47.09	0.00
850 LD	L30 308	PASS	AISC- H1-3	0.058	21
		722.63 C	17.53	7.19	0.00
851 LD	L30 308	PASS	AISC- H1-3	0.069	22
		524.54 C	17.99	17.37	2.33
852 LD	L30 308	PASS	AISC- H1-3	0.093	23
		1424.98 C	-8.36	23.86	1.97
853 LD	L30 308	PASS	AISC- H2-1	0.054	21
		144.53 T	-13.29	19.32	0.00

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856	LD L30 308	PASS	AISC- H1-3	0.119	23
		2943.53 C	-6.47	25.29	1.13
857	LD L30 308	PASS	AISC- H2-1	0.112	22
		2126.20 T	21.09	26.27	0.58
858	LD L40 4010	PASS	AISC- H1-3	0.131	21
		1769.01 C	9.38	121.87	0.00
859	LD L30 308	PASS	AISC- H2-1	0.184	21
		5694.43 T	-15.77	32.19	0.00
860	LD L30 308	PASS	AISC- H1-3	0.233	21
		5753.99 C	15.79	47.64	0.00
861	LD L30 308	PASS	AISC- H2-1	0.082	21
		1895.51 T	0.33	24.63	0.00
862	LD L30 308	PASS	AISC- H1-3	0.076	21
		1667.49 C	3.45	17.17	0.00
863	LD L30 308	PASS	AISC- H2-1	0.092	24
		670.93 T	39.88	18.56	1.75
864	LD L30 308	PASS	AISC- H1-3	0.120	24
		1652.37 C	-36.54	18.03	0.00
865	LD L30 308	PASS	AISC- H1-3	0.068	23
		821.02 C	10.65	16.21	0.00
866	LD L30 308	PASS	AISC- H1-3	0.067	21
		979.41 C	0.83	17.52	0.00
867	LD L40 4010	PASS	AISC- H2-1	0.070	21
		2434.74 T	11.52	44.04	0.00
868	LD L40 4010	PASS	AISC- H1-3	0.148	21
		2771.37 C	-28.77	124.74	0.00
869	LD L40 4010	PASS	AISC- H2-1	0.045	24
		247.38 T	4.72	47.48	0.00
870	LD L30 308	PASS	AISC- H1-3	0.061	21
		799.31 C	-18.47	6.73	0.00
871	LD L30 308	PASS	AISC- H1-3	0.075	22
		616.64 C	-19.17	17.90	2.33
872	LD L30 308	PASS	AISC- H1-3	0.124	24
		1433.25 C	-34.74	24.47	1.97
873	LD L30 308	PASS	AISC- H2-1	0.080	24
		350.41 T	37.83	16.72	0.00
874	LD L30 308	PASS	AISC- H1-3	0.047	24
		1031.61 C	4.35	9.28	1.50
875	LD L30 308	PASS	AISC- H2-1	0.077	24
		1115.39 T	-26.75	13.84	1.17
876	LD L30 308	PASS	AISC- H1-3	0.118	24
		2956.54 C	5.51	25.22	1.13

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879	LD L40 4010	PASS	AISC- H1-3	0.155	24
		1475.67 C	79.95	110.89	1.90
881	LD L40 4010	PASS	AISC- H2-1	0.166	21
		8198.18 T	25.08	74.60	0.00
882	LD L40 4010	PASS	AISC- H1-3	0.128	22
		6263.10 C	22.02	43.16	1.43
884	LD L40 4010	PASS	AISC- H2-1	0.147	22
		5871.11 T	-1.04	97.86	0.00
885	LD L40 4010	PASS	AISC- H2-1	0.106	22
		5963.75 T	-2.56	45.99	1.43
887	LD L40 4010	PASS	AISC- H2-1	0.081	21
		632.52 T	-18.78	76.59	1.43
889	LD L40 4010	PASS	AISC- H1-3	0.072	22
		597.16 C	-50.32	45.58	1.48
890	LD L30 308	PASS	AISC- H2-1	0.062	22
		240.63 T	-42.74	5.04	0.00
891	LD L30 308	PASS	AISC- H1-3	0.093	21
		2169.13 C	7.35	15.66	0.00
892	LD L30 308	PASS	AISC- H2-1	0.082	21
		1178.14 T	-46.86	4.21	0.00
893	LD L30 308	PASS	AISC- H1-3	0.091	21
		2128.97 C	3.66	17.17	0.00
894	LD L30 308	PASS	AISC- H2-1	0.070	21
		197.08 T	57.28	-0.94	0.00
895	LD L30 308	PASS	AISC- H1-3	0.070	24
		1722.90 C	-5.04	10.71	0.00
896	LD L30 308	PASS	AISC- H2-1	0.054	24
		914.03 T	30.72	1.35	0.00
897	LD L30 308	PASS	AISC- H1-3	0.064	24
		1562.63 C	-3.06	10.87	0.00
898	LD L40 4010	PASS	AISC- H2-1	0.130	22
		682.58 T	39.41	122.15	1.90
900	LD L40 4010	PASS	AISC- H2-1	0.190	21
		7868.96 T	23.90	107.90	0.00
901	LD L40 4010	PASS	AISC- H2-1	0.160	21
		7928.54 T	22.89	72.31	1.43
903	LD L40 4010	PASS	AISC- H2-1	0.097	22
		5409.11 T	-1.55	43.39	0.00
904	LD L40 4010	PASS	AISC- H1-3	0.123	21
		6051.54 C	-63.12	-14.24	1.43
905	LD L40 4010	PASS	AISC- H2-1	0.081	21
		778.22 T	-18.20	75.49	0.00

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910 LD	L30 308	PASS	AISC- H2-1	0.051	22
		230.45 T	41.05	0.57	0.00
911 LD	L30 308	PASS	AISC- H1-3	0.093	21
		2195.12 C	-7.04	15.38	0.00
912 LD	L30 308	PASS	AISC- H2-1	0.075	21
		1192.24 T	46.95	-0.07	0.00
913 LD	L30 308	PASS	AISC- H1-3	0.090	21
		2150.90 C	-3.12	17.08	0.00
914 LD	L30 308	PASS	AISC- H2-1	0.066	21
		179.59 T	-53.98	-0.88	0.00
915 LD	L30 308	PASS	AISC- H1-3	0.066	23
		1699.27 C	2.07	10.70	0.00
916 LD	L30 308	PASS	AISC- H2-1	0.052	23
		901.17 T	-30.43	0.35	0.00
917 LD	L30 308	PASS	AISC- H1-3	0.061	23
		1541.89 C	1.55	10.90	0.00
918 LD	L40 4010	PASS	AISC- H1-3	0.203	22
		2632.58 C	-177.41	-87.87	0.00
920 LD	L40 4010	PASS	AISC- H2-1	0.095	23
		3707.02 T	10.81	58.28	0.00
921 LD	L40 4010	PASS	AISC- H2-1	0.082	22
		3230.56 T	22.21	41.12	1.43
923 LD	L40 4010	PASS	AISC- H2-1	0.078	24
		4068.14 T	3.46	37.15	0.00
924 LD	L40 4010	PASS	AISC- H1-3	0.069	22
		889.37 C	-45.46	-40.40	1.43
926 LD	L40 4010	PASS	AISC- H1-3	0.064	21
		353.96 C	52.31	37.73	0.00
928 LD	L40 4010	PASS	AISC- H2-1	0.095	22
		3701.60 T	-54.86	-29.60	0.00
929 LD	L30 308	PASS	AISC- H2-1	0.034	24
		86.44 T	26.99	0.99	0.00
930 LD	L30 308	PASS	AISC- H1-3	0.121	22
		3555.96 C	-11.39	9.55	0.00
931 LD	L30 308	PASS	AISC- H2-1	0.094	22
		1927.83 T	47.90	2.36	0.00
932 LD	L30 308	PASS	AISC- H1-3	0.112	22
		3340.09 C	-3.75	11.85	0.00
933 LD	L30 308	PASS	AISC- H2-1	0.033	23
		92.38 T	-27.81	0.00	0.00
934 LD	L30 308	PASS	AISC- H1-3	0.127	22
		3759.13 C	12.39	9.08	0.00

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937 LD	L40 4010	PASS	AISC- H1-3	0.063	20
		10.36 C	0.00	-75.41	1.83
938 LD	L40 4010	PASS	AISC- H1-3	0.063	20
		10.32 C	0.00	-75.42	1.83
939 LD	L40 4010	PASS	AISC- H1-3	0.063	20
		10.37 C	0.00	-75.40	1.83
949 LD	L30 305	PASS	AISC- H2-1	0.166	20
		58.66 T	83.80	4.15	0.00
950 LD	L30 305	PASS	AISC- H1-3	0.189	22
		17.91 C	90.22	8.36	0.00
951 LD	L30 305	PASS	AISC- H1-3	0.174	24
		101.16 C	81.02	7.67	0.00
973 LD	L30 305	PASS	AISC- H1-3	0.099	22
		208.86 C	-46.88	2.06	0.00
974 LD	L30 305	PASS	AISC- H2-1	0.228	24
		327.15 T	109.44	6.80	1.74
975 LD	L30 305	PASS	AISC- H2-1	0.163	24
		386.02 T	81.67	1.09	0.00
976 LD	L30 305	PASS	AISC- H1-3	0.088	20
		4.28 C	-40.15	-5.04	1.74
977 LD	L30 305	PASS	AISC- H2-1	0.166	20
		58.64 T	83.81	4.15	1.74
978 LD	L40 4010	PASS	AISC- H1-3	0.020	24
		83.03 C	22.99	-8.72	0.49
981 LD	L40 4010	PASS	AISC- H1-3	0.019	20
		67.19 C	19.14	-9.51	0.58
983 LD	L30 305	PASS	AISC- H1-3	0.101	24
		82.74 C	-48.29	-3.54	0.00
984 LD	L30 305	PASS	AISC- H2-1	0.153	20
		212.31 T	68.94	7.27	1.74
985 LD	L30 305	PASS	AISC- H2-1	0.142	20
		215.35 T	66.87	4.73	0.00
986 LD	L30 305	PASS	AISC- H1-3	0.100	22
		209.67 C	-47.14	2.05	1.74
987 LD	L30 305	PASS	AISC- H2-1	0.172	20
		52.30 T	82.39	7.11	1.74
988 LD	L40 4010	PASS	AISC- H1-3	0.019	20
		67.15 C	19.13	-9.51	0.58
991 LD	L40 4010	PASS	AISC- H1-3	0.018	20
		63.73 C	18.03	-9.24	0.58
993 LD	L40 4010	PASS	AISC- H1-3	0.020	22
		76.24 C	20.50	-10.15	0.49

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999 LD	L30 305	PASS	AISC- H2-1	0.231	22
		442.21 T	113.17	4.17	1.74
1000 LD	L30 305	PASS	AISC- H2-1	0.231	22
		441.64 T	113.16	4.17	0.00
1001 LD	L30 305	PASS	AISC- H2-1	0.096	22
		232.68 T	-37.93	-7.05	1.74
1002 LD	L30 305	PASS	AISC- H1-3	0.188	22
		17.44 C	89.79	8.40	1.74
1003 LD	L30 305	PASS	AISC- H1-3	0.261	20
		48.60 C	-53.70	56.98	0.00
1004 LD	L30 305	PASS	AISC- H2-1	0.222	20
		30.75 T	-47.99	46.96	1.15
1006 LD	L30 305	PASS	AISC- H2-1	0.216	20
		29.53 T	45.69	46.47	1.15
1007 LD	L30 305	PASS	AISC- H1-3	0.257	20
		46.38 C	-50.41	57.71	1.53
1008 LD	L30 305	PASS	AISC- H1-3	0.261	20
		48.62 C	53.73	56.97	0.00
1009 LD	L30 305	PASS	AISC- H2-1	0.222	20
		30.77 T	-48.01	46.96	0.00
1011 LD	L30 305	PASS	AISC- H2-1	0.220	24
		38.87 T	-59.72	38.63	1.15
1012 LD	L30 305	PASS	AISC- H1-3	0.257	20
		46.45 C	50.40	57.69	1.53
1013 LD	L30 305	PASS	AISC- H1-3	0.250	20
		44.56 C	-50.01	55.27	1.53
1014 LD	L30 305	PASS	AISC- H2-1	0.221	22
		37.20 T	55.91	41.50	1.15
1016 LD	L30 305	PASS	AISC- H2-1	0.220	22
		37.02 T	-55.61	41.51	1.15
1017 LD	L30 305	PASS	AISC- H1-3	0.250	20
		44.54 C	50.00	55.27	1.53
1027 LD	L30 305	PASS	AISC- H2-1	0.108	24
		403.76 T	51.98	-0.71	0.00
1028 LD	L30 305	PASS	AISC- H1-3	0.214	22
		116.75 C	102.15	-7.98	0.00
1029 LD	L30 305	PASS	AISC- H2-1	0.162	24
		3.47 T	83.48	-3.27	0.00
1030 LD	L30 305	PASS	AISC- H2-1	0.088	23
		149.14 T	39.04	4.33	1.74
1031 LD	L30 305	PASS	AISC- H1-3	0.052	24
		409.39 C	10.82	5.74	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1034 LD	L30 305	PASS	AISC- H1-3	0.165	24
		87.46 C	80.37	-5.30	1.74
1035 LD	L30 305	PASS	AISC- H1-3	0.043	29
		166.66 C	14.85	3.46	1.74
1036 LD	L30 305	PASS	AISC- H1-3	0.049	29
		176.14 C	18.97	2.65	0.00
1037 LD	L30 305	PASS	AISC- H1-3	0.050	20
		95.91 C	-16.61	5.54	0.00
1038 LD	L30 305	PASS	AISC- H1-3	0.048	20
		113.10 C	-11.01	8.12	1.74
1039 LD	L30 305	PASS	AISC- H2-1	0.145	22
		509.04 T	65.59	-3.86	1.74
1040 LD	L30 305	PASS	AISC- H2-1	0.116	21
		254.34 T	54.54	3.34	1.74
1041 LD	L30 305	PASS	AISC- H2-1	0.062	21
		328.31 T	24.77	2.56	0.00
1042 LD	L30 305	PASS	AISC- H2-1	0.062	21
		328.31 T	24.83	2.56	1.74
1043 LD	L30 305	PASS	AISC- H2-1	0.117	21
		254.52 T	54.68	3.33	0.00
1044 LD	L30 305	PASS	AISC- H1-3	0.214	22
		117.34 C	102.20	-7.97	1.74
1045 LD	L30 305	PASS	AISC- H2-1	0.055	24
		14.78 T	-14.51	-9.84	1.00
1046 LD	L30 305	PASS	AISC- H1-3	0.247	23
		167.64 C	-43.48	57.02	0.00
1047 LD	L30 305	PASS	AISC- H1-3	0.143	24
		36.59 C	35.96	-26.92	0.00
1048 LD	L30 305	PASS	AISC- H1-3	0.278	23
		39.36 C	-56.91	60.98	0.00
1049 LD	L30 305	PASS	AISC- H1-3	0.140	24
		109.25 C	21.24	-34.44	0.00
1050 LD	L30 305	PASS	AISC- H1-3	0.231	22
		233.64 C	-56.58	42.04	0.00
1051 LD	L30 305	PASS	AISC- H2-1	0.053	22
		26.72 T	-5.17	15.05	1.00
1052 LD	L30 305	PASS	AISC- H1-3	0.186	21
		130.07 C	89.37	-6.66	0.00
1053 LD	L30 305	PASS	AISC- H1-3	0.197	24
		221.57 C	-26.79	-49.49	0.00
1054 LD	L30 305	PASS	AISC- H1-3	0.132	20
		51.61 C	32.89	24.70	0.00

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1057	LD	L30 305	PASS	AISC- H1-3	0.230	22
			233.24 C	-56.46	-41.93	0.00
1058	LD	L30 305	PASS	AISC- H2-1	0.053	22
			26.57 T	-5.26	-15.06	1.00
1059	LD	L30 305	PASS	AISC- H1-3	0.186	21
			129.86 C	89.35	6.47	0.00
1060	LD	L30 305	PASS	AISC- H1-3	0.112	22
			74.54 C	-50.31	6.26	0.00
1061	LD	L30 305	PASS	AISC- H1-3	0.209	21
			39.33 C	113.79	0.00	0.00
1062	LD	L30 305	PASS	AISC- H1-3	0.112	22
			74.50 C	-50.34	-6.28	0.00
1063	LD	L30 305	PASS	AISC- H1-3	0.104	23
			16.11 C	-42.18	9.42	0.00
1064	LD	L30 305	PASS	AISC- H2-1	0.095	24
			244.68 T	-39.49	5.73	2.01
1065	LD	L30 305	PASS	AISC- H1-3	0.113	23
			178.98 C	57.63	0.22	0.00
1066	LD	L30 305	PASS	AISC- H2-1	0.111	24
			382.72 T	47.71	4.59	2.01
1067	LD	L30 305	PASS	AISC- H2-1	0.148	24
			71.50 T	-54.85	16.19	0.00
1068	LD	L30 305	PASS	AISC- H1-3	0.069	29
			58.79 C	25.24	7.37	0.00
1069	LD	L30 305	PASS	AISC- H2-1	0.069	20
			317.82 T	20.25	7.97	2.01
1070	LD	L30 305	PASS	AISC- H1-3	0.165	24
			294.97 C	-77.55	-3.89	2.01
1071	LD	L30 305	PASS	AISC- H2-1	0.050	32
			28.22 T	-19.49	4.78	2.01
1072	LD	L30 305	PASS	AISC- H2-1	0.066	22
			356.55 T	-24.44	3.81	2.01
1073	LD	L30 305	PASS	AISC- H1-3	0.185	22
			357.84 C	88.58	-3.06	2.01
1074	LD	L30 305	PASS	AISC- H2-1	0.123	22
			62.51 T	62.12	2.94	2.01
1075	LD	L30 305	PASS	AISC- H2-1	0.123	22
			324.46 T	54.18	5.26	2.01
1076	LD	L30 305	PASS	AISC- H2-1	0.182	22
			118.97 T	69.57	18.28	0.00
1077	LD	L30 305	PASS	AISC- H2-1	0.124	22
			62.38 T	-62.22	2.95	2.01

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MEMBER		TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1080	LD	L30 305	PASS	AISC- H1-3	0.185	22
			358.94 C	-98.45	-3.09	2.01
1081	LD	L30 308	PASS	AISC- H2-1	0.221	22
			3852.16 T	113.00	11.82	0.00
1082	LD	L30 308	PASS	AISC- H1-3	0.143	22
			2856.91 C	38.61	20.69	0.00
1083	LD	L30 308	PASS	AISC- H1-3	0.161	24
			1625.81 C	96.06	9.74	0.00
1223	UPT	PIPX140	PASS	AISC- H1-2	0.205	22
			47509.58 C	0.00	1388.06	0.00
1225	UPT	PIPX140	PASS	AISC- H1-2	0.694	21
			182888.45 C	0.00	2798.01	0.00
1226	UPT	PIPX140	PASS	AISC- H1-1	0.656	21
			186031.48 C	0.00	1413.31	1.00
1227	UPT	PIPX140	PASS	AISC- H1-2	0.660	21
			172570.61 C	0.00	2759.47	1.00
1228	UPT	PIPX140	PASS	AISC- H1-2	0.661	21
			172891.62 C	0.00	2701.05	0.00
1229	UPT	PIPX140	PASS	AISC- H1-1	0.624	21
			176121.44 C	0.00	1411.86	1.00
1230	UPT	PIPX140	PASS	AISC- H1-2	0.624	21
			162332.06 C	0.00	2689.82	1.00
1231	UPT	PIPX140	PASS	AISC- H1-2	0.626	21
			162648.70 C	0.00	2712.04	0.00
1232	UPT	PIPX140	PASS	AISC- H1-1	0.591	21
			166088.14 C	0.00	1434.03	1.00
1233	UPT	PIPX140	PASS	AISC- H1-2	0.592	21
			152143.84 C	0.00	2713.85	1.00
1234	UPT	PIPX140	PASS	AISC- H1-2	0.594	21
			152445.95 C	0.00	2737.05	0.00
1235	UPT	PIPX140	PASS	AISC- H1-1	0.557	21
			155961.14 C	0.00	1405.30	1.00
1236	UPT	PIPX140	PASS	AISC- H1-2	0.555	21
			141772.69 C	0.00	2629.69	1.00
1237	UPT	PIPX140	PASS	AISC- H1-2	0.557	21
			142068.38 C	0.00	2653.82	0.00
1238	UPT	PIPX140	PASS	AISC- H1-1	0.521	21
			145742.61 C	0.00	1322.29	1.00
1239	UPT	PIPX140	PASS	AISC- H1-2	0.517	21
			131187.47 C	0.00	2512.52	1.00
1240	UPT	PIPX140	PASS	AISC- H1-2	0.518	21
			131463.45 C	0.00	2538.36	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1243	UPT PIPX140	PASS	AISC- H1-2	0.482	21
		120803.11 C	0.00	2486.83	0.00
1244	UPT PIPX140	PASS	AISC- H1-1	0.447	21
		124596.68 C	0.00	1173.69	1.00
1245	UPT PIPX140	PASS	AISC- H1-2	0.439	21
		109662.52 C	0.00	2301.29	1.00
1246	UPT PIPX140	PASS	AISC- H1-2	0.441	21
		109883.97 C	0.00	2331.47	0.00
1247	UPT PIPX140	PASS	AISC- H1-1	0.407	21
		113697.20 C	0.00	1051.13	1.00
1248	UPT PIPX140	PASS	AISC- H1-2	0.396	21
		98445.70 C	0.00	2109.92	1.00
1249	UPT PIPX140	PASS	AISC- H1-2	0.398	21
		98627.09 C	0.00	2143.56	0.00
1250	UPT PIPX140	PASS	AISC- H1-1	0.363	21
		102360.98 C	0.00	832.13	1.00
1251	UPT PIPX140	PASS	AISC- H1-2	0.351	21
		87118.40 C	0.00	1892.51	1.00
1252	UPT PIPX140	PASS	AISC- H1-2	0.353	21
		87258.92 C	0.00	1929.09	0.00
1253	UPT PIPX140	PASS	AISC- H1-2	0.381	21
		80347.00 C	0.00	2415.04	1.00
1254	UPT PIPX140	PASS	AISC- H1-2	0.187	22
		46221.56 C	0.00	1028.37	1.00
1255	UPT PIPX140	PASS	AISC- H1-2	0.197	22
		46268.02 C	0.00	1290.52	1.00
1256	UPT PIPX140	PASS	AISC- H1-2	0.224	22
		54152.09 C	0.00	1315.77	0.00
1257	UPT PIPX140	PASS	AISC- H1-2	0.210	22
		52246.05 C	0.00	1127.18	1.00
1258	UPT PIPX140	PASS	AISC- H1-2	0.217	22
		52274.19 C	0.00	1305.14	1.00
1259	UPT PIPX140	PASS	AISC- H1-2	0.244	22
		60232.83 C	0.00	1334.63	0.00
1260	UPT PIPX140	PASS	AISC- H1-2	0.233	22
		58281.19 C	0.00	1222.60	1.00
1261	UPT PIPX140	PASS	AISC- H1-2	0.238	22
		58287.85 C	0.00	1341.44	1.00
1262	UPT PIPX140	PASS	AISC- H1-2	0.264	22
		66135.84 C	0.00	1375.48	0.00
1263	UPT PIPX140	PASS	AISC- H1-2	0.255	22
		64178.25 C	0.00	1289.69	1.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1266	UPT PIPX140	PASS	AISC- H1-2	0.276	22
		70006.40 C	0.00	1357.82	1.00
1267	UPT PIPX140	PASS	AISC- H1-2	0.278	22
		69983.86 C	0.00	1401.14	1.00
1268	UPT PIPX140	PASS	AISC- H1-2	0.304	22
		77609.19 C	0.00	1442.40	0.00
1269	UPT PIPX140	PASS	AISC- H1-2	0.296	22
		75736.79 C	0.00	1402.80	1.00
1270	UPT PIPX140	PASS	AISC- H1-2	0.296	22
		75704.23 C	0.00	1405.09	1.00
1271	UPT PIPX140	PASS	AISC- H1-2	0.322	22
		83210.34 C	0.00	1448.73	0.00
1272	UPT PIPX140	PASS	AISC- H1-2	0.316	22
		81411.61 C	0.00	1436.64	1.00
1273	UPT PIPX140	PASS	AISC- H1-2	0.316	22
		81372.89 C	0.00	1433.50	1.00
1274	UPT PIPX140	PASS	AISC- H1-2	0.341	22
		88758.87 C	0.00	1480.77	0.00
1275	UPT PIPX140	PASS	AISC- H1-2	0.335	22
		87038.91 C	0.00	1462.06	1.00
1276	UPT PIPX140	PASS	AISC- H1-2	0.334	22
		86875.91 C	0.00	1449.76	0.00
1277	UPT PIPX140	PASS	AISC- H1-2	0.359	22
		94249.71 C	0.00	1473.26	0.00
1278	UPT PIPX140	PASS	AISC- H1-2	0.354	22
		92612.83 C	0.00	1470.21	1.00
1279	UPT PIPX140	PASS	AISC- H1-2	0.353	22
		92447.64 C	0.00	1458.22	0.00
1280	UPT PIPX140	PASS	AISC- H1-2	0.373	22
		99714.91 C	0.00	1380.65	0.00
1281	UPT PIPX140	PASS	AISC- H1-2	0.373	22
		98126.09 C	0.00	1502.41	1.00
1283	UPT PIPX140	PASS	AISC- H1-2	0.372	22
		98098.74 C	0.00	1489.44	0.00
1284	UPT PIPX140	PASS	AISC- H1-2	0.374	22
		99709.29 C	0.00	1407.90	1.00
1285	UPT PIPX140	PASS	AISC- H1-2	0.353	22
		92452.24 C	0.00	1460.31	1.00
1286	UPT PIPX140	PASS	AISC- H1-2	0.354	22
		92617.12 C	0.00	1472.25	0.00
1287	UPT PIPX140	PASS	AISC- H1-2	0.360	22
		94251.05 C	0.00	1502.38	1.00

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MEMBER	TABLE	RESULT/	FX	CRITICAL COND/	MY	RATIO/	MZ	LOADING/	LOCATION
1290	UPT PIPX140	PASS	88758.87 C	AISC- H1-2	0.00	0.343	1512.40	22	1.00
1291	UPT PIPX140	PASS	81372.73 C	AISC- H1-2	0.00	0.317	1467.08	22	0.00
1292	UPT PIPX140	PASS	81411.44 C	AISC- H1-2	0.00	0.316	1436.15	22	0.00
1293	UPT PIPX140	PASS	83210.35 C	AISC- H1-2	0.00	0.324	1483.48	22	1.00
1294	UPT PIPX140	PASS	75704.16 C	AISC- H1-2	0.00	0.298	1441.99	22	0.00
1295	UPT PIPX140	PASS	75736.71 C	AISC- H1-2	0.00	0.296	1402.52	22	0.00
1296	UPT PIPX140	PASS	77609.23 C	AISC- H1-2	0.00	0.305	1481.47	22	1.00
1297	UPT PIPX140	PASS	69983.83 C	AISC- H1-2	0.00	0.279	1442.58	22	0.00
1298	UPT PIPX140	PASS	70006.36 C	AISC- H1-2	0.00	0.276	1357.39	22	0.00
1299	UPT PIPX140	PASS	71930.47 C	AISC- H1-2	0.00	0.287	1467.32	22	1.00
1300	UPT PIPX140	PASS	64167.57 C	AISC- H1-2	0.00	0.260	1432.80	22	0.00
1301	UPT PIPX140	PASS	64178.05 C	AISC- H1-2	0.00	0.255	1289.81	22	0.00
1302	UPT PIPX140	PASS	66135.79 C	AISC- H1-2	0.00	0.266	1425.64	22	1.00
1303	UPT PIPX140	PASS	58287.45 C	AISC- H1-2	0.00	0.240	1394.40	22	0.00
1304	UPT PIPX140	PASS	58280.77 C	AISC- H1-2	0.00	0.233	1222.25	22	0.00
1305	UPT PIPX140	PASS	60232.69 C	AISC- H1-2	0.00	0.246	1393.19	22	1.00
1306	UPT PIPX140	PASS	52279.78 C	AISC- H1-2	0.00	0.219	1366.47	22	0.00
1307	UPT PIPX140	PASS	52251.73 C	AISC- H1-2	0.00	0.210	1127.38	22	0.00
1308	UPT PIPX140	PASS	54158.81 C	AISC- H1-2	0.00	0.226	1391.90	22	1.00
1309	UPT PIPX140	PASS	46271.89 C	AISC- H1-2	0.00	0.200	1368.79	22	0.00
1310	UPT PIPX140	PASS	46224.70 C	AISC- H1-2	0.00	0.187	1031.60	22	0.00

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MEMBER	TABLE	RESULT/	FX	CRITICAL COND/	MY	RATIO/	MZ	LOADING/	LOCATION
1313	LD L30 308	PASS	2541.13 C	AISC- H1-3	8.68	0.192	18.45	24	0.00
1314	LD L30 308	PASS	5016.92 C	AISC- H1-1	-31.42	0.352	12.36	21	0.00
1315	LD L30 308	PASS	4365.42 C	AISC- H1-1	10.57	0.288	22.43	22	0.00
1316	LD L30 308	PASS	2509.15 C	AISC- H1-3	6.78	0.172	16.73	24	0.00
1317	LD L30 308	PASS	5176.02 C	AISC- H1-1	-33.44	0.332	10.34	21	0.00
1318	LD L30 308	PASS	4250.70 C	AISC- H1-1	10.39	0.257	21.06	22	0.00
1319	LD L30 308	PASS	2404.58 C	AISC- H1-3	5.73	0.150	15.00	24	0.00
1320	LD L30 308	PASS	4976.93 C	AISC- H1-1	-34.39	0.292	8.22	21	0.00
1321	LD L30 308	PASS	4108.54 C	AISC- H1-1	10.53	0.227	19.43	22	0.00
1322	LD L30 308	PASS	2294.02 C	AISC- H1-3	-7.20	0.131	12.63	24	2.90
1323	LD L30 308	PASS	4848.90 C	AISC- H1-1	14.73	0.259	16.59	21	2.90
1324	LD L30 308	PASS	3942.35 C	AISC- H1-1	10.59	0.199	17.66	22	0.00
1325	LD L30 308	PASS	2203.55 C	AISC- H1-3	-6.82	0.116	11.42	24	2.75
1326	LD L30 308	PASS	4714.19 C	AISC- H1-1	14.69	0.231	15.65	21	2.75
1327	LD L30 308	PASS	3836.78 C	AISC- H1-3	10.41	0.180	16.07	22	0.00
1328	LD L30 308	PASS	2109.93 C	AISC- H1-3	-6.83	0.103	10.28	24	2.60
1329	LD L30 308	PASS	4585.74 C	AISC- H1-1	15.30	0.205	14.85	21	2.60
1330	LD L30 308	PASS	3708.31 C	AISC- H1-3	10.67	0.163	14.30	22	0.00
1331	LD L30 308	PASS	106.04 T	AISC- H2-1	45.35	0.093	21.46	21	0.00
1332	LD L30 308	PASS	4489.79 C	AISC- H1-3	15.16	0.193	14.11	21	2.45
1333	LD L30 308	PASS	3610.46 C	AISC- H1-3	11.04	0.148	12.15	22	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1336	LD L30 308	PASS	AISC- H1-3	0.133	22
		3489.29 C	11.58	9.64	0.00
1337	LD L30 308	PASS	AISC- H2-1	0.089	21
		199.53 T	43.51	19.27	0.00
1338	LD L30 308	PASS	AISC- H1-3	0.176	21
		4411.26 C	-33.99	-4.80	0.00
1339	LD L30 308	PASS	AISC- H1-1	0.340	21
		4809.21 C	-30.85	12.68	3.35
1340	LD L30 308	PASS	AISC- H1-1	0.210	23
		2882.36 C	-8.43	18.23	3.35
1341	LD L30 308	PASS	AISC- H1-1	0.338	22
		4762.35 C	9.30	23.45	3.35
1342	LD L30 308	PASS	AISC- H1-1	0.322	21
		4979.78 C	-33.32	10.66	3.20
1343	LD L30 308	PASS	AISC- H1-1	0.195	23
		2860.89 C	-12.66	16.44	3.20
1344	LD L30 308	PASS	AISC- H1-1	0.299	22
		4568.02 C	10.36	22.14	3.20
1345	LD L30 308	PASS	AISC- H1-1	0.283	21
		4767.89 C	-34.51	8.56	3.05
1346	LD L30 308	PASS	AISC- H1-3	0.176	23
		2749.49 C	-14.91	14.69	3.05
1347	LD L30 309	PASS	AISC- H1-1	0.267	22
		4460.64 C	10.47	20.72	3.05
1348	LD L30 308	PASS	AISC- H1-1	0.250	21
		4628.50 C	-34.90	6.63	2.90
1349	LD L30 308	PASS	AISC- H1-3	0.156	23
		2635.85 C	-15.57	13.02	2.90
1350	LD L30 308	PASS	AISC- H1-1	0.236	22
		4328.66 C	10.80	19.04	2.90
1351	LD L30 308	PASS	AISC- H1-1	0.221	21
		4482.25 C	14.25	15.73	0.00
1352	LD L30 308	PASS	AISC- H1-3	0.139	23
		2540.68 C	-15.78	11.33	2.75
1353	LD L30 308	PASS	AISC- H1-1	0.208	22
		4174.20 C	10.99	17.21	2.75
1354	LD L30 308	PASS	AISC- H1-1	0.199	21
		4340.87 C	14.78	14.90	0.00
1355	LD L30 308	PASS	AISC- H1-3	0.123	23
		2443.05 C	-14.85	9.72	2.60
1356	LD L30 308	PASS	AISC- H1-3	0.188	22
		4081.48 C	10.83	15.55	2.60

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1359	LD L30 308	PASS	AISC- H1-3	0.170	22
		3967.52 C	10.95	13.70	2.45
1360	LD L30 308	PASS	AISC- H1-3	0.169	21
		4086.49 C	14.26	13.58	0.00
1361	LD L30 308	PASS	AISC- H2-1	0.096	21
		344.71 T	44.48	21.00	2.30
1362	LD L30 308	PASS	AISC- H1-3	0.155	22
		3891.92 C	10.78	11.43	2.30
1363	LD L30 308	PASS	AISC- H1-3	0.164	21
		4100.62 C	-32.38	-3.86	2.15
1364	LD L30 308	PASS	AISC- H2-1	0.098	21
		496.77 T	45.12	20.13	2.15
1365	LD L30 308	PASS	AISC- H1-3	0.138	22
		3767.98 C	10.06	8.86	2.15
1366	LD L30 308	PASS	AISC- H2-1	0.140	22
		3516.48 T	-59.21	-4.32	1.00
1367	LD L30 308	PASS	AISC- H1-3	0.172	22
		768.29 C	104.52	20.60	0.00
1368	LD L30 308	PASS	AISC- H2-1	0.174	21
		2883.01 T	70.26	22.04	0.00
1370	LD L30 308	PASS	AISC- H1-3	0.129	24
		3894.30 C	-1.85	17.60	1.54
1371	LD L30 308	PASS	AISC- H1-3	0.194	22
		3695.22 C	54.27	24.10	0.00
1372	LD L30 308	PASS	AISC- H1-3	0.128	24
		3865.62 C	-26.66	-3.42	0.00
1373	LD L30 308	PASS	AISC- H1-3	0.192	22
		3829.45 C	49.90	24.44	0.00
1374	LD L30 308	PASS	AISC- H1-3	0.125	24
		3789.96 C	-27.01	-3.01	0.00
1375	LD L30 308	PASS	AISC- H1-3	0.190	22
		3894.94 C	48.45	24.10	0.00
1376	LD L30 308	PASS	AISC- H1-3	0.122	24
		3703.80 C	-27.20	-2.67	0.00
1377	LD L30 308	PASS	AISC- H1-3	0.185	22
		3929.32 C	44.22	23.48	0.00
1378	LD L30 308	PASS	AISC- H1-3	0.116	24
		3645.86 C	-24.36	-2.22	0.00
1379	LD L30 308	PASS	AISC- H1-3	0.182	22
		3976.18 C	42.94	22.79	0.00
1380	LD L30 308	PASS	AISC- H1-3	0.111	24
		3591.93 C	-22.58	-1.81	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1383	LD L30 308	PASS	AISC- H1-3	0.172	22
		4009.76 C	37.56	20.78	0.00
1384	LD L30 308	PASS	AISC- H1-3	0.100	24
		3528.78 C	-16.45	-0.76	0.00
1385	LD L30 308	PASS	AISC- H1-3	0.165	22
		4023.99 C	33.74	19.48	0.00
1386	LD L30 308	PASS	AISC- H1-3	0.095	24
		3528.42 C	-0.71	7.90	1.26
1387	LD L30 308	PASS	AISC- H1-3	0.155	22
		3830.42 C	32.49	17.86	0.00
1388	LD L30 308	PASS	AISC- H1-3	0.096	24
		3271.12 C	-7.72	7.71	1.23
1389	LD L30 308	PASS	AISC- H1-3	0.096	23
		3574.57 C	-8.94	-3.46	0.41
1390	LD L30 308	PASS	AISC- H1-3	0.101	23
		3260.04 C	-14.90	6.37	0.00
1391	LD L30 308	PASS	AISC- H1-3	0.090	24
		3610.43 C	-2.99	-3.28	0.72
1392	LD L30 308	PASS	AISC- H1-3	0.150	22
		3538.06 C	32.71	18.12	1.23
1393	LD L30 308	PASS	AISC- H1-3	0.096	22
		1596.34 C	-39.74	-8.37	1.26
1394	LD L30 308	PASS	AISC- H1-3	0.101	23
		3518.38 C	-8.41	6.74	0.00
1395	LD L30 308	PASS	AISC- H1-3	0.095	24
		3735.44 C	3.42	-3.86	1.05
1396	LD L30 308	PASS	AISC- H1-3	0.158	22
		3739.11 C	33.33	19.72	1.26
1397	LD L30 308	PASS	AISC- H1-3	0.102	22
		1539.92 C	-45.30	-8.58	1.29
1398	LD L30 308	PASS	AISC- H1-3	0.102	23
		3539.22 C	-6.04	7.91	0.00
1399	LD L30 308	PASS	AISC- H1-3	0.100	24
		3794.62 C	6.38	-3.84	1.08
1400	LD L30 308	PASS	AISC- H1-3	0.165	22
		3745.79 C	36.97	20.97	1.29
1401	LD L30 308	PASS	AISC- H1-3	0.105	22
		1502.87 C	47.86	-9.09	0.00
1402	LD L30 308	PASS	AISC- H1-3	0.177	22
		3994.82 C	-39.91	21.93	1.32
1403	LD L30 308	PASS	AISC- H1-3	0.103	24
		3835.22 C	-7.42	-3.75	0.22

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1406	LD L30 308	PASS	AISC- H1-3	0.106	23
		3602.20 C	-4.09	10.08	0.00
1407	LD L30 308	PASS	AISC- H1-3	0.107	24
		3910.21 C	8.67	-3.97	1.02
1408	LD L30 308	PASS	AISC- H1-3	0.176	22
		3744.32 C	42.28	22.90	1.36
1409	LD L30 308	PASS	AISC- H1-3	0.113	22
		1436.20 C	-54.60	-9.84	1.39
1410	LD L30 308	PASS	AISC- H1-3	0.110	23
		3656.40 C	-4.15	11.22	0.00
1411	LD L30 308	PASS	AISC- H1-3	0.109	24
		3972.85 C	9.10	-3.92	1.04
1412	LD L30 308	PASS	AISC- H1-3	0.179	22
		3710.91 C	43.56	23.57	1.39
1413	LD L30 308	PASS	AISC- H1-3	0.113	22
		1136.75 C	-59.04	-10.72	0.00
1414	LD L30 308	PASS	AISC- H1-3	0.185	22
		3688.65 C	47.81	24.15	1.43
1415	LD L30 308	PASS	AISC- H1-3	0.118	22
		1408.56 C	-58.76	-10.17	1.43
1416	LD L30 308	PASS	AISC- H1-3	0.114	23
		3714.18 C	-3.39	12.37	0.00
1417	LD L30 308	PASS	AISC- H1-3	0.120	22
		1373.38 C	-60.49	-10.44	1.46
1418	LD L30 308	PASS	AISC- H1-3	0.121	23
		3800.81 C	-5.12	13.63	0.00
1419	LD L30 308	PASS	AISC- H1-3	0.115	22
		1119.27 C	-60.74	-10.95	0.00
1420	LD L30 308	PASS	AISC- H1-3	0.187	22
		3634.79 C	49.21	24.48	1.46
1421	LD L30 308	PASS	AISC- H1-3	0.123	22
		1316.28 C	-64.33	-10.52	1.50
1422	LD L30 308	PASS	AISC- H1-3	0.127	23
		3876.80 C	-6.33	14.85	0.00
1423	LD L30 308	PASS	AISC- H1-3	0.119	22
		1078.77 C	-64.65	-11.00	0.00
1424	LD L30 308	PASS	AISC- H1-3	0.189	22
		3511.37 C	53.51	24.10	1.50
1425	LD L30 308	PASS	AISC- H1-3	0.124	22
		1353.66 C	-63.67	-10.53	1.54
1426	LD L30 308	PASS	AISC- H1-3	0.132	23
		3883.25 C	-7.73	16.10	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1430 LD	L30 307	PASS	AISC- H1-3	0.140	22
		2319.38 C	-36.73	-14.63	1.46
1431 LD	L30 307	PASS	AISC- H1-3	0.104	21
		1774.40 C	24.50	5.90	2.23
1432 LD	L30 307	PASS	AISC- H1-3	0.111	22
		1591.83 C	-18.47	13.95	0.00
1433 LD	L30 307	PASS	AISC- H2-1	0.165	22
		3698.23 T	-67.33	-0.32	0.00
1434 LD	L30 307	PASS	AISC- H1-3	0.142	22
		2380.17 C	37.00	-14.88	1.46
1435 LD	L30 307	PASS	AISC- H1-3	0.107	21
		1842.39 C	-24.67	5.97	2.23
1436 LD	L30 307	PASS	AISC- H1-3	0.113	22
		1643.07 C	18.58	13.89	0.00
1437 LD	L30 307	PASS	AISC- H2-1	0.160	22
		3342.17 T	-69.43	0.19	0.00
1438 LD	L30 307	PASS	AISC- H1-3	0.133	22
		2195.37 C	36.70	-13.31	1.43
1439 LD	L30 307	PASS	AISC- H1-3	0.104	21
		1747.38 C	-25.84	6.48	2.13
1440 LD	L30 307	PASS	AISC- H1-3	0.106	22
		1559.65 C	19.42	12.70	0.00
1441 LD	L30 307	PASS	AISC- H2-1	0.160	22
		3266.68 T	70.04	0.65	0.00
1442 LD	L30 307	PASS	AISC- H1-3	0.131	22
		2145.62 C	-36.33	-13.17	1.43
1443 LD	L30 307	PASS	AISC- H1-3	0.102	21
		1683.35 C	25.79	6.37	2.13
1444 LD	L30 307	PASS	AISC- H1-3	0.105	22
		1512.59 C	-19.39	12.79	0.00
1445 LD	L30 307	PASS	AISC- H2-1	0.155	22
		3300.50 T	65.93	0.53	0.00
1446 LD	L30 307	PASS	AISC- H1-3	0.129	22
		2223.47 C	-33.52	-13.28	1.39
1447 LD	L30 307	PASS	AISC- H1-3	0.100	21
		1751.07 C	25.21	5.96	2.03
1448 LD	L30 307	PASS	AISC- H1-3	0.105	22
		1573.72 C	-19.06	12.66	0.00
1449 LD	L30 307	PASS	AISC- H2-1	0.155	22
		3382.19 T	-65.48	0.00	0.00
1450 LD	L30 307	PASS	AISC- H1-3	0.131	22
		2278.57 C	33.98	-13.43	1.39

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1453 LD	L30 307	PASS	AISC- H2-1	0.156	22
		3348.07 T	-66.22	-0.12	0.00
1454 LD	L30 307	PASS	AISC- H1-3	0.131	22
		2317.98 C	33.48	-13.19	1.36
1455 LD	L30 307	PASS	AISC- H1-3	0.101	21
		1849.65 C	-25.52	5.75	1.93
1456 LD	L30 307	PASS	AISC- H1-3	0.105	22
		1666.74 C	19.40	12.26	0.00
1457 LD	L30 307	PASS	AISC- H2-1	0.155	22
		3260.33 T	66.61	0.48	0.00
1458 LD	L30 307	PASS	AISC- H1-3	0.128	22
		2257.30 C	-32.95	-13.04	1.36
1459 LD	L30 307	PASS	AISC- H1-3	0.099	21
		1772.56 C	25.56	5.66	1.93
1460 LD	L30 307	PASS	AISC- H1-3	0.103	22
		1609.14 C	-19.42	12.34	0.00
1461 LD	L30 307	PASS	AISC- H2-1	0.149	22
		3180.76 T	63.15	0.56	0.00
1462 LD	L30 307	PASS	AISC- H1-3	0.123	22
		2269.25 C	-29.95	-12.54	1.32
1463 LD	L30 307	PASS	AISC- H1-3	0.095	21
		1773.39 C	24.60	5.43	1.83
1464 LD	L30 307	PASS	AISC- H1-3	0.101	22
		1620.28 C	-18.88	11.96	0.00
1465 LD	L30 307	PASS	AISC- H2-1	0.150	22
		3275.38 T	-62.70	-0.13	0.00
1466 LD	L30 307	PASS	AISC- H1-3	0.126	22
		2336.53 C	30.50	-12.70	1.32
1467 LD	L30 307	PASS	AISC- H1-3	0.098	21
		1858.78 C	-24.52	5.51	1.83
1468 LD	L30 307	PASS	AISC- H1-3	0.102	22
		1684.70 C	18.83	11.90	0.00
1469 LD	L30 307	PASS	AISC- H2-1	0.149	22
		3097.67 T	63.87	0.63	0.00
1470 LD	L30 307	PASS	AISC- H1-3	0.121	22
		2284.23 C	-29.12	-12.09	1.29
1471 LD	L30 307	PASS	AISC- H1-3	0.093	21
		1778.63 C	24.57	5.18	1.73
1472 LD	L30 307	PASS	AISC- H1-3	0.099	22
		1639.32 C	-19.03	11.61	0.00
1473 LD	L30 307	PASS	AISC- H2-1	0.149	22
		3200.03 T	-63.36	-0.16	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1476 LD	L30 307	PASS	AISC- H1-3	0.101	22
		1712.01 C	18.97	11.56	0.00
1477 LD	L30 307	PASS	AISC- H2-1	0.143	22
		2980.60 T	61.10	0.82	0.00
1478 LD	L30 307	PASS	AISC- H1-3	0.116	22
		2279.76 C	-26.38	-11.43	1.26
1479 LD	L30 307	PASS	AISC- H1-3	0.089	21
		1761.44 C	23.40	4.98	1.63
1480 LD	L30 307	PASS	AISC- H1-3	0.096	22
		1639.34 C	-18.41	11.17	0.00
1481 LD	L30 307	PASS	AISC- H2-1	0.143	22
		3091.78 T	-60.43	-0.10	0.00
1482 LD	L30 307	PASS	AISC- H1-3	0.119	22
		2364.12 C	26.93	-11.59	1.26
1483 LD	L30 307	PASS	AISC- H1-3	0.092	21
		1868.72 C	-23.33	5.00	1.63
1484 LD	L30 307	PASS	AISC- H1-3	0.098	22
		1722.31 C	18.36	11.14	0.00
1485 LD	L30 307	PASS	AISC- H2-1	0.140	22
		2843.65 T	60.56	1.07	0.00
1486 LD	L30 307	PASS	AISC- H1-3	0.112	22
		2264.99 C	-24.99	-10.75	1.23
1487 LD	L30 307	PASS	AISC- H2-1	0.089	22
		2114.66 T	23.91	6.58	0.00
1488 LD	L30 307	PASS	AISC- H1-3	0.094	22
		1641.00 C	-18.17	10.74	0.00
1489 LD	L30 307	PASS	AISC- H2-1	0.139	22
		2965.12 T	-59.79	-0.01	0.00
1490 LD	L30 307	PASS	AISC- H1-3	0.115	22
		2360.74 C	25.47	-10.91	1.23
1491 LD	L30 307	PASS	AISC- H2-1	0.091	22
		2237.26 T	-23.89	6.19	0.00
1492 LD	L30 307	PASS	AISC- H1-3	0.096	22
		1737.34 C	18.20	10.74	0.00
1493 LD	L30 307	PASS	AISC- H2-1	0.131	22
		2678.12 T	55.83	1.52	0.00
1494 LD	L30 307	PASS	AISC- H1-3	0.105	22
		2231.32 C	-22.08	-10.05	1.20
1495 LD	L30 307	PASS	AISC- H2-1	0.086	22
		2084.93 T	22.75	6.28	0.00
1496 LD	L30 307	PASS	AISC- H1-3	0.090	22
		1656.05 C	-17.04	10.18	0.00

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1499 LD	L30 307	PASS	AISC- H2-1	0.087	22
		2228.34 T	-22.16	5.78	0.00
1500 LD	L30 307	PASS	AISC- H1-3	0.094	22
		1770.97 C	17.32	10.20	0.00
1501 LD	L30 307	PASS	AISC- H2-1	0.125	22
		2426.64 T	54.88	1.39	0.00
1502 LD	L30 307	PASS	AISC- H1-3	0.093	22
		2125.16 C	-17.74	-8.27	1.17
1503 LD	L30 307	PASS	AISC- H2-1	0.084	22
		1929.90 T	22.54	6.86	0.00
1504 LD	L30 307	PASS	AISC- H1-3	0.085	22
		1577.50 C	-16.29	9.83	0.00
1505 LD	L30 307	PASS	AISC- H2-1	0.122	22
		2550.53 T	-53.34	-0.04	0.00
1506 LD	L30 307	PASS	AISC- H1-3	0.096	22
		2250.66 C	5.30	15.83	0.00
1507 LD	L30 307	PASS	AISC- H1-3	0.084	21
		1820.66 C	-20.86	5.13	1.33
1508 LD	L30 307	PASS	AISC- H1-3	0.088	22
		1644.23 C	17.08	9.65	0.00
1510 LD	L30 308	PASS	AISC- H1-1	0.220	22
		6823.23 C	-10.80	26.18	1.54
1511 LD	L30 308	PASS	AISC- H1-1	0.222	22
		7397.33 C	19.72	-15.56	1.50
1512 LD	L30 308	PASS	AISC- H1-1	0.202	21
		6892.80 C	-4.41	19.62	1.50
1513 LD	L30 308	PASS	AISC- H1-1	0.318	21
		10348.02 C	-12.89	-34.26	1.46
1514 LD	L30 308	PASS	AISC- H1-1	0.215	22
		6796.32 C	-13.20	24.10	1.46
1515 LD	L30 308	PASS	AISC- H1-1	0.210	22
		7140.14 C	18.30	-14.99	1.42
1516 LD	L30 308	PASS	AISC- H1-1	0.192	21
		6775.32 C	-4.97	16.70	1.42
1517 LD	L30 308	PASS	AISC- H1-1	0.206	22
		7063.81 C	17.95	-14.50	1.39
1518 LD	L30 308	PASS	AISC- H1-1	0.184	21
		6715.85 C	-3.66	14.84	1.39
1519 LD	L30 308	PASS	AISC- H1-1	0.201	22
		6982.95 C	17.77	-13.77	1.36
1520 LD	L30 308	PASS	AISC- H1-1	0.183	21
		6730.04 C	-5.35	13.58	1.36

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1523 LD	L30 308	PASS	AISC- H1-1	0.189	22
		6828.93 C	15.85	-11.61	1.29
1524 LD	L30 308	PASS	AISC- H1-1	0.175	21
		6800.83 C	-14.94	3.88	0.00
1525 LD	L30 308	PASS	AISC- H1-1	0.183	22
		6723.77 C	15.22	-10.16	1.26
1526 LD	L30 308	PASS	AISC- H1-1	0.177	21
		6942.42 C	-13.17	4.87	0.00
1527 LD	L30 308	PASS	AISC- H1-3	0.180	22
		6602.11 C	-14.11	8.96	0.00
1528 LD	L30 308	PASS	AISC- H1-3	0.161	21
		6392.42 C	-2.95	8.01	1.23
1529 LD	L30 308	PASS	AISC- H1-1	0.187	21
		7477.70 C	8.84	-6.73	1.23
1530 LD	L30 308	PASS	AISC- H1-1	0.270	21
		9831.47 C	14.15	-21.70	0.00
1531 LD	L30 308	PASS	AISC- H1-3	0.171	22
		6308.67 C	14.39	-7.43	0.00
1532 LD	L30 308	PASS	AISC- H1-3	0.186	22
		6359.94 C	14.74	15.07	0.00
1533 LD	L30 308	PASS	AISC- H1-1	0.196	21
		7608.90 C	10.81	-8.80	1.26
1534 LD	L30 308	PASS	AISC- H1-1	0.286	21
		10067.94 C	15.56	-25.52	0.00
1535 LD	L30 308	PASS	AISC- H1-3	0.179	22
		6451.80 C	14.60	-9.32	0.00
1536 LD	L30 308	PASS	AISC- H1-1	0.193	22
		6945.27 C	12.69	14.49	0.00
1537 LD	L30 308	PASS	AISC- H1-1	0.194	21
		7529.00 C	9.70	-8.33	1.29
1538 LD	L30 308	PASS	AISC- H1-1	0.292	21
		10113.24 C	14.83	-28.21	0.00
1539 LD	L30 308	PASS	AISC- H1-3	0.179	22
		6443.28 C	15.39	-8.55	0.00
1540 LD	L30 308	PASS	AISC- H1-1	0.194	22
		6807.24 C	13.44	16.07	0.00
1541 LD	L30 308	PASS	AISC- H1-1	0.195	21
		7545.48 C	10.18	-7.60	1.32
1542 LD	L30 308	PASS	AISC- H1-1	0.300	21
		10187.79 C	15.00	-30.18	0.00
1543 LD	L30 308	PASS	AISC- H1-3	0.181	22
		6468.55 C	16.66	-7.92	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1546 LD	L30 308	PASS	AISC- H1-1	0.306	21
		10272.76 C	14.32	-31.67	0.00
1547 LD	L30 308	PASS	AISC- H1-3	0.183	22
		6479.23 C	18.44	-7.45	0.00
1548 LD	L30 308	PASS	AISC- H1-1	0.200	22
		6714.27 C	13.02	19.27	0.00
1549 LD	L30 308	PASS	AISC- H1-1	0.194	21
		7523.17 C	8.44	-7.00	1.27
1550 LD	L30 308	PASS	AISC- H1-1	0.309	21
		10248.46 C	13.78	-32.97	0.00
1551 LD	L30 308	PASS	AISC- H1-1	0.181	22
		6523.03 C	18.85	-6.83	0.00
1552 LD	L30 308	PASS	AISC- H1-1	0.204	22
		6707.29 C	13.80	20.94	0.00
1553 LD	L30 308	PASS	AISC- H1-1	0.197	21
		7599.22 C	8.65	-6.46	1.31
1554 LD	L30 308	PASS	AISC- H1-1	0.314	21
		10285.60 C	13.68	-33.76	0.00
1555 LD	L30 308	PASS	AISC- H1-1	0.184	22
		6600.54 C	19.56	-6.36	0.00
1556 LD	L30 308	PASS	AISC- H1-1	0.210	22
		6766.88 C	13.71	22.52	0.00
1557 LD	L30 308	PASS	AISC- H1-1	0.198	21
		7634.64 C	-8.29	-5.77	0.12
1558 LD	L30 308	PASS	AISC- H1-1	0.198	21
		6811.77 C	6.34	18.25	0.00
1559 LD	L30 308	PASS	AISC- H1-1	0.186	22
		6669.75 C	-19.61	-5.65	1.46
1560 LD	L30 308	PASS	AISC- H1-1	0.215	22
		7221.28 C	-18.22	-15.32	0.00
1561 LD	L30 308	PASS	AISC- H1-1	0.201	21
		7677.35 C	5.86	-7.06	1.12
1562 LD	L30 308	PASS	AISC- H1-1	0.320	21
		10321.08 C	12.36	-34.63	0.00
1563 LD	L30 308	PASS	AISC- H1-1	0.191	22
		6808.93 C	21.55	-4.79	0.00
1564 LD	L30 308	PASS	AISC- H1-1	0.221	22
		6890.20 C	12.73	26.05	0.00
1565 LD	L30 308	PASS	AISC- H1-1	0.200	21
		7595.99 C	-6.84	-6.15	0.26
1566 LD	L30 308	PASS	AISC- H1-1	0.207	21
		6828.70 C	5.22	22.00	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1570 LD	L30 307	PASS	AISC- H1-3	0.085	24
		1329.16 C	-23.24	-9.24	1.46
1571 LD	L30 307	PASS	AISC- H1-3	0.073	22
		477.19 C	21.65	13.73	0.00
1572 LD	L30 307	PASS	AISC- H1-3	0.066	24
		654.01 C	-10.47	13.57	0.00
1573 LD	L30 307	PASS	AISC- H2-1	0.116	21
		3787.93 T	-9.21	11.89	0.00
1574 LD	L30 307	PASS	AISC- H1-3	0.149	21
		2499.45 C	5.16	36.10	0.00
1575 LD	L30 307	PASS	AISC- H1-3	0.072	23
		950.80 C	11.59	11.85	0.00
1576 LD	L30 307	PASS	AISC- H1-3	0.085	21
		995.23 C	2.73	21.52	0.00
1577 LD	L30 307	PASS	AISC- H2-1	0.119	24
		1946.61 T	48.80	7.05	0.00
1578 LD	L30 307	PASS	AISC- H1-3	0.082	24
		1302.79 C	-22.32	-9.11	1.43
1579 LD	L30 307	PASS	AISC- H2-1	0.068	24
		962.78 T	19.65	10.89	0.00
1580 LD	L30 307	PASS	AISC- H1-3	0.066	24
		674.05 C	-11.42	12.98	0.00
1581 LD	L30 307	PASS	AISC- H2-1	0.116	21
		3698.65 T	-8.87	12.71	0.00
1582 LD	L30 307	PASS	AISC- H1-3	0.148	21
		2496.58 C	5.55	35.85	0.00
1583 LD	L30 307	PASS	AISC- H2-1	0.066	21
		1508.43 T	-3.16	14.39	0.00
1584 LD	L30 307	PASS	AISC- H1-3	0.083	21
		1023.62 C	2.63	20.84	0.00
1585 LD	L30 307	PASS	AISC- H2-1	0.119	21
		3716.74 T	-10.55	13.11	0.00
1586 LD	L30 307	PASS	AISC- H1-3	0.149	21
		2572.86 C	5.76	35.56	0.00
1587 LD	L30 307	PASS	AISC- H2-1	0.068	21
		1561.41 T	-4.19	14.11	0.00
1588 LD	L30 307	PASS	AISC- H1-3	0.084	21
		1082.94 C	3.04	20.48	0.00
1589 LD	L30 307	PASS	AISC- H2-1	0.115	24
		1928.16 T	46.82	6.95	0.00
1590 LD	L30 307	PASS	AISC- H1-3	0.081	24
		1338.78 C	-5.31	18.86	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1593 LD	L30 307	PASS	AISC- H2-1	0.114	24
		1880.37 T	46.39	6.99	0.00
1594 LD	L30 307	PASS	AISC- H1-3	0.080	24
		1346.67 C	-5.45	18.25	0.00
1595 LD	L30 307	PASS	AISC- H1-3	0.070	22
		484.69 C	22.21	12.60	0.00
1596 LD	L30 307	PASS	AISC- H1-3	0.062	24
		675.46 C	-11.96	11.75	0.00
1597 LD	L30 307	PASS	AISC- H2-1	0.116	21
		3588.43 T	-9.57	13.71	0.00
1598 LD	L30 307	PASS	AISC- H1-3	0.147	21
		2554.45 C	6.23	34.93	0.00
1599 LD	L30 307	PASS	AISC- H2-1	0.066	21
		1532.97 T	-3.39	14.26	0.00
1600 LD	L30 307	PASS	AISC- H1-3	0.081	21
		1075.39 C	2.83	19.88	0.00
1601 LD	L30 307	PASS	AISC- H2-1	0.110	24
		1845.12 T	43.73	7.13	0.00
1602 LD	L30 307	PASS	AISC- H1-3	0.079	24
		1362.01 C	-5.43	17.73	0.00
1603 LD	L30 307	PASS	AISC- H1-3	0.069	22
		494.50 C	21.64	12.42	0.00
1604 LD	L30 307	PASS	AISC- H1-3	0.061	24
		700.81 C	-11.61	11.21	0.00
1605 LD	L30 307	PASS	AISC- H2-1	0.116	21
		3539.95 T	-9.42	14.30	0.00
1606 LD	L30 307	PASS	AISC- H1-3	0.147	21
		2597.60 C	6.66	34.16	0.00
1607 LD	L30 307	PASS	AISC- H2-1	0.065	21
		1466.76 T	-3.02	14.34	0.00
1608 LD	L30 307	PASS	AISC- H1-3	0.077	21
		1041.45 C	2.76	19.06	0.00
1609 LD	L30 307	PASS	AISC- H2-1	0.109	24
		1763.93 T	43.86	7.33	0.00
1610 LD	L30 307	PASS	AISC- H1-3	0.077	24
		1351.53 C	-5.11	16.99	0.00
1611 LD	L30 307	PASS	AISC- H1-3	0.070	22
		565.43 C	21.10	12.50	0.00
1612 LD	L30 307	PASS	AISC- H1-3	0.058	24
		683.06 C	-11.60	10.51	0.00
1613 LD	L30 307	PASS	AISC- H2-1	0.118	21
		3441.07 T	-10.86	15.33	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1616 LD	L30 307	PASS	AISC- H1-3	0.075	21
		1047.79 C	3.15	18.51	0.00
1617 LD	L30 307	PASS	AISC- H2-1	0.105	24
		1689.90 T	41.21	7.68	0.00
1618 LD	L30 307	PASS	AISC- H1-3	0.074	24
		1342.02 C	-4.83	16.22	0.00
1619 LD	L30 307	PASS	AISC- H1-3	0.070	22
		621.05 C	20.01	12.60	0.00
1620 LD	L30 307	PASS	AISC- H1-3	0.055	24
		607.01 C	-10.70	9.97	0.00
1621 LD	L30 307	PASS	AISC- H2-1	0.115	21
		3218.60 T	-9.74	16.60	0.00
1622 LD	L30 307	PASS	AISC- H1-3	0.141	21
		2539.19 C	7.08	32.18	0.00
1623 LD	L30 307	PASS	AISC- H2-1	0.064	21
		1343.39 T	-3.57	14.87	0.00
1624 LD	L30 307	PASS	AISC- H1-3	0.070	21
		991.46 C	2.89	17.67	0.00
1625 LD	L30 307	PASS	AISC- H2-1	0.103	24
		1566.85 T	41.71	8.01	0.00
1626 LD	L30 307	PASS	AISC- H1-3	0.070	24
		1300.63 C	-4.13	15.30	0.00
1627 LD	L30 307	PASS	AISC- H1-3	0.072	22
		730.99 C	19.17	12.98	0.00
1628 LD	L30 307	PASS	AISC- H1-3	0.051	24
		654.82 C	-10.01	9.23	0.00
1629 LD	L30 307	PASS	AISC- H2-1	0.113	21
		3029.36 T	-9.19	17.99	0.00
1630 LD	L30 307	PASS	AISC- H1-3	0.137	21
		2493.65 C	7.31	30.70	0.00
1631 LD	L30 307	PASS	AISC- H2-1	0.061	21
		1169.62 T	-3.27	15.36	0.00
1632 LD	L30 307	PASS	AISC- H1-3	0.064	21
		875.96 C	2.74	16.64	0.00
1633 LD	L30 307	PASS	AISC- H2-1	0.099	24
		1430.36 T	39.43	8.53	0.00
1634 LD	L30 307	PASS	AISC- H1-3	0.065	24
		1248.80 C	-2.97	14.28	0.00
1635 LD	L30 307	PASS	AISC- H1-3	0.076	22
		909.26 C	18.48	13.57	0.00
1636 LD	L30 307	PASS	AISC- H1-3	0.045	24
		602.47 C	-6.01	8.42	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1639 LD	L30 307	PASS	AISC- H2-1	0.061	21
		1025.20 T	-4.62	15.86	0.00
1640 LD	L30 307	PASS	AISC- H1-3	0.059	21
		793.39 C	2.77	15.45	0.00
1641 LD	L30 307	PASS	AISC- H2-1	0.097	24
		1304.39 T	40.23	8.68	0.00
1642 LD	L30 307	PASS	AISC- H1-3	0.065	24
		1178.31 C	-17.73	-6.05	1.17
1643 LD	L30 307	PASS	AISC- H2-1	0.075	24
		883.80 T	30.08	8.57	0.00
1644 LD	L30 307	PASS	AISC- H2-1	0.062	23
		635.92 T	20.16	10.95	1.63
1645 LD	L30 307	PASS	AISC- H2-1	0.110	21
		2522.80 T	-8.56	21.85	0.00
1646 LD	L30 307	PASS	AISC- H1-3	0.125	21
		2294.57 C	7.36	28.07	0.00
1647 LD	L30 307	PASS	AISC- H2-1	0.075	21
		1688.46 T	-3.53	16.91	0.00
1648 LD	L30 307	PASS	AISC- H1-3	0.083	21
		1338.45 C	-8.18	-16.63	1.63
1650 LD	L30 308	PASS	AISC- H1-1	0.201	21
		6577.72 C	5.76	21.47	1.54
1651 LD	L30 308	PASS	AISC- H1-1	0.218	22
		7218.52 C	-19.13	-15.72	1.50
1652 LD	L30 308	PASS	AISC- H1-1	0.195	21
		6624.54 C	4.79	18.92	1.50
1653 LD	L30 308	PASS	AISC- H1-1	0.210	22
		7026.56 C	-17.75	-15.49	1.46
1654 LD	L30 308	PASS	AISC- H1-1	0.190	21
		6524.13 C	6.51	17.54	1.46
1655 LD	L30 308	PASS	AISC- H1-1	0.205	22
		6933.15 C	-17.85	-15.18	1.42
1656 LD	L30 308	PASS	AISC- H1-1	0.183	21
		6466.00 C	5.11	15.98	1.42
1657 LD	L30 308	PASS	AISC- H1-1	0.201	22
		6845.34 C	-17.48	-14.72	1.39
1658 LD	L30 308	PASS	AISC- H1-3	0.178	21
		6381.88 C	3.82	14.10	1.39
1659 LD	L30 308	PASS	AISC- H1-1	0.196	22
		6751.16 C	-17.21	-14.03	1.36
1660 LD	L30 308	PASS	AISC- H1-3	0.176	21
		6367.39 C	5.45	12.83	1.36

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1663	LD L30 306	PASS	AISC- H1-3	0.188	22
		6564.57 C	-14.98	-11.97	1.29
1664	LD L30 308	PASS	AISC- H1-3	0.169	21
		6364.52 C	15.91	4.07	0.00
1665	LD L30 308	PASS	AISC- H1-3	0.181	22
		6466.86 C	13.49	11.22	0.00
1666	LD L30 308	PASS	AISC- H1-3	0.170	21
		6456.26 C	13.80	4.98	0.00
1667	LD L30 308	PASS	AISC- H1-3	0.174	22
		6309.80 C	14.06	9.34	0.00
1668	LD L30 308	PASS	AISC- H1-3	0.152	21
		5927.66 C	4.67	8.11	1.23
1669	LD L30 308	PASS	AISC- H1-1	0.180	22
		6465.66 C	-16.87	-4.55	0.00
1670	LD L30 308	PASS	AISC- H1-1	0.212	22
		6573.29 C	-10.18	25.39	0.00
1671	LD L30 308	PASS	AISC- H1-1	0.194	21
		7371.18 C	-4.67	-6.86	1.15
1673	LD L30 308	PASS	AISC- H1-1	0.185	22
		6571.88 C	-20.89	-4.58	0.00
1674	LD L30 308	PASS	AISC- H1-1	0.214	22
		6601.06 C	35.55	-12.71	1.50
1675	LD L30 308	PASS	AISC- H1-1	0.194	21
		7436.73 C	-5.14	-7.03	1.12
1676	LD L30 308	PASS	AISC- H1-1	0.315	21
		10130.86 C	-11.61	-34.76	0.00
1677	LD L30 308	PASS	AISC- H1-1	0.179	22
		6415.40 C	-19.16	-5.44	0.00
1678	LD L30 308	PASS	AISC- H1-1	0.206	22
		6508.77 C	-12.88	23.40	0.00
1679	LD L30 308	PASS	AISC- H1-1	0.191	21
		7378.50 C	-6.45	-6.49	1.22
1680	LD L30 308	PASS	AISC- H1-1	0.313	21
		10152.86 C	-12.30	-34.42	0.00
1681	LD L30 308	PASS	AISC- H1-3	0.181	22
		6328.67 C	-19.16	-6.12	0.00
1682	LD L30 308	PASS	AISC- H1-1	0.201	22
		6457.54 C	-13.43	21.80	0.00
1683	LD L30 308	PASS	AISC- H1-1	0.190	21
		7325.77 C	-6.99	-7.00	1.19
1684	LD L30 308	PASS	AISC- H1-1	0.309	21
		10079.58 C	-13.14	-33.95	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1687	LD L30 308	PASS	AISC- H1-1	0.187	21
		7230.29 C	-6.93	-7.39	1.16
1688	LD L30 308	PASS	AISC- H1-1	0.304	21
		10030.06 C	-13.22	-33.20	0.00
1689	LD L30 308	PASS	AISC- H1-3	0.175	22
		6166.15 C	-17.96	-7.15	0.00
1690	LD L30 308	PASS	AISC- H1-3	0.195	22
		6351.76 C	-12.77	18.52	0.00
1691	LD L30 308	PASS	AISC- H1-1	0.186	21
		7229.84 C	-9.30	-6.49	1.36
1692	LD L30 308	PASS	AISC- H1-1	0.300	21
		10040.92 C	-13.67	-31.93	0.00
1693	LD L30 308	PASS	AISC- H1-3	0.172	22
		6130.21 C	-16.10	-7.58	0.00
1694	LD L30 308	PASS	AISC- H1-3	0.192	22
		6354.63 C	-13.39	17.04	0.00
1695	LD L30 308	PASS	AISC- H1-1	0.186	21
		7207.34 C	-9.47	-7.25	1.32
1696	LD L30 308	PASS	AISC- H1-1	0.294	21
		9941.00 C	-14.24	-30.49	0.00
1697	LD L30 308	PASS	AISC- H1-3	0.169	22
		6075.24 C	-14.56	-8.15	0.00
1698	LD L30 308	PASS	AISC- H1-3	0.187	22
		6370.69 C	-12.78	15.33	0.00
1699	LD L30 308	PASS	AISC- H1-1	0.184	21
		7161.59 C	-8.72	-7.91	1.29
1700	LD L30 308	PASS	AISC- H1-1	0.286	21
		9849.80 C	-13.85	-28.56	0.00
1701	LD L30 308	PASS	AISC- H1-3	0.167	22
		6054.77 C	-13.25	-8.79	0.00
1702	LD L30 308	PASS	AISC- H1-3	0.183	22
		6459.45 C	-11.48	13.73	0.00
1703	LD L30 308	PASS	AISC- H1-1	0.185	21
		7200.88 C	-9.23	-8.33	1.26
1704	LD L30 308	PASS	AISC- H1-1	0.278	21
		9778.59 C	-14.14	-25.95	0.00
1705	LD L30 308	PASS	AISC- H1-3	0.158	22
		5892.38 C	-11.91	-6.93	0.00
1706	LD L30 308	PASS	AISC- H1-3	0.170	22
		5896.99 C	-12.07	13.35	0.00
1707	LD L30 308	PASS	AISC- H1-1	0.175	21
		7064.03 C	-6.52	-6.52	1.23

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1710	LD L30 307	PASS	AISC- H1-3	0.151	21
		2552.61 C	-5.38	36.17	0.00
1711	LD L30 307	PASS	AISC- H1-3	0.072	24
		928.06 C	12.77	11.49	0.00
1712	LD L30 307	PASS	AISC- H1-3	0.087	21
		1039.97 C	-2.84	21.45	0.00
1713	LD L30 307	PASS	AISC- H2-1	0.116	21
		3769.50 T	8.35	12.25	0.00
1714	LD L30 307	PASS	AISC- H1-3	0.150	21
		2543.08 C	-5.65	35.89	0.00
1715	LD L30 307	PASS	AISC- H2-1	0.067	21
		1568.44 T	2.95	14.28	0.00
1716	LD L30 307	PASS	AISC- H1-3	0.084	21
		1068.13 C	-2.68	20.73	0.00
1717	LD L30 307	PASS	AISC- H2-1	0.119	21
		3798.16 T	10.08	12.59	0.00
1718	LD L30 307	PASS	AISC- H1-3	0.151	21
		2627.61 C	-5.81	35.62	0.00
1719	LD L30 307	PASS	AISC- H2-1	0.069	21
		1631.40 T	4.18	13.96	0.00
1720	LD L30 307	PASS	AISC- H1-3	0.085	21
		1134.89 C	-3.03	20.39	0.00
1721	LD L30 307	PASS	AISC- H2-1	0.116	21
		3676.41 T	9.14	13.11	0.00
1722	LD L30 307	PASS	AISC- H1-3	0.149	21
		2615.11 C	-6.23	35.00	0.00
1723	LD L30 307	PASS	AISC- H2-1	0.068	21
		1610.07 T	3.52	14.08	0.00
1724	LD L30 307	PASS	AISC- H1-3	0.082	21
		1133.21 C	-2.79	19.80	0.00
1725	LD L30 307	PASS	AISC- H2-1	0.116	21
		3634.63 T	9.01	13.61	0.00
1726	LD L30 307	PASS	AISC- H1-3	0.149	21
		2664.71 C	-6.64	34.23	0.00
1727	LD L30 307	PASS	AISC- H2-1	0.066	21
		1551.96 T	3.25	14.12	0.00
1728	LD L30 307	PASS	AISC- H1-3	0.078	21
		1106.12 C	-2.71	18.99	0.00
1729	LD L30 307	PASS	AISC- H2-1	0.118	21
		3543.50 T	10.36	14.54	0.00
1730	LD L30 307	PASS	AISC- H1-3	0.147	21
		2687.62 C	-6.74	33.39	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1733	LD L30 307	PASS	AISC- H2-1	0.115	21
		3329.89 T	9.14	15.68	0.00
1734	LD L30 307	PASS	AISC- H1-3	0.143	21
		2623.37 C	-7.07	32.24	0.00
1735	LD L30 307	PASS	AISC- H2-1	0.066	21
		1450.73 T	3.74	14.55	0.00
1736	LD L30 307	PASS	AISC- H1-3	0.073	21
		1074.78 C	-2.85	17.64	0.00
1737	LD L30 307	PASS	AISC- H2-1	0.112	21
		3151.12 T	8.46	16.91	0.00
1738	LD L30 307	PASS	AISC- H1-3	0.139	21
		2589.31 C	-7.35	30.75	0.00
1739	LD L30 307	PASS	AISC- H2-1	0.063	21
		1292.09 T	3.20	14.97	0.00
1740	LD L30 307	PASS	AISC- H1-3	0.067	21
		972.80 C	-2.79	16.64	0.00
1741	LD L30 307	PASS	AISC- H2-1	0.111	21
		2897.98 T	7.99	18.79	0.00
1742	LD L30 307	PASS	AISC- H1-3	0.133	21
		2493.14 C	-7.05	29.18	0.00
1743	LD L30 307	PASS	AISC- H2-1	0.062	21
		1157.71 T	3.85	15.37	0.00
1744	LD L30 307	PASS	AISC- H1-3	0.062	21
		899.67 C	-3.01	15.46	0.00
1745	LD L30 307	PASS	AISC- H2-1	0.108	21
		2640.08 T	7.33	20.44	0.00
1746	LD L30 307	PASS	AISC- H1-3	0.128	21
		2395.91 C	-7.69	27.94	0.00
1747	LD L30 307	PASS	AISC- H2-1	0.074	21
		1770.34 T	1.71	16.30	0.00
1748	LD L30 307	PASS	AISC- H1-3	0.086	21
		1404.40 C	9.26	-16.78	1.63
1749	LD L30 307	PASS	AISC- H2-1	0.070	23
		2043.41 T	-9.79	7.03	0.00
1750	LD L30 307	PASS	AISC- H1-3	0.078	23
		1327.72 C	0.91	19.75	0.00
1751	LD L30 307	PASS	AISC- H1-3	0.071	22
		427.45 C	-21.19	13.69	0.00
1752	LD L30 307	PASS	AISC- H1-3	0.060	21
		628.04 C	-12.62	9.73	2.40
1753	LD L30 307	PASS	AISC- H2-1	0.072	22
		894.91 T	-19.68	13.37	0.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1756	LD L30 307	PASS	AISC- H1-3	0.056	21
		511.76 C	-13.44	9.68	2.31
1757	LD L30 307	PASS	AISC- H2-1	0.074	22
		827.66 T	-21.45	13.59	0.00
1758	LD L30 307	PASS	AISC- H1-3	0.077	23
		1323.64 C	2.14	18.93	0.00
1759	LD L30 307	PASS	AISC- H1-3	0.067	22
		357.15 C	-22.70	12.55	0.00
1760	LD L30 307	PASS	AISC- H1-3	0.054	21
		564.59 C	-13.41	8.52	2.22
1761	LD L30 307	PASS	AISC- H2-1	0.073	22
		800.60 T	-20.59	13.99	0.00
1762	LD L30 307	PASS	AISC- H1-3	0.076	23
		1331.20 C	2.37	18.33	0.00
1763	LD L30 307	PASS	AISC- H1-3	0.067	22
		407.88 C	-22.41	12.42	0.00
1764	LD L30 307	PASS	AISC- H1-3	0.052	21
		596.20 C	-12.99	7.58	2.13
1765	LD L30 307	PASS	AISC- H2-1	0.073	22
		791.31 T	-20.19	14.46	0.00
1766	LD L30 307	PASS	AISC- H1-3	0.075	23
		1347.37 C	2.56	17.81	0.00
1767	LD L30 307	PASS	AISC- H1-3	0.066	22
		409.22 C	-21.91	12.21	0.00
1768	LD L30 307	PASS	AISC- H1-3	0.049	21
		603.70 C	-12.28	6.69	2.04
1769	LD L30 307	PASS	AISC- H2-1	0.072	22
		732.07 T	-19.29	15.20	0.00
1770	LD L30 307	PASS	AISC- H1-3	0.073	23
		1336.69 C	2.52	17.07	0.00
1771	LD L30 307	PASS	AISC- H1-3	0.067	22
		470.40 C	-21.39	12.24	0.00
1772	LD L30 307	PASS	AISC- H1-3	0.046	21
		647.51 C	-11.30	5.63	1.96
1773	LD L30 307	PASS	AISC- H2-1	0.072	22
		676.61 T	-18.68	16.14	0.00
1774	LD L30 307	PASS	AISC- H1-3	0.071	23
		1327.86 C	2.57	16.30	0.00
1775	LD L30 307	PASS	AISC- H1-3	0.066	22
		514.03 C	-20.25	12.28	0.00
1776	LD L30 307	PASS	AISC- H1-3	0.043	21
		681.03 C	-10.03	4.70	1.87

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1779	LD L30 307	PASS	AISC- H1-3	0.068	22
		609.34 C	-19.19	12.58	0.00
1780	LD L30 307	PASS	AISC- H1-3	0.040	21
		749.77 C	-8.46	3.53	1.79
1781	LD L30 307	PASS	AISC- H2-1	0.070	22
		439.01 T	-16.38	18.71	0.00
1782	LD L30 307	PASS	AISC- H1-3	0.063	23
		1235.03 C	1.49	14.35	0.00
1783	LD L30 307	PASS	AISC- H1-3	0.070	22
		758.64 C	-17.83	13.08	0.00
1784	LD L30 307	PASS	AISC- H1-3	0.039	21
		883.61 C	-1.46	-5.52	0.85
1785	LD L30 307	PASS	AISC- H2-1	0.072	22
		429.69 T	-16.24	19.99	0.00
1786	LD L30 307	PASS	AISC- H1-3	0.058	23
		1177.35 C	0.58	13.42	0.00
1787	LD L30 307	PASS	AISC- H2-1	0.059	23
		882.17 T	-16.91	8.83	0.00
1788	LD L30 307	PASS	AISC- H2-1	0.061	24
		603.05 T	-19.28	11.02	1.63
1789	LD L30 308	PASS	AISC- H1-3	0.059	23
		125.24 C	-3.51	26.13	3.05
1790	LD L30 308	PASS	AISC- H1-3	0.063	23
		127.50 C	-3.91	27.78	3.20
1791	LD L30 308	PASS	AISC- H1-3	0.062	23
		122.53 C	-3.20	27.15	3.35
1792	LD L30 308	PASS	AISC- H1-3	0.081	21
		200.66 C	4.90	35.32	0.00
1793	LD L30 308	PASS	AISC- H1-3	0.088	21
		205.14 C	5.13	38.11	0.00
1794	LD L30 308	PASS	AISC- H1-3	0.089	21
		197.17 C	4.40	38.51	0.00
1795	LD L30 308	PASS	AISC- H1-3	0.081	21
		200.63 C	-4.85	35.04	0.00
1796	LD L30 308	PASS	AISC- H1-3	0.087	21
		205.01 C	-4.88	37.86	0.00
1797	LD L30 308	PASS	AISC- H1-3	0.087	21
		197.00 C	-3.75	38.33	0.00
1798	LD L30 308	PASS	AISC- H1-3	0.077	21
		203.74 C	5.06	33.50	0.00
1799	LD L30 308	PASS	AISC- H1-3	0.070	21
		196.95 C	5.07	30.39	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1802	LD L30 308	PASS	AISC- H1-3	0.052	23
		122.69 C	-3.55	22.78	2.75
1803	LD L30 308	PASS	AISC- H1-3	0.057	23
		127.46 C	-3.59	25.04	2.90
1804	LD L30 308	PASS	AISC- H1-3	0.065	21
		199.07 C	4.92	28.04	2.60
1805	LD L30 308	PASS	AISC- H1-3	0.070	21
		196.93 C	5.20	30.09	2.75
1806	LD L30 308	PASS	AISC- H1-3	0.077	21
		203.77 C	5.09	33.21	2.90
1807	LD L30 308	PASS	AISC- H1-3	0.059	21
		191.36 C	4.85	25.05	0.00
1808	LD L30 308	PASS	AISC- H1-3	0.054	21
		191.85 C	4.90	22.47	0.00
1809	LD L30 308	PASS	AISC- H1-3	0.035	23
		117.67 C	-2.95	14.94	2.30
1810	LD L30 308	PASS	AISC- H1-3	0.041	23
		117.46 C	-3.17	17.69	2.45
1811	LD L30 308	PASS	AISC- H1-3	0.058	21
		191.37 C	-4.92	24.73	0.00
1812	LD L30 308	PASS	AISC- H1-3	0.053	21
		191.79 C	-4.70	22.14	0.00
1813	LD L30 308	PASS	AISC- H1-3	0.043	21
		271.85 C	3.44	16.69	0.00
1814	LD L30 308	PASS	AISC- H1-3	0.046	21
		183.05 C	4.98	18.82	0.00
1815	LD L30 308	PASS	AISC- H1-3	0.031	23
		136.82 C	-0.73	13.99	0.00
1816	LD L30 308	PASS	AISC- H1-3	0.076	23
		112.85 C	4.85	9.07	0.00
1817	LD L30 308	PASS	AISC- H1-3	0.040	21
		283.20 C	-1.59	16.32	0.00
1818	LD L30 308	PASS	AISC- H1-3	0.045	21
		183.05 C	4.04	18.46	2.15
1821	LD L30 307	PASS	AISC- H1-3	0.102	22
		190.69 C	17.86	34.72	1.00
1825	LD L30 307	PASS	AISC- H2-1	0.076	21
		1264.79 T	12.13	15.75	1.00
1826	LD L30 307	PASS	AISC- H1-3	0.113	21
		1562.12 C	-17.55	-24.63	0.00
1827	ST PIP X100	PASS	AISC- H1-2	0.368	21
		49809.47 C	0.00	559.22	1.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1830	ST PIP X100	PASS	AISC- H1-3	0.215	22
		22036.13 C	0.00	781.34	1.00
1831	ST PIP X100	PASS	AISC- H1-3	0.238	22
		22110.07 C	0.00	1020.49	1.00
1832	ST PIP X100	PASS	AISC- H1-2	0.279	22
		29114.10 C	0.00	1018.70	0.00
1833	ST PIP X100	PASS	AISC- H1-2	0.244	22
		25702.40 C	0.00	873.40	1.00
1834	ST PIP X100	PASS	AISC- H1-2	0.258	22
		25719.55 C	0.00	1030.52	1.00
1835	ST PIP X100	PASS	AISC- H1-2	0.304	22
		32880.80 C	0.00	1033.86	0.00
1836	ST PIP X100	PASS	AISC- H1-2	0.277	22
		29555.95 C	0.00	972.98	1.00
1837	ST PIP X100	PASS	AISC- H1-2	0.289	22
		29523.50 C	0.00	1101.03	1.00
1838	ST PIP X100	PASS	AISC- H1-2	0.334	22
		36473.94 C	0.00	1111.90	0.00
1839	ST PIP X100	PASS	AISC- H1-2	0.308	22
		33302.05 C	0.00	1041.10	1.00
1840	ST PIP X100	PASS	AISC- H1-2	0.317	22
		33238.24 C	0.00	1151.15	1.00
1841	ST PIP X100	PASS	AISC- H1-2	0.362	22
		39994.68 C	0.00	1168.31	0.00
1842	ST PIP X100	PASS	AISC- H1-2	0.334	22
		36958.53 C	0.00	1079.37	1.00
1843	ST PIP X100	PASS	AISC- H1-2	0.343	22
		36872.89 C	0.00	1179.15	1.00
1844	ST PIP X100	PASS	AISC- H1-2	0.386	22
		43367.23 C	0.00	1201.19	0.00
1845	ST PIP X100	PASS	AISC- H1-2	0.358	22
		40312.17 C	0.00	1102.26	1.00
1846	ST PIP X100	PASS	AISC- H1-2	0.378	22
		40189.17 C	0.00	1328.47	1.00
1847	ST PIP X100	PASS	AISC- H1-2	0.415	21
		42946.94 C	0.00	1545.28	1.00
1848	ST PIP X100	PASS	AISC- H1-2	0.412	21
		42962.70 C	0.00	1507.59	0.00
1849	ST PIP X100	PASS	AISC- H1-2	0.471	21
		56479.32 C	0.00	1214.23	0.00
1850	ST PIP X100	PASS	AISC- H1-2	0.475	21
		49830.29 C	0.00	1717.89	1.00

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1853	ST PIP X100	PASS	AISC- H1-2	0.537	21
		57044.04 C	0.00	1889.31	1.00
1854	ST PIP X100	PASS	AISC- H1-2	0.534	21
		56856.23 C	0.00	1869.26	0.00
1855	ST PIP X100	PASS	AISC- H1-2	0.588	21
		70239.48 C	0.00	1544.67	0.00
1856	ST PIP X100	PASS	AISC- H1-2	0.593	21
		64049.23 C	0.00	2013.62	1.00
1857	ST PIP X100	PASS	AISC- H1-2	0.590	21
		63800.05 C	0.00	1999.91	0.00
1858	ST PIP X100	PASS	AISC- H1-2	0.641	21
		76767.66 C	0.00	1665.34	0.00
1859	ST PIP X100	PASS	AISC- H1-2	0.646	21
		70988.85 C	0.00	2113.74	1.00
1860	ST PIP X100	PASS	AISC- H1-2	0.643	21
		70699.48 C	0.00	2104.13	0.00
1861	ST PIP X100	PASS	AISC- H1-2	0.687	21
		82936.16 C	0.00	1745.13	0.00
1862	ST PIP X100	PASS	AISC- H1-2	0.684	21
		77009.06 C	0.00	2110.08	1.00
1863	ST PIP X100	PASS	AISC- H1-2	0.701	21
		76703.41 C	0.00	2315.64	1.00
1864	ST PIP X100	PASS	AISC- H1-3	0.215	22
		22036.13 C	0.00	781.34	1.00
1865	ST PIP X100	PASS	AISC- H1-3	0.238	22
		22110.07 C	0.00	1020.49	1.00
1866	ST PIP X100	PASS	AISC- H1-2	0.279	22
		29114.10 C	0.00	1018.70	0.00
1867	ST PIP X100	PASS	AISC- H1-2	0.244	22
		25702.41 C	0.00	873.40	1.00
1868	ST PIP X100	PASS	AISC- H1-2	0.258	22
		25719.55 C	0.00	1030.51	1.00
1869	ST PIP X100	PASS	AISC- H1-2	0.304	22
		32880.80 C	0.00	1033.85	0.00
1870	ST PIP X100	PASS	AISC- H1-2	0.277	22
		29555.93 C	0.00	972.98	1.00
1871	ST PIP X100	PASS	AISC- H1-2	0.289	22
		29523.47 C	0.00	1101.00	1.00
1872	ST PIP X100	PASS	AISC- H1-2	0.334	22
		36473.85 C	0.00	1111.88	0.00
1873	ST PIP X100	PASS	AISC- H1-2	0.308	22
		33301.82 C	0.00	1041.09	1.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1876	ST PIP X100	PASS	AISC- H1-2	0.334	22
		36963.34 C	0.00	1079.55	1.00
1877	ST PIP X100	PASS	AISC- H1-2	0.343	22
		36878.13 C	0.00	1179.83	1.00
1878	ST PIP X100	PASS	AISC- H1-2	0.386	22
		43369.06 C	0.00	1202.09	0.00
1879	ST PIP X100	PASS	AISC- H1-2	0.358	22
		40303.79 C	0.00	1102.96	1.00
1880	ST PIP X100	PASS	AISC- H1-2	0.377	22
		40179.65 C	0.00	1317.25	1.00
1881	LD L30 307	PASS	AISC- H1-3	0.123	22
		1690.95 C	8.46	29.45	0.00
1882	LD L30 307	PASS	AISC- H2-1	0.117	21
		196.72 T	32.43	32.53	0.00
1883	LD L30 307	PASS	AISC- H1-3	0.106	21
		2120.14 C	7.84	15.42	1.83
1884	LD L30 307	PASS	AISC- H1-3	0.113	22
		1455.48 C	7.73	29.20	0.00
1885	LD L30 307	PASS	AISC- H2-1	0.118	21
		108.58 T	33.35	33.29	0.00
1886	LD L30 307	PASS	AISC- H1-3	0.095	21
		1813.73 C	7.93	16.07	1.67
1887	LD L30 307	PASS	AISC- H1-3	0.108	22
		1376.03 C	7.64	28.81	0.00
1888	LD L30 307	PASS	AISC- H2-1	0.121	21
		108.18 T	33.72	34.60	0.00
1889	LD L30 307	PASS	AISC- H1-3	0.093	21
		1695.23 C	-25.98	-5.79	0.00
1890	LD L30 307	PASS	AISC- H1-3	0.102	22
		1282.34 C	7.51	27.76	0.00
1891	LD L30 307	PASS	AISC- H1-3	0.122	22
		77.74 C	-32.98	-35.54	0.00
1892	LD L30 307	PASS	AISC- H1-3	0.094	21
		1582.79 C	-25.12	-8.81	0.00
1893	LD L30 307	PASS	AISC- H2-1	0.094	21
		1050.42 T	11.31	26.76	1.17
1894	LD L30 307	PASS	AISC- H1-3	0.138	22
		373.49 C	-33.44	-39.32	0.00
1895	LD L30 307	PASS	AISC- H1-3	0.106	21
		1674.54 C	-25.93	-13.85	0.00
1896	LD L30 307	PASS	AISC- H1-3	0.113	21
		1562.14 C	-17.54	-24.63	1.00

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1899 LD	L30 307	PASS	AISC- H1-3	0.106	21
		1674.61 C	-25.92	-13.85	1.17
1900 LD	L30 307	PASS	AISC- H1-3	0.138	22
		373.47 C	-33.46	-39.32	1.17
1901 LD	L30 307	PASS	AISC- H2-1	0.094	21
		1050.35 T	11.30	26.76	0.00
1902 LD	L30 307	PASS	AISC- H1-1	0.339	21
		8641.62 C	39.76	-42.74	1.07
1903 LD	L30 307	PASS	AISC- H1-3	0.130	22
		3961.51 C	-20.04	2.87	0.00
1904 LD	L30 307	PASS	AISC- H1-3	0.193	22
		4305.71 C	19.63	29.19	0.00
1905 LD	L30 307	PASS	AISC- H1-3	0.089	24
		2215.28 C	-13.57	7.75	0.00
1906 LD	L30 307	PASS	AISC- H1-3	0.202	22
		4732.63 C	-45.40	11.87	0.00
1907 LD	L30 307	PASS	AISC- H1-3	0.210	21
		4079.91 C	-35.47	29.68	0.00
1908 LD	L30 305	PASS	AISC- H2-1	0.044	20
		126.96 T	-13.00	5.71	1.87
1909 LD	L30 305	PASS	AISC- H2-1	0.049	24
		228.68 T	-14.15	5.98	1.87
1910 LD	L30 305	PASS	AISC- H2-1	0.044	20
		125.15 T	-12.99	5.87	1.87
1911 LD	L30 305	PASS	AISC- H1-3	0.072	24
		252.35 C	-15.90	11.41	0.00
1912 LD	L30 305	PASS	AISC- H1-3	0.092	24
		243.22 C	-24.63	13.15	2.00
1913 LD	L30 305	PASS	AISC- H1-3	0.072	23
		294.15 C	-13.60	12.38	0.00
1914 LD	L30 308	PASS	AISC- H2-1	0.172	21
		2895.99 T	68.65	21.86	1.00
1915 LD	L30 308	PASS	AISC- H2-1	0.201	22
		3290.72 T	105.69	11.31	1.00
1916 LD	L30 305	PASS	AISC- H1-3	0.067	21
		323.32 C	-18.71	6.82	0.00
1917 LD	L30 305	PASS	AISC- H1-3	0.065	22
		395.65 C	-14.33	8.18	1.87
1918 LD	L30 305	PASS	AISC- H2-1	0.047	24
		162.60 T	-15.53	4.95	0.00
1919 LD	L30 308	PASS	AISC- H1-3	0.135	22
		2835.90 C	32.33	20.46	1.00

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1922 LD	L30 308	PASS	AISC- H1-3	0.163	22
		504.21 C	101.02	20.65	1.00
1923 LD	L30 305	PASS	AISC- H1-3	0.073	24
		476.89 C	21.00	5.29	1.87
1924 LD	L30 305	PASS	AISC- H1-3	0.068	21
		354.25 C	-18.75	7.03	1.87
1925 LD	L30 305	PASS	AISC- H2-1	0.045	20
		128.71 T	-12.79	6.20	0.00
1926 LD	L30 305	PASS	AISC- H1-3	0.069	22
		215.26 C	-27.45	3.54	0.00
1927 LD	L30 305	PASS	AISC- H1-3	0.072	22
		209.24 C	-29.35	3.53	1.87
1928 LD	L30 305	PASS	AISC- H2-1	0.044	20
		125.15 T	-12.99	5.87	0.00
1929 LD	L30 305	PASS	AISC- H2-1	0.033	22
		129.88 T	-11.60	-2.99	0.00
1930 LD	L30 305	PASS	AISC- H2-1	0.097	21
		30.98 T	20.66	20.62	0.00
1931 LD	L30 305	PASS	AISC- H2-1	0.060	24
		305.81 T	-8.04	12.92	1.32
1932 LD	L30 305	PASS	AISC- H1-3	0.186	23
		121.91 C	13.25	-55.64	1.00
1933 LD	L30 305	PASS	AISC- H2-1	0.061	24
		475.95 T	5.34	13.10	1.32
1934 LD	L30 305	PASS	AISC- H2-1	0.066	21
		60.31 T	-9.47	-16.47	1.32
1935 LD	L30 305	PASS	AISC- H1-3	0.210	21
		191.14 C	-1.76	-70.45	1.00
1936 LD	L30 305	PASS	AISC- H2-1	0.068	22
		390.83 T	2.39	18.48	1.32
1937 LD	L30 305	PASS	AISC- H2-1	0.031	22
		361.95 T	10.84	0.30	0.00
1938 LD	L30 305	PASS	AISC- H2-1	0.075	24
		127.29 T	38.70	0.28	0.00
1939 LD	L30 305	PASS	AISC- H2-1	0.051	24
		309.34 T	20.88	1.56	0.00
1940 LD	L30 305	PASS	AISC- H1-3	0.090	22
		46.72 C	45.80	-1.66	0.00
1941 LD	L30 305	PASS	AISC- H2-1	0.024	32
		144.21 T	-5.34	3.58	1.87
1942 LD	L30 305	PASS	AISC- H2-1	0.024	22
		212.98 T	3.12	4.43	1.87

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1945 LD	L30 305	PASS	AISC- H1-3	0.055	24
		38.45 C	-21.60	4.83	0.00
1946 LD	L30 305	PASS	AISC- H2-1	0.076	24
		20.56 T	38.97	-1.67	1.87
1947 LD	L30 305	PASS	AISC- H1-3	0.065	22
		182.32 C	-26.86	2.93	1.87
1948 LD	L30 305	PASS	AISC- H1-3	0.065	22
		182.34 C	-26.86	2.94	0.00
1949 LD	L30 305	PASS	AISC- H1-3	0.090	22
		48.46 C	45.80	-1.65	1.87
1950 LD	L30 305	PASS	AISC- H1-3	0.145	23
		129.00 C	-34.14	27.45	0.00
1951 LD	L30 305	PASS	AISC- H1-3	0.152	23
		40.12 C	-30.53	33.40	0.00
1952 LD	L30 305	PASS	AISC- H1-3	0.127	23
		4.32 C	-25.76	28.18	0.00
1953 LD	L30 305	PASS	AISC- H2-1	0.035	22
		45.24 T	-3.70	9.33	1.00
1954 LD	L30 305	PASS	AISC- H2-1	0.062	24
		23.70 T	-26.76	4.43	2.12
1955 LD	L30 305	PASS	AISC- H1-3	0.055	24
		113.75 C	-19.17	5.33	0.00
1956 LD	L30 305	PASS	AISC- H2-1	0.077	24
		281.00 T	29.54	5.46	2.12
1957 LD	L30 305	PASS	AISC- H1-3	0.070	22
		319.95 C	-26.46	2.63	2.12
1958 LD	L30 305	PASS	AISC- H2-1	0.035	24
		44.24 T	-9.32	-6.03	1.00
1959 LD	L30 305	PASS	AISC- H1-3	0.127	21
		67.70 C	59.93	5.48	0.00
1960 LD	L30 305	PASS	AISC- H1-3	0.073	22
		19.18 C	-26.56	8.30	0.00
1961 LD	L30 305	PASS	AISC- H1-3	0.116	21
		40.62 C	62.63	0.01	1.00
1962 LD	L30 305	PASS	AISC- H2-1	0.087	22
		151.84 T	-37.79	4.93	2.12
1963 LD	L30 305	PASS	AISC- H2-1	0.087	22
		153.77 T	37.41	4.94	2.12
1964 LD	L30 305	PASS	AISC- H1-3	0.128	21
		66.77 C	60.07	5.50	1.00
1965 LD	L30 305	PASS	AISC- H1-3	0.074	22
		21.54 C	27.00	8.31	0.00

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1968 LD	L30 305	PASS	AISC- H1-3	0.060	24
		228.60 C	-23.16	2.89	2.12
1969 LD	L30 305	PASS	AISC- H1-3	0.039	32
		37.71 C	-7.85	-8.21	0.00
1970 LD	L30 305	PASS	AISC- H2-1	0.034	24
		215.22 T	8.91	4.18	2.12
1971 LD	L30 305	PASS	AISC- H2-1	0.038	32
		163.90 T	-11.47	4.31	2.12
1972 LD	L30 305	PASS	AISC- H1-3	0.047	22
		174.77 C	-4.79	-11.34	0.00
1973 LD	L30 305	PASS	AISC- H1-3	0.070	22
		317.62 C	26.49	2.64	2.12
1974 LD	L30 305	PASS	AISC- H1-3	0.098	22
		532.48 C	-14.19	18.68	0.00
1975 LD	L30 305	PASS	AISC- H1-3	0.140	21
		324.73 C	5.92	-41.40	0.00
1976 LD	L30 305	PASS	AISC- H1-3	0.110	23
		367.87 C	-6.45	-29.85	0.00
1977 LD	L30 305	PASS	AISC- H1-3	0.089	24
		436.42 C	6.39	21.64	1.40
1978 LD	L30 305	PASS	AISC- H1-3	0.141	21
		326.63 C	-6.15	-41.64	0.00
1979 LD	L30 305	PASS	AISC- H1-3	0.110	23
		164.35 C	10.31	-29.99	1.40
1980 LD	L30 307	PASS	AISC- H1-3	0.203	22
		4704.85 C	-16.14	31.27	0.00
1981 LD	L30 307	PASS	AISC- H1-3	0.074	23
		2084.16 C	8.49	5.66	0.00
1982 LD	L30 307	PASS	AISC- H1-3	0.122	22
		77.55 C	-33.03	-35.54	1.33
1983 LD	L30 307	PASS	AISC- H2-1	0.121	21
		107.65 T	33.87	34.60	1.50
1984 LD	L30 307	PASS	AISC- H2-1	0.118	21
		105.76 T	33.75	33.29	1.67
1985 LD	L30 307	PASS	AISC- H2-1	0.119	21
		210.24 T	33.55	32.46	1.83
1986 LD	L30 307	PASS	AISC- H1-3	0.088	24
		2397.47 C	5.96	-10.06	1.07
1987 LD	L30 307	PASS	AISC- H1-3	0.193	22
		4305.74 C	19.63	29.19	1.07
1988 LD	L30 307	PASS	AISC- H1-3	0.206	22
		4502.24 C	17.26	34.26	0.00

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1991	LD L30 307	PASS	AISC- H1-3	0.072	23
		2062.41 C	9.52	3.81	0.00
1992	LD L30 307	PASS	AISC- H1-3	0.213	22
		4187.00 C	-22.11	37.40	0.00
1993	LD L30 307	PASS	AISC- H1-3	0.071	29
		1851.19 C	8.78	6.41	0.00
1994	LD L30 307	PASS	AISC- H1-3	0.201	22
		3945.78 C	-12.59	40.63	0.00
1995	LD L30 307	PASS	AISC- H1-3	0.073	29
		1883.98 C	9.64	6.28	0.00
1996	LD L30 307	PASS	AISC- H1-3	0.084	23
		2306.24 C	4.37	-10.45	0.00
1997	LD L30 307	PASS	AISC- H1-3	0.088	23
		2208.43 C	-10.58	9.22	1.07
1998	LD L30 307	PASS	AISC- H1-3	0.088	23
		2399.49 C	-5.59	-10.51	1.09
1999	LD L30 307	PASS	AISC- H1-3	0.203	22
		4704.76 C	-16.14	31.27	1.09
2000	LD L30 307	PASS	AISC- H1-3	0.092	24
		2449.71 C	-7.86	-10.23	0.00
2001	LD L30 307	PASS	AISC- H1-3	0.077	24
		2091.27 C	12.60	4.38	1.09
2002	LD L30 307	PASS	AISC- H1-3	0.096	24
		2487.77 C	9.49	-10.63	1.12
2003	LD L30 307	PASS	AISC- H1-3	0.206	22
		4502.49 C	17.25	34.26	1.12
2004	LD L30 307	PASS	AISC- H1-3	0.091	23
		2429.89 C	6.33	-10.92	0.00
2005	LD L30 307	PASS	AISC- H1-3	0.073	23
		2053.52 C	-9.59	4.69	1.12
2006	LD L30 307	PASS	AISC- H1-3	0.099	24
		2530.54 C	-10.23	-10.76	0.00
2007	LD L30 307	PASS	AISC- H1-3	0.077	24
		2071.13 C	15.26	2.45	1.14
2008	LD L30 307	PASS	AISC- H1-3	0.093	23
		2479.37 C	-6.30	-10.98	1.14
2009	LD L30 307	PASS	AISC- H1-3	0.209	22
		4352.80 C	-18.52	36.21	1.14
2010	LD L30 307	PASS	AISC- H1-3	0.092	23
		2532.61 C	-4.54	-10.82	1.17
2011	LD L30 307	PASS	AISC- H1-3	0.212	22
		4180.08 C	-22.07	37.41	1.17

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2014	LD L30 307	PASS	AISC- H1-3	0.093	22
		1547.40 C	25.22	-9.53	0.00
2015	LD L30 307	PASS	AISC- H1-3	0.207	22
		4010.32 C	-14.78	41.03	1.20
2016	LD L30 307	PASS	AISC- H1-3	0.096	24
		2803.08 C	-3.77	-9.84	0.00
2017	LD L30 307	PASS	AISC- H1-3	0.074	29
		1886.19 C	9.78	6.44	1.20
2018	LD L30 306	PASS	AISC- H1-3	0.092	21
		1483.21 C	-27.59	2.83	0.00
2019	LD L30 306	PASS	AISC- H1-3	0.127	22
		2673.29 C	-9.82	15.11	0.00
2020	LD L30 306	PASS	AISC- H2-1	0.107	22
		1237.61 T	24.82	15.43	0.00
2021	LD L30 306	PASS	AISC- H1-3	0.087	22
		1509.29 C	-17.28	-6.72	1.17
2022	LD L30 306	PASS	AISC- H1-3	0.092	21
		1483.20 C	27.59	2.83	0.00
2023	LD L30 306	PASS	AISC- H1-3	0.127	22
		2673.28 C	9.82	15.11	0.00
2024	LD L30 306	PASS	AISC- H2-1	0.107	22
		1237.61 T	-24.81	15.43	0.00
2025	LD L30 306	PASS	AISC- H1-3	0.087	22
		1509.28 C	17.28	-6.72	1.17
2026	LD L30 306	PASS	AISC- H2-1	0.097	22
		1821.74 T	-32.51	-0.10	0.00
2027	LD L30 306	PASS	AISC- H1-3	0.132	22
		2557.93 C	10.99	17.91	0.00
2028	LD L30 306	PASS	AISC- H2-1	0.128	22
		1959.19 T	-22.73	18.43	0.00
2029	LD L30 306	PASS	AISC- H1-3	0.140	22
		2120.08 C	13.55	-23.61	1.23
2030	LD L30 306	PASS	AISC- H2-1	0.097	22
		1821.76 T	32.52	-0.10	0.00
2031	LD L30 306	PASS	AISC- H1-3	0.132	22
		2557.96 C	-10.98	17.91	0.00
2032	LD L30 306	PASS	AISC- H2-1	0.128	22
		1959.20 T	22.74	18.43	0.00
2033	LD L30 306	PASS	AISC- H1-3	0.140	22
		2120.09 C	-13.55	-23.61	1.23
2034	LD L30 306	PASS	AISC- H2-1	0.119	22
		2020.60 T	-39.73	-2.55	0.00

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2037	LD	L30 306	PASS	AISC- H1-3	0.132	22
			1990.24 C	10.18	-23.59	1.30
2038	LD	L30 306	PASS	AISC- H2-1	0.119	22
			2020.66 T	39.74	-2.56	0.00
2039	LD	L30 306	PASS	AISC- H1-3	0.136	22
			2515.40 C	-10.84	19.96	0.00
2040	LD	L30 306	PASS	AISC- H2-1	0.129	22
			1998.72 T	23.24	17.74	0.00
2041	LD	L30 306	PASS	AISC- H1-3	0.132	22
			1990.27 C	-10.19	-23.59	1.30
2042	LD	L30 306	PASS	AISC- H2-1	0.130	22
			2185.39 T	42.45	-3.79	0.00
2043	LD	L30 306	PASS	AISC- H1-3	0.139	22
			2456.47 C	-11.04	21.53	0.00
2044	LD	L30 306	PASS	AISC- H2-1	0.126	22
			2076.96 T	21.59	17.06	0.00
2045	LD	L30 306	PASS	AISC- H1-3	0.128	22
			1934.60 C	-7.59	-24.19	1.37
2046	LD	L30 306	PASS	AISC- H2-1	0.130	22
			2185.16 T	-42.40	-3.78	0.00
2047	LD	L30 306	PASS	AISC- H1-3	0.139	22
			2456.23 C	11.08	21.53	0.00
2048	LD	L30 306	PASS	AISC- H2-1	0.126	22
			2076.84 T	-21.48	17.06	0.00
2049	LD	L30 306	PASS	AISC- H1-3	0.128	22
			1934.49 C	7.55	-24.19	1.37
2050	LD	L30 306	PASS	AISC- H2-1	0.147	22
			2337.35 T	-49.06	-4.75	0.00
2051	LD	L30 306	PASS	AISC- H1-3	0.140	22
			2412.33 C	10.73	22.64	0.00
2052	LD	L30 306	PASS	AISC- H2-1	0.127	22
			2074.18 T	-23.28	16.27	0.00
2053	LD	L30 306	PASS	AISC- H1-3	0.125	22
			1830.66 C	6.93	-23.93	1.45
2054	LD	L30 306	PASS	AISC- H2-1	0.147	22
			2336.30 T	49.29	-4.78	0.00
2055	LD	L30 306	PASS	AISC- H1-3	0.140	22
			2411.23 C	-10.61	22.64	0.00
2056	LD	L30 306	PASS	AISC- H2-1	0.127	22
			2073.00 T	23.59	16.27	0.00
2057	LD	L30 306	PASS	AISC- H1-3	0.125	22
			1829.64 C	-7.06	-23.92	1.45

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MEMBER	TABLE		RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2060	LD	L30 306	PASS	AISC- H2-1	0.125	22
			2091.20 T	-22.69	15.79	0.00
2061	LD	L30 306	PASS	AISC- H1-3	0.120	22
			1767.38 C	5.60	-23.27	1.54
2062	LD	L30 306	PASS	AISC- H2-1	0.159	22
			2399.91 T	53.95	-6.01	0.00
2063	LD	L30 306	PASS	AISC- H1-3	0.139	22
			2298.69 C	-10.13	23.73	0.00
2064	LD	L30 306	PASS	AISC- H2-1	0.127	22
			2107.88 T	23.62	15.70	0.00
2065	LD	L30 306	PASS	AISC- H1-3	0.121	22
			1781.39 C	-5.95	-23.35	1.54
2066	LD	L30 307	PASS	AISC- H1-1	0.361	21
			8842.53 C	-43.21	-48.57	1.09
2067	LD	L30 307	PASS	AISC- H1-3	0.113	22
			3467.72 C	14.76	-4.12	0.00
2068	LD	L30 307	PASS	AISC- H1-3	0.102	22
			1282.12 C	7.46	27.76	1.33
2069	LD	L30 307	PASS	AISC- H1-3	0.108	22
			1375.34 C	7.49	28.81	1.50
2070	LD	L30 307	PASS	AISC- H1-3	0.112	22
			1457.17 C	7.31	29.22	1.67
2071	LD	L30 307	PASS	AISC- H1-3	0.122	22
			1685.74 C	7.36	29.68	1.83
2072	LD	L30 307	PASS	AISC- H1-3	0.204	21
			4922.67 C	19.50	-27.24	1.07
2073	LD	L30 307	PASS	AISC- H1-1	0.339	21
			8641.59 C	39.76	-42.74	0.00
2074	LD	L30 307	PASS	AISC- H1-3	0.144	22
			3596.61 C	12.15	-18.90	0.00
2075	LD	L30 307	PASS	AISC- H1-3	0.130	22
			3961.47 C	-20.05	2.87	1.07
2076	LD	L30 307	PASS	AISC- H1-3	0.138	22
			3317.92 C	-13.12	-18.56	1.09
2077	LD	L30 307	PASS	AISC- H1-3	0.202	22
			4564.52 C	41.99	15.60	1.09
2078	LD	L30 307	PASS	AISC- H1-3	0.215	21
			5168.31 C	-23.28	-27.13	0.00
2079	LD	L30 307	PASS	AISC- H1-3	0.160	21
			3582.05 C	25.63	17.92	1.09
2080	LD	L30 307	PASS	AISC- H1-1	0.370	21
			6663.08 C	-44.50	-54.55	1.12

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2083	LD L30 307	PASS	AISC- H1-3	0.125	22
		3303.16 C	18.97	-8.28	0.00
2084	LD L30 307	PASS	AISC- H1-1	0.375	21
		8237.75 C	-44.30	-61.21	1.17
2085	LD L30 307	PASS	AISC- H1-3	0.130	22
		3299.72 C	19.98	-9.81	0.00
2086	LD L30 307	PASS	AISC- H1-1	0.392	21
		8774.23 C	-40.22	-64.42	1.20
2087	LD L30 307	PASS	AISC- H1-3	0.144	22
		3618.57 C	21.59	-11.36	0.00
2088	LD L30 307	PASS	AISC- H1-3	0.157	22
		3857.51 C	-20.24	-15.65	1.20
2089	LD L30 307	PASS	AISC- H1-3	0.246	22
		5329.75 C	33.81	31.81	1.20
2090	LD L30 307	PASS	AISC- H1-3	0.142	22
		3331.05 C	-15.69	-18.34	1.12
2091	LD L30 307	PASS	AISC- H1-3	0.209	22
		4596.79 C	42.12	18.46	1.12
2092	LD L30 307	PASS	AISC- H1-3	0.212	21
		4993.34 C	-23.93	-27.17	0.00
2093	LD L30 307	PASS	AISC- H1-3	0.154	21
		3428.09 C	26.49	15.94	1.12
2094	LD L30 307	PASS	AISC- H1-3	0.145	22
		3352.95 C	-17.97	-18.06	1.14
2095	LD L30 307	PASS	AISC- H1-3	0.212	22
		4585.52 C	40.99	20.38	1.14
2096	LD L30 307	PASS	AISC- H1-3	0.210	21
		4882.74 C	-24.41	-26.84	0.00
2097	LD L30 307	PASS	AISC- H1-3	0.148	21
		3382.67 C	24.83	14.49	1.14
2098	LD L30 307	PASS	AISC- H1-3	0.147	22
		3411.98 C	-18.86	-17.36	1.17
2099	LD L30 307	PASS	AISC- H1-3	0.213	22
		4612.44 C	39.10	21.57	1.17
2100	LD L30 307	PASS	AISC- H1-3	0.208	21
		4794.57 C	-24.87	-26.39	0.00
2101	LD L30 307	PASS	AISC- H1-3	0.144	21
		3368.22 C	23.52	13.40	1.17
2102	LD L30 307	PASS	AISC- H1-3	0.208	21
		5157.91 C	-20.90	-24.10	0.00
2103	LD L30 307	PASS	AISC- H1-3	0.150	21
		3680.31 C	23.95	12.05	1.20

ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2106	LD L30 306	PASS	AISC- H1-3	0.107	22
		327.30 C	18.52	28.15	0.00
2107	LD L30 306	PASS	AISC- H1-3	0.037	24
		561.40 C	-3.96	6.05	0.00
2108	LD L30 306	PASS	AISC- H2-1	0.135	21
		2241.85 T	-17.37	21.82	0.00
2109	LD L30 306	PASS	AISC- H1-3	0.221	21
		3749.99 C	24.82	31.89	0.00
2110	LD L30 306	PASS	AISC- H2-1	0.149	21
		786.66 T	-16.74	42.68	0.00
2111	LD L30 306	PASS	AISC- H1-3	0.076	21
		1011.67 C	4.24	16.71	0.00
2112	LD L30 306	PASS	AISC- H2-1	0.137	21
		2517.98 T	-21.74	17.21	0.00
2113	LD L30 306	PASS	AISC- H1-3	0.226	21
		3660.81 C	24.54	35.10	0.00
2114	LD L30 306	PASS	AISC- H2-1	0.169	21
		1663.61 T	-17.02	42.12	0.00
2115	LD L30 306	PASS	AISC- H1-3	0.145	21
		1811.88 C	-15.05	-28.28	1.23
2117	LD L30 306	PASS	AISC- H2-1	0.097	22
		846.10 T	21.18	17.70	0.00
2118	LD L30 306	PASS	AISC- H1-3	0.099	22
		1285.46 C	-11.15	18.71	0.00
2119	LD L30 306	PASS	AISC- H1-3	0.096	22
		166.84 C	19.39	24.96	0.00
2120	LD L30 306	PASS	AISC- H1-3	0.060	24
		868.36 C	-7.21	9.50	0.00
2121	LD L30 306	PASS	AISC- H2-1	0.097	22
		959.30 T	23.96	14.46	0.00
2122	LD L30 306	PASS	AISC- H1-3	0.103	22
		1277.29 C	-11.98	19.73	0.00
2123	LD L30 306	PASS	AISC- H1-3	0.086	22
		26.48 C	19.43	22.32	0.00
2124	LD L30 306	PASS	AISC- H1-3	0.064	24
		872.30 C	-8.49	10.20	0.00
2125	LD L30 306	PASS	AISC- H2-1	0.137	21
		2822.80 T	-25.53	11.61	0.00
2126	LD L30 306	PASS	AISC- H1-3	0.232	21
		3611.35 C	25.01	37.65	0.00
2127	LD L30 306	PASS	AISC- H2-1	0.160	21
		1822.59 T	-14.44	38.23	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2130	LD L30 306	PASS	AISC- H1-3	0.233	21
		3507.16 C	24.53	39.56	0.00
2131	LD L30 306	PASS	AISC- H2-1	0.153	21
		1911.85 T	-13.40	35.21	0.00
2132	LD L30 306	PASS	AISC- H1-3	0.154	21
		1772.26 C	-15.82	-31.38	1.37
2133	LD L30 306	PASS	AISC- H2-1	0.097	24
		1254.10 T	33.55	5.19	0.00
2134	LD L30 306	PASS	AISC- H1-3	0.102	22
		1226.06 C	-11.53	20.43	0.00
2135	LD L30 306	PASS	AISC- H2-1	0.086	24
		918.74 T	16.93	15.14	0.00
2136	LD L30 306	PASS	AISC- H1-3	0.067	24
		886.56 C	-9.09	10.90	0.00
2137	LD L30 306	PASS	AISC- H2-1	0.106	24
		1376.08 T	39.20	4.17	0.00
2138	LD L30 306	PASS	AISC- H1-3	0.102	22
		1183.44 C	-11.09	20.95	0.00
2139	LD L30 306	PASS	AISC- H2-1	0.090	24
		999.30 T	19.27	14.62	0.00
2140	LD L30 306	PASS	AISC- H1-3	0.070	24
		907.98 C	-9.37	11.48	0.00
2141	LD L30 306	PASS	AISC- H2-1	0.137	21
		3167.73 T	-28.93	5.57	0.00
2142	LD L30 306	PASS	AISC- H1-3	0.231	21
		3343.16 C	23.56	41.06	0.00
2143	LD L30 306	PASS	AISC- H2-1	0.146	21
		1960.25 T	-12.38	32.66	0.00
2144	LD L30 306	PASS	AISC- H1-3	0.153	21
		1713.41 C	-15.26	-31.73	1.45
2145	LD L30 306	PASS	AISC- H2-1	0.145	21
		3569.05 T	-33.77	1.69	0.00
2146	LD L30 306	PASS	AISC- H1-3	0.239	21
		3491.62 C	23.29	42.51	0.00
2147	LD L30 306	PASS	AISC- H2-1	0.141	21
		2170.27 T	-10.82	29.48	0.00
2148	LD L30 306	PASS	AISC- H1-3	0.157	21
		1810.55 C	-14.71	-32.14	1.54
2149	LD L30 306	PASS	AISC- H2-1	0.114	24
		1539.04 T	44.24	2.33	0.00
2150	LD L30 306	PASS	AISC- H1-3	0.112	22
		1427.86 C	-11.54	21.86	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2153	LD L30 307	PASS	AISC- H1-3	0.094	21
		1582.98 C	-25.07	-8.81	1.33
2154	LD L30 307	PASS	AISC- H1-3	0.093	21
		1695.72 C	-25.84	-5.79	1.50
2155	LD L30 307	PASS	AISC- H1-3	0.095	21
		1818.20 C	7.09	16.07	0.00
2156	LD L30 307	PASS	AISC- H1-3	0.104	21
		2098.59 C	7.58	15.19	0.00
2157	LD L30 307	PASS	AISC- H1-1	0.390	21
		8759.84 C	-34.18	67.61	0.00
2158	LD L30 307	PASS	AISC- H1-3	0.141	22
		3602.90 C	-20.59	-10.99	0.00
2159	LD L30 307	PASS	AISC- H1-3	0.214	22
		4622.40 C	39.18	21.71	0.00
2160	LD L30 307	PASS	AISC- H1-3	0.143	21
		3370.31 C	23.10	13.41	0.00
2161	LD L30 307	PASS	AISC- H1-3	0.212	22
		4585.91 C	41.05	20.38	0.00
2162	LD L30 307	PASS	AISC- H1-3	0.148	21
		3383.68 C	24.71	14.49	0.00
2163	LD L30 307	PASS	AISC- H1-3	0.209	22
		4597.03 C	42.14	18.46	0.00
2164	LD L30 307	PASS	AISC- H1-3	0.154	21
		3428.46 C	26.45	15.94	0.00
2165	LD L30 307	PASS	AISC- H1-3	0.202	22
		4564.61 C	41.99	15.60	0.00
2166	LD L30 307	PASS	AISC- H1-3	0.160	21
		3582.18 C	25.61	17.92	0.00
2167	LD L30 307	PASS	AISC- H1-3	0.144	22
		3596.66 C	12.15	-18.90	1.07
2168	LD L30 307	PASS	AISC- H1-3	0.202	22
		4732.66 C	-45.40	11.87	1.07
2169	LD L30 307	PASS	AISC- H1-3	0.204	21
		4922.71 C	19.50	-27.24	0.00
2170	LD L30 307	PASS	AISC- H1-3	0.210	21
		4079.96 C	-35.47	29.68	1.07
2171	LD L30 307	PASS	AISC- H1-3	0.215	21
		5168.43 C	-23.27	-27.13	1.09
2172	LD L30 307	PASS	AISC- H1-1	0.361	21
		8842.62 C	-43.20	-48.57	0.00
2173	LD L30 307	PASS	AISC- H1-3	0.138	22
		3318.04 C	-13.11	-18.56	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2176 LD	L30 307	PASS	AISC- H1-1	0.370	21
		8663.38 C	-44.49	-54.55	0.00
2177 LD	L30 307	PASS	AISC- H1-3	0.142	22
		3331.39 C	-15.67	-18.33	0.00
2178 LD	L30 307	PASS	AISC- H1-3	0.121	22
		3335.84 C	18.57	-6.47	1.12
2179 LD	L30 307	PASS	AISC- H1-3	0.210	21
		4883.89 C	-24.32	-26.84	1.14
2180 LD	L30 307	PASS	AISC- H1-1	0.375	21
		8474.66 C	-44.63	-58.50	0.00
2181 LD	L30 307	PASS	AISC- H1-3	0.145	22
		3353.78 C	-17.88	-18.05	0.00
2182 LD	L30 307	PASS	AISC- H1-3	0.125	22
		3304.16 C	18.85	-8.29	1.14
2183 LD	L30 307	PASS	AISC- H1-3	0.208	21
		4793.97 C	-24.52	-26.41	1.17
2184 LD	L30 307	PASS	AISC- H1-1	0.374	21
		8230.58 C	-44.08	-61.18	0.00
2185 LD	L30 307	PASS	AISC- H1-3	0.147	22
		3416.41 C	-18.60	-17.33	0.00
2186 LD	L30 307	PASS	AISC- H1-3	0.129	22
		3301.82 C	19.60	-9.85	1.17
2187 LD	L30 307	PASS	AISC- H1-3	0.206	21
		5132.82 C	19.80	-24.15	0.00
2188 LD	L30 307	PASS	AISC- H1-3	0.147	21
		3663.17 C	-22.77	11.73	1.20
2189 LD	L30 307	PASS	AISC- H1-3	0.155	22
		3829.57 C	19.01	-15.72	1.20
2190 LD	L30 307	PASS	AISC- H1-3	0.245	22
		5261.62 C	-35.70	31.01	1.20
2191 LD	L30 306	PASS	AISC- H2-1	0.144	21
		3561.31 T	33.30	1.68	0.00
2192 LD	L30 306	PASS	AISC- H1-3	0.239	21
		3484.34 C	-23.62	42.46	0.00
2193 LD	L30 306	PASS	AISC- H2-1	0.139	21
		2158.26 T	9.93	29.48	0.00
2194 LD	L30 306	PASS	AISC- H1-3	0.158	21
		1800.08 C	15.23	-32.03	1.54
2195 LD	L30 306	PASS	AISC- H2-1	0.097	22
		1391.24 T	-27.94	7.75	0.00
2196 LD	L30 306	PASS	AISC- H1-3	0.111	22
		1390.02 C	11.82	21.79	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2199 LD	L30 306	PASS	AISC- H2-1	0.098	22
		1087.71 T	-28.89	10.55	0.00
2200 LD	L30 306	PASS	AISC- H1-3	0.102	22
		1188.64 C	11.23	20.95	0.00
2201 LD	L30 306	PASS	AISC- H2-1	0.081	22
		111.16 T	-21.05	18.56	0.00
2202 LD	L30 306	PASS	AISC- H1-3	0.063	23
		857.07 C	-3.67	-12.93	1.45
2203 LD	L30 306	PASS	AISC- H2-1	0.136	21
		3161.64 T	28.82	5.61	0.00
2204 LD	L30 306	PASS	AISC- H1-3	0.231	21
		3337.03 C	-23.60	41.05	0.00
2205 LD	L30 306	PASS	AISC- H2-1	0.146	21
		1956.47 T	12.09	32.69	0.00
2206 LD	L30 306	PASS	AISC- H1-3	0.153	21
		1710.14 C	15.38	-31.72	1.45
2207 LD	L30 306	PASS	AISC- H2-1	0.096	22
		1026.56 T	-26.35	12.12	0.00
2208 LD	L30 306	PASS	AISC- H1-3	0.102	22
		1225.67 C	11.57	20.43	0.00
2209 LD	L30 306	PASS	AISC- H2-1	0.083	22
		27.37 T	-20.49	20.35	0.00
2210 LD	L30 306	PASS	AISC- H1-3	0.061	23
		838.33 C	-3.81	-12.40	1.37
2211 LD	L30 306	PASS	AISC- H2-1	0.138	21
		3039.64 T	28.24	7.96	0.00
2212 LD	L30 306	PASS	AISC- H1-3	0.234	21
		3507.27 C	-24.57	39.56	0.00
2213 LD	L30 306	PASS	AISC- H2-1	0.153	21
		1912.02 T	13.30	35.21	0.00
2214 LD	L30 306	PASS	AISC- H1-3	0.154	21
		1772.42 C	15.86	-31.38	1.37
2215 LD	L30 306	PASS	AISC- H2-1	0.137	21
		2822.75 T	25.52	11.61	0.00
2216 LD	L30 306	PASS	AISC- H1-3	0.232	21
		3611.31 C	-25.02	37.64	0.00
2217 LD	L30 306	PASS	AISC- H2-1	0.159	21
		1822.57 T	14.43	38.23	0.00
2218 LD	L30 306	PASS	AISC- H1-3	0.151	21
		1815.24 C	15.70	-30.03	1.30
2219 LD	L30 306	PASS	AISC- H2-1	0.097	22
		959.22 T	-23.95	14.46	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2222 LD	L30 306	PASS	AISC- H1-3	0.057	23
		823.95 C	-3.09	-11.45	1.30
2223 LD	L30 306	PASS	AISC- H2-1	0.097	22
		846.08 T	-21.18	17.70	0.00
2224 LD	L30 306	PASS	AISC- H1-3	0.099	22
		1285.44 C	11.16	18.71	0.00
2225 LD	L30 306	PASS	AISC- H1-3	0.096	22
		166.85 C	-19.38	24.96	0.00
2226 LD	L30 306	PASS	AISC- H1-3	0.052	23
		822.34 C	-1.77	-10.64	1.23
2227 LD	L30 306	PASS	AISC- H2-1	0.137	21
		2517.95 T	21.74	17.22	0.00
2228 LD	L30 306	PASS	AISC- H1-3	0.226	21
		3660.78 C	-24.54	35.10	0.00
2229 LD	L30 306	PASS	AISC- H2-1	0.169	21
		1663.60 T	17.01	42.12	0.00
2230 LD	L30 306	PASS	AISC- H1-3	0.145	21
		1811.87 C	15.05	-28.28	1.23
2231 LD	L30 306	PASS	AISC- H2-1	0.103	22
		679.89 T	-16.02	25.21	0.00
2232 LD	L30 306	PASS	AISC- H1-3	0.097	22
		1231.72 C	12.00	18.16	0.00
2233 LD	L30 306	PASS	AISC- H1-3	0.107	22
		327.31 C	-18.52	28.15	0.00
2234 LD	L30 306	PASS	AISC- H2-1	0.035	22
		371.93 T	2.58	8.92	0.00
2235 LD	L30 306	PASS	AISC- H2-1	0.135	21
		2241.84 T	17.37	21.82	0.00
2236 LD	L30 306	PASS	AISC- H1-3	0.221	21
		3749.98 C	-24.83	31.89	0.00
2237 LD	L30 306	PASS	AISC- H2-1	0.149	21
		786.66 T	16.74	42.68	0.00
2238 LD	L30 306	PASS	AISC- H1-3	0.076	21
		1011.67 C	-4.24	16.71	0.00
2239 LD	L30 307	PASS	AISC- H1-3	0.046	21
		138.03 C	-10.39	13.17	1.83
2240 LD	L30 307	PASS	AISC- H1-3	0.048	21
		138.17 C	-9.90	14.55	1.67
2241 LD	L30 307	PASS	AISC- H1-3	0.031	22
		168.46 C	4.78	9.33	1.67
2242 LD	L30 307	PASS	AISC- H1-3	0.048	21
		138.09 C	-9.64	14.54	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2245 LD	L30 307	PASS	AISC- H1-3	0.052	21
		125.97 C	-9.72	16.89	1.50
2246 LD	L30 307	PASS	AISC- H1-3	0.056	21
		123.45 C	-9.44	19.15	1.33
2247 LD	L30 307	PASS	AISC- H1-3	0.030	22
		158.34 C	-4.66	9.18	0.00
2248 LD	L30 307	PASS	AISC- H1-3	0.029	22
		154.56 C	-4.52	9.10	0.00
2249 LD	L30 307	PASS	AISC- H1-3	0.056	21
		123.45 C	-9.41	19.15	0.00
2250 LD	L30 307	PASS	AISC- H1-3	0.052	21
		125.98 C	-9.64	16.89	0.00
2251 LD	L30 307	PASS	AISC- H1-3	0.072	21
		99.97 C	8.57	27.69	0.00
2252 LD	L30 307	PASS	AISC- H1-3	0.062	21
		113.74 C	9.09	22.45	0.00
2253 LD	L30 307	PASS	AISC- H1-3	0.032	23
		70.17 C	-4.09	11.22	1.00
2254 LD	L30 307	PASS	AISC- H1-3	0.030	23
		79.90 C	-5.14	9.84	1.17
2255 LD	L30 307	PASS	AISC- H1-3	0.072	21
		99.97 C	8.57	27.69	1.00
2256 LD	L30 307	PASS	AISC- H1-3	0.062	21
		113.74 C	9.08	22.45	1.17
2275 ST	PIP S80	PASS	AISC- H1-1	0.644	21
		48418.39 C	0.00	204.97	0.00
2288 ST	PIP S80	PASS	AISC- H1-2	0.393	22
		24918.20 C	0.00	415.78	0.00
2301 ST	PIP S80	PASS	AISC- H1-2	0.393	22
		24918.20 C	0.00	415.78	0.00
2322 ST	PIP S80	PASS	AISC- H1-1	0.585	21
		43937.19 C	0.00	186.63	1.00
2324 ST	PIP S80	PASS	AISC- H1-2	0.342	22
		22678.74 C	0.00	305.73	0.00
2326 ST	PIP S80	PASS	AISC- H1-2	0.342	22
		22678.74 C	0.00	305.73	0.00
2328 LD	L30 305	PASS	AISC- H1-3	0.091	22
		721.60 C	6.14	19.17	0.00
2329 LD	L30 305	PASS	AISC- H2-1	0.075	22
		441.79 T	-2.16	20.63	0.00
2330 LD	L30 305	PASS	AISC- H1-3	0.067	23
		1303.94 C	-0.37	7.73	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2333 LD	L30 305	PASS	AISC- H1-3	0.101	22
		652.64 C	3.49	25.48	0.00
2334 LD	L30 305	PASS	AISC- H1-3	0.076	23
		1299.78 C	-3.49	8.76	0.00
2335 LD	L30 305	PASS	AISC- H2-1	0.061	24
		1347.12 T	-0.77	7.53	0.00
2336 LD	L30 305	PASS	AISC- H2-1	0.060	23
		1297.56 T	1.17	7.31	0.00
2337 LD	L30 305	PASS	AISC- H1-3	0.065	24
		1252.98 C	-0.05	7.92	0.00
2338 LD	L30 305	PASS	AISC- H2-1	0.054	23
		1189.33 T	0.74	6.54	0.00
2339 LD	L30 305	PASS	AISC- H2-1	0.055	24
		1239.17 T	-0.58	6.41	0.00
2340 LD	L30 305	PASS	AISC- H1-3	0.121	22
		2462.78 C	6.79	-8.34	1.12
2341 LD	L30 305	PASS	AISC- H1-3	0.166	21
		2495.44 C	-4.45	25.55	0.00
2342 LD	L30 305	PASS	AISC- H1-3	0.111	22
		2417.98 C	-0.32	9.79	0.00
2343 LD	L30 305	PASS	AISC- H1-3	0.178	21
		3172.72 C	0.11	24.42	0.00
2344 LD	L30 305	PASS	AISC- H1-3	0.152	21
		3096.42 C	6.02	-12.36	1.12
2345 LD	L30 305	PASS	AISC- H1-3	0.161	22
		2432.86 C	6.79	-22.84	0.00
2346 LD	L30 305	PASS	AISC- H1-3	0.132	22
		2883.06 C	6.63	7.42	0.00
2347 LD	L30 305	PASS	AISC- H1-3	0.147	22
		2822.58 C	-1.73	-16.67	0.00
2348 LD	L30 305	PASS	AISC- H1-3	0.112	21
		2452.75 C	2.89	-8.15	0.56
2349 LD	L30 305	PASS	AISC- H1-3	0.158	21
		2909.32 C	0.69	20.04	0.00
2350 LD	L30 305	PASS	AISC- H1-3	0.120	21
		2867.53 C	1.43	-6.93	0.19
2351 LD	L30 305	PASS	AISC- H1-3	0.121	22
		2362.43 C	-1.69	-13.24	0.00
2352 LD	L30 305	PASS	AISC- H1-3	0.178	21
		3172.71 C	-0.11	24.42	0.00
2353 LD	L30 305	PASS	AISC- H1-3	0.132	22
		2883.06 C	-6.63	7.42	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2356 LD	L30 305	PASS	AISC- H1-3	0.161	22
		2432.85 C	-6.79	-22.84	0.00
2357 LD	L30 305	PASS	AISC- H1-3	0.152	21
		3096.42 C	-6.02	-12.36	1.12
2358 LD	L30 305	PASS	AISC- H1-3	0.166	21
		2495.44 C	4.45	25.55	0.00
2359 LD	L30 305	PASS	AISC- H1-3	0.112	21
		2452.75 C	-2.89	-8.15	0.56
2360 LD	L30 305	PASS	AISC- H1-3	0.147	22
		2822.58 C	1.73	-16.67	0.00
2361 LD	L30 305	PASS	AISC- H1-3	0.111	22
		2417.97 C	0.32	9.79	0.00
2362 LD	L30 305	PASS	AISC- H1-3	0.121	22
		2362.43 C	1.69	-13.24	0.00
2363 LD	L30 305	PASS	AISC- H1-3	0.120	21
		2867.53 C	-1.43	-6.93	0.19
2364 ST	PIP S80	PASS	AISC- H1-2	0.226	22
		15287.45 C	0.00	183.61	0.00
2366 ST	PIP S80	PASS	AISC- H1-2	0.226	22
		15287.45 C	0.00	183.61	0.00
2368 ST	PIP S80	PASS	AISC- H1-3	0.132	22
		8697.10 C	0.00	108.73	0.00
2370 ST	PIP S80	PASS	AISC- H1-3	0.132	22
		8697.10 C	0.00	108.73	0.00
2372 ST	PIP S80	PASS	AISC- H1-3	0.045	22
		2830.22 C	0.00	42.28	1.00
2373 ST	PIP S80	PASS	AISC- H1-3	0.024	22
		1037.37 C	0.00	49.03	0.00
2374 ST	PIP S80	PASS	AISC- H1-3	0.045	22
		2830.22 C	0.00	42.28	1.00
2375 ST	PIP S80	PASS	AISC- H1-3	0.024	22
		1037.37 C	0.00	49.03	0.00
2376 LD	L30 305	PASS	AISC- H1-3	0.063	23
		1265.79 C	0.65	6.60	0.00
2377 LD	L30 305	PASS	AISC- H1-3	0.059	24
		1098.88 C	1.03	7.04	0.00
2378 LD	L30 305	PASS	AISC- H1-3	0.057	23
		1111.12 C	-0.37	6.35	0.00
2379 LD	L30 305	PASS	AISC- H1-3	0.050	24
		1033.25 C	-0.36	5.01	0.00
2380 LD	L30 305	PASS	AISC- H1-3	0.052	23
		992.04 C	-1.41	5.34	0.00

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MEMBER	TABLE		RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2383	LD	L30 305	PASS	AISC- H1-3	0.063	24
			741.36 C	13.48	4.07	0.00
2384	LD	L30 305	PASS	AISC- H1-3	0.092	23
			687.34 C	-29.70	3.84	0.00
2385	LD	L30 305	PASS	AISC- H2-1	0.175	23
			628.59 T	-78.50	1.57	0.00
2386	LD	L30 305	PASS	AISC- H1-3	0.090	24
			630.58 C	-29.75	3.95	1.12
2387	LD	L30 305	PASS	AISC- H2-1	0.176	24
			685.12 T	-78.58	1.50	1.12
2388	LD	L30 305	PASS	AISC- H2-1	0.107	24
			824.94 T	39.28	2.51	0.00
2389	LD	L30 305	PASS	AISC- H1-3	0.065	23
			806.61 C	13.46	3.89	1.12
2390	LD	L30 305	PASS	AISC- H2-1	0.105	23
			759.82 T	39.21	2.65	1.12
2391	LD	L30 305	PASS	AISC- H2-1	0.067	23
			805.03 T	-18.26	2.95	0.00
2392	LD	L30 305	PASS	AISC- H1-3	0.046	24
			841.03 C	-3.51	3.77	1.12
2393	LD	L30 305	PASS	AISC- H2-1	0.068	24
			850.80 T	-18.30	2.82	1.12
2394	LD	L30 305	PASS	AISC- H2-1	0.046	24
			918.31 T	6.43	2.38	0.00
2395	LD	L30 305	PASS	AISC- H1-3	0.050	23
			923.98 C	2.20	4.93	1.12
2396	LD	L30 305	PASS	AISC- H2-1	0.044	23
			872.96 T	6.37	2.29	1.12
2397	LD	L30 305	PASS	AISC- H1-3	0.041	24
			884.83 C	2.75	-2.10	0.28
2398	LD	L30 305	PASS	AISC- H1-3	0.050	24
			925.79 C	-1.43	5.51	1.12
2399	LD	L30 305	PASS	AISC- H1-3	0.044	23
			951.66 C	2.46	-2.23	0.75
2400	LD	L30 305	PASS	AISC- H1-3	0.044	23
			1036.69 C	-1.20	-2.32	0.37
2401	LD	L30 305	PASS	AISC- H1-3	0.052	23
			1078.62 C	-0.40	5.11	1.12
2402	LD	L30 305	PASS	AISC- H1-3	0.043	24
			991.04 C	-0.96	-2.48	0.65
2403	LD	L30 305	PASS	AISC- H1-3	0.044	24
			1025.55 C	0.44	-2.64	0.56

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MEMBER	TABLE		RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2406	LD	L30 305	PASS	AISC- H2-1	0.049	24
			1177.79 T	0.20	5.40	1.12
2407	LD	L30 305	PASS	AISC- H1-3	0.061	23
			1163.75 C	1.07	6.88	1.12
2408	LD	L30 305	PASS	AISC- H2-1	0.047	23
			1112.88 T	0.21	5.28	0.00
2409	LD	L30 305	PASS	AISC- H1-3	0.053	22
			388.19 C	0.67	13.47	1.12
2410	LD	L30 305	PASS	AISC- H1-3	0.061	24
			1221.26 C	0.75	6.46	1.12
2411	LD	L30 305	PASS	AISC- H2-1	0.053	24
			1202.60 T	0.90	5.95	0.00
2412	ST	PIP S80	PASS	AISC- H1-1	0.394	21
			29517.21 C	0.00	133.29	0.00
2414	ST	PIP S80	PASS	AISC- H1-1	0.223	21
			16663.63 C	0.00	78.30	0.00
2416	ST	PIP S80	PASS	AISC- H1-3	0.076	21
			5343.48 C	0.00	41.32	0.00
2417	ST	PIP S80	PASS	AISC- H1-3	0.029	21
			1698.05 C	0.00	36.73	1.00
2418	LD	L30 305	PASS	AISC- H1-3	0.114	22
			2419.15 C	2.01	9.86	0.00
2419	LD	L30 305	PASS	AISC- H1-3	0.139	21
			2450.66 C	1.50	18.60	0.00
2420	LD	L30 305	PASS	AISC- H1-3	0.101	22
			2235.29 C	-0.47	8.43	0.00
2421	LD	L30 305	PASS	AISC- H1-3	0.123	21
			2490.70 C	-1.76	12.10	0.00
2422	LD	L30 305	PASS	AISC- H1-3	0.098	22
			2181.07 C	-1.33	7.51	0.00
2423	LD	L30 305	PASS	AISC- H1-3	0.107	21
			2189.05 C	-0.08	11.42	0.00
2424	LD	L30 305	PASS	AISC- H1-3	0.088	22
			1945.82 C	0.94	7.08	0.00
2425	LD	L30 305	PASS	AISC- H1-3	0.091	21
			1916.26 C	0.38	8.60	0.00
2426	LD	L30 305	PASS	AISC- H1-3	0.075	22
			1648.79 C	-1.00	5.84	0.00
2427	LD	L30 305	PASS	AISC- H1-3	0.148	21
			2846.81 C	-2.39	16.29	0.00
2428	LD	L30 305	PASS	AISC- H1-3	0.118	21
			2783.95 C	-1.37	-7.05	1.02

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2431 LD	L30 305	PASS	AISC- H1-3	0.115	22
		2433.98 C	-0.02	-11.21	0.00
2432 LD	L30 305	PASS	AISC- H1-3	0.105	21
		2402.45 C	-1.78	-6.93	0.84
2433 LD	L30 305	PASS	AISC- H1-3	0.131	21
		2515.39 C	0.04	16.02	0.00
2435 LD	L30 305	PASS	AISC- H1-3	0.100	22
		2186.35 C	1.30	-8.05	0.00
2437 LD	L30 305	PASS	AISC- H1-3	0.098	22
		2153.05 C	-1.29	-7.68	0.00
2438 LD	L30 305	PASS	AISC- H1-3	0.101	21
		2437.41 C	-0.66	-5.81	0.93
2439 LD	L30 305	PASS	AISC- H1-3	0.115	21
		2211.09 C	0.76	13.41	0.00
2440 LD	L30 305	PASS	AISC- H1-3	0.092	21
		2167.52 C	-0.99	-5.54	0.84
2441 LD	L30 305	PASS	AISC- H1-3	0.090	22
		2138.15 C	0.16	-5.72	0.19
2442 LD	L30 305	PASS	AISC- H1-3	0.091	22
		2022.92 C	-0.09	7.65	0.00
2444 LD	L30 305	PASS	AISC- H1-3	0.087	21
		2149.59 C	-0.19	-4.68	0.65
2446 LD	L30 305	PASS	AISC- H1-3	0.084	21
		2094.50 C	-0.20	-4.38	0.84
2447 LD	L30 305	PASS	AISC- H1-3	0.077	22
		1906.24 C	-0.27	-4.00	0.47
2448 LD	L30 305	PASS	AISC- H1-3	0.087	22
		1951.70 C	-0.46	6.91	0.00
2449 LD	L30 305	PASS	AISC- H1-3	0.076	22
		1914.03 C	0.54	-3.39	0.65
2450 LD	L30 305	PASS	AISC- H1-3	0.082	21
		1871.00 C	-2.19	-4.89	1.12
2451 LD	L30 305	PASS	AISC- H1-3	0.094	21
		1989.26 C	0.79	8.66	0.00
2452 LD	L30 305	PASS	AISC- H1-3	0.080	21
		1959.03 C	-1.00	-3.95	0.65
2453 LD	L30 305	PASS	AISC- H1-3	0.098	24
		343.47 C	42.92	1.21	1.12
2454 LD	L30 305	PASS	AISC- H1-3	0.114	22
		2419.15 C	-2.01	9.86	0.00
2455 LD	L30 305	PASS	AISC- H1-3	0.139	21
		2450.66 C	-1.50	18.60	0.00

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2459 LD	L30 305	PASS	AISC- H1-3	0.107	21
		2189.05 C	0.08	11.42	0.00
2460 LD	L30 305	PASS	AISC- H1-3	0.088	22
		1945.82 C	-0.94	7.08	0.00
2461 LD	L30 305	PASS	AISC- H1-3	0.091	21
		1916.26 C	-0.38	8.60	0.00
2462 LD	L30 305	PASS	AISC- H1-3	0.075	22
		1648.79 C	1.00	5.84	0.00
2464 LD	L30 305	PASS	AISC- H1-3	0.118	21
		2783.95 C	1.37	-7.05	1.02
2465 LD	L30 305	PASS	AISC- H1-3	0.125	22
		2379.18 C	2.26	-13.74	0.00
2466 LD	L30 305	PASS	AISC- H1-3	0.112	22
		2481.35 C	2.50	8.06	0.00
2467 LD	L30 305	PASS	AISC- H1-3	0.115	22
		2433.98 C	0.02	-11.21	0.00
2468 LD	L30 305	PASS	AISC- H1-3	0.105	21
		2402.45 C	1.78	-6.93	0.84
2469 LD	L30 305	PASS	AISC- H1-3	0.131	21
		2515.39 C	-0.04	16.02	0.00
2473 LD	L30 305	PASS	AISC- H1-3	0.098	22
		2153.05 C	1.29	-7.68	0.00
2474 LD	L30 305	PASS	AISC- H1-3	0.101	21
		2437.41 C	0.66	-5.81	0.93
2475 LD	L30 305	PASS	AISC- H1-3	0.115	21
		2211.09 C	-0.76	13.41	0.00
2476 LD	L30 305	PASS	AISC- H1-3	0.092	21
		2167.52 C	0.99	-5.54	0.84
2477 LD	L30 305	PASS	AISC- H1-3	0.090	22
		2138.15 C	-0.16	-5.72	0.19
2478 LD	L30 305	PASS	AISC- H1-3	0.091	22
		2022.92 C	0.09	7.65	0.00
2479 LD	L30 305	PASS	AISC- H1-3	0.081	22
		1979.96 C	-0.36	-4.36	0.28
2480 LD	L30 305	PASS	AISC- H1-3	0.087	21
		2149.59 C	0.19	-4.68	0.65
2481 LD	L30 305	PASS	AISC- H1-3	0.099	21
		2137.99 C	0.98	8.47	0.00
2482 LD	L30 305	PASS	AISC- H1-3	0.084	21
		2094.50 C	0.20	-4.38	0.84
2483 LD	L30 305	PASS	AISC- H1-3	0.077	22
		1906.24 C	0.27	-4.00	0.47

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MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2486 LD	L30 305	PASS	AISC- H1-3	0.082	21
		1871.00 C	2.19	-4.89	1.12
2487 LD	L30 305	PASS	AISC- H1-3	0.094	21
		1989.26 C	-0.79	8.66	0.00
2488 LD	L30 305	PASS	AISC- H1-3	0.080	21
		1959.03 C	1.00	-3.95	0.65
2489 LD	L30 305	PASS	AISC- H1-3	0.098	23
		348.09 C	-42.86	1.17	1.12
2493 LD	L30 306	PASS	AISC- H1-3	0.010	22
		7.22 C	-0.75	-3.74	0.50
2494 LD	L30 306	PASS	AISC- H1-3	0.008	21
		3.48 C	-0.70	-2.90	0.67
2495 LD	L30 306	PASS	AISC- H1-3	0.008	21
		3.48 C	0.70	-2.90	0.67
2499 LD	L30 306	PASS	AISC- H1-3	0.010	22
		4.69 C	0.46	-3.65	0.50
2500 LD	L30 306	PASS	AISC- H1-3	0.008	21
		2.30 C	-0.43	-2.84	0.33
2501 LD	L30 306	PASS	AISC- H1-3	0.008	21
		2.30 C	0.43	-2.84	0.33
2505 LD	L30 306	PASS	AISC- H2-1	0.009	23
		38.93 T	-1.42	-2.25	0.67
2506 LD	L30 306	PASS	AISC- H2-1	0.009	24
		38.95 T	-1.41	-2.26	0.33
2507 LD	L30 306	PASS	AISC- H1-3	0.009	22
		1.78 C	-0.18	-3.47	0.50
2508 LD	L30 306	PASS	AISC- H2-1	0.277	23
		545.44 T	148.25	10.29	0.00
2509 LD	L30 306	PASS	AISC- H2-1	0.234	24
		267.55 T	124.50	11.17	0.00
2510 LD	L30 306	PASS	AISC- H1-3	0.257	23
		378.45 C	-138.18	10.17	0.00
2511 LD	L30 306	PASS	AISC- H1-3	0.257	24
		399.19 C	-137.99	10.11	1.00
2512 LD	L30 306	PASS	AISC- H2-1	0.276	24
		524.03 T	148.24	10.31	1.00
2513 LD	L30 306	PASS	AISC- H2-1	0.232	23
		193.74 T	124.55	11.18	1.00
2514 LD	L30 306	PASS	AISC- H1-3	0.015	23
		0.58 C	9.09	0.17	1.00
2515 LD	L30 306	PASS	AISC- H1-3	0.063	24
		438.30 C	-30.99	0.29	0.00

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2518 ST	PIP S80	PASS	AISC- H1-1	0.285	22
		19963.75 C	0.00	191.58	1.00
2519 ST	PIP S80	PASS	AISC- H1-1	0.524	21
		38684.04 C	0.00	211.20	0.00
2520 LD	L30 306	PASS	AISC- H2-1	0.063	21
		481.50 T	1.12	20.60	0.00
2521 LD	L30 306	PASS	AISC- H1-3	0.067	22
		380.99 C	-2.88	21.42	1.00
2522 LD	L30 306	PASS	AISC- H1-3	0.054	21
		833.52 C	-3.90	10.03	0.00
2523 LD	L30 306	PASS	AISC- H1-3	0.054	21
		833.52 C	-3.90	10.03	1.00
2524 LD	L30 306	PASS	AISC- H1-3	0.067	22
		380.99 C	-2.88	21.42	0.00
2525 LD	L30 306	PASS	AISC- H2-1	0.063	21
		481.50 T	1.12	20.60	1.00
2526 ST	PIP S80	PASS	AISC- H1-1	0.251	22
		17466.44 C	0.00	172.15	1.00
2527 ST	PIP S80	PASS	AISC- H1-1	0.251	22
		17466.44 C	0.00	172.15	1.00
2528 ST	PIP S80	PASS	AISC- H1-1	0.467	21
		33897.27 C	0.00	229.80	1.00
2529 ST	PIP S80	PASS	AISC- H1-1	0.189	22
		12946.49 C	0.00	144.61	0.00
2530 LD	L30 306	PASS	AISC- H1-3	0.058	22
		228.23 C	-1.85	20.21	0.00
2531 LD	L30 306	PASS	AISC- H2-1	0.055	21
		296.71 T	0.70	19.27	1.00
2532 LD	L30 306	PASS	AISC- H2-1	0.055	21
		296.71 T	0.70	19.27	0.00
2533 LD	L30 306	PASS	AISC- H1-3	0.058	22
		228.23 C	-1.85	20.21	1.00
2534 LD	L30 306	PASS	AISC- H1-3	0.043	21
		514.49 C	-2.50	10.12	0.00
2535 LD	L30 306	PASS	AISC- H1-3	0.043	21
		514.49 C	-2.50	10.12	1.00
2536 ST	PIP S80	PASS	AISC- H1-1	0.189	22
		12946.49 C	0.00	144.61	1.00
2537 ST	PIP S80	PASS	AISC- H1-1	0.336	21
		24965.06 C	0.00	127.67	1.00
2538 LD	L30 305	PASS	AISC- H1-3	0.148	21
		2846.81 C	2.39	16.29	0.00

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2541 LD	L30 305	PASS	AISC- H1-3	0.102	21
		2476.11 C	0.51	-5.69	0.65
2542 ST	PIP S80	PASS	AISC- H1-3	0.155	22
		10707.70 C	0.00	97.96	1.00
2543 ST	PIP S80	PASS	AISC- H1-3	0.155	22
		10707.70 C	0.00	97.96	1.00
2544 ST	PIP S80	PASS	AISC- H1-3	0.100	22
		6642.64 C	0.00	75.96	0.00
2545 LD	L30 306	PASS	AISC- H1-3	0.049	22
		79.05 C	-0.70	18.92	0.00
2546 LD	L30 306	PASS	AISC- H2-1	0.050	24
		3.25 T	14.64	10.74	1.00
2547 LD	L30 306	PASS	AISC- H2-1	0.049	23
		4.41 T	14.62	10.70	0.00
2548 LD	L30 306	PASS	AISC- H1-3	0.049	22
		79.05 C	-0.70	18.92	1.00
2549 LD	L30 306	PASS	AISC- H2-1	0.048	24
		62.07 T	9.60	13.07	0.00
2550 LD	L30 306	PASS	AISC- H2-1	0.048	23
		26.85 T	9.56	13.06	1.00
2551 ST	PIP S80	PASS	AISC- H1-3	0.100	22
		6642.64 C	0.00	75.96	0.00
2552 ST	PIP S80	PASS	AISC- H1-1	0.287	21
		20634.11 C	0.00	155.38	0.00
2553 ST	PIP S80	PASS	AISC- H1-1	0.172	21
		12675.96 C	0.00	74.25	0.00
2554 LD	L30 305	PASS	AISC- H1-3	0.102	22
		2191.03 C	-1.66	8.46	1.12
2555 LD	L30 305	PASS	AISC- H1-3	0.123	21
		2490.70 C	1.76	12.10	0.00
2556 LD	L30 305	PASS	AISC- H1-3	0.102	22
		2191.03 C	1.66	8.46	1.12
2557 LD	L30 305	PASS	AISC- H1-3	0.081	22
		1979.96 C	0.36	-4.36	0.28
2558 ST	PIP S80	PASS	AISC- H1-3	0.070	22
		4652.81 C	0.00	54.83	1.00
2559 ST	PIP S80	PASS	AISC- H1-3	0.128	21
		8835.69 C	0.00	79.74	1.00
2560 ST	PIP S80	PASS	AISC- H1-3	0.070	22
		4652.81 C	0.00	54.83	1.00
2561 LD	L30 305	PASS	AISC- H1-3	0.099	21
		2137.99 C	0.98	8.47	1.12

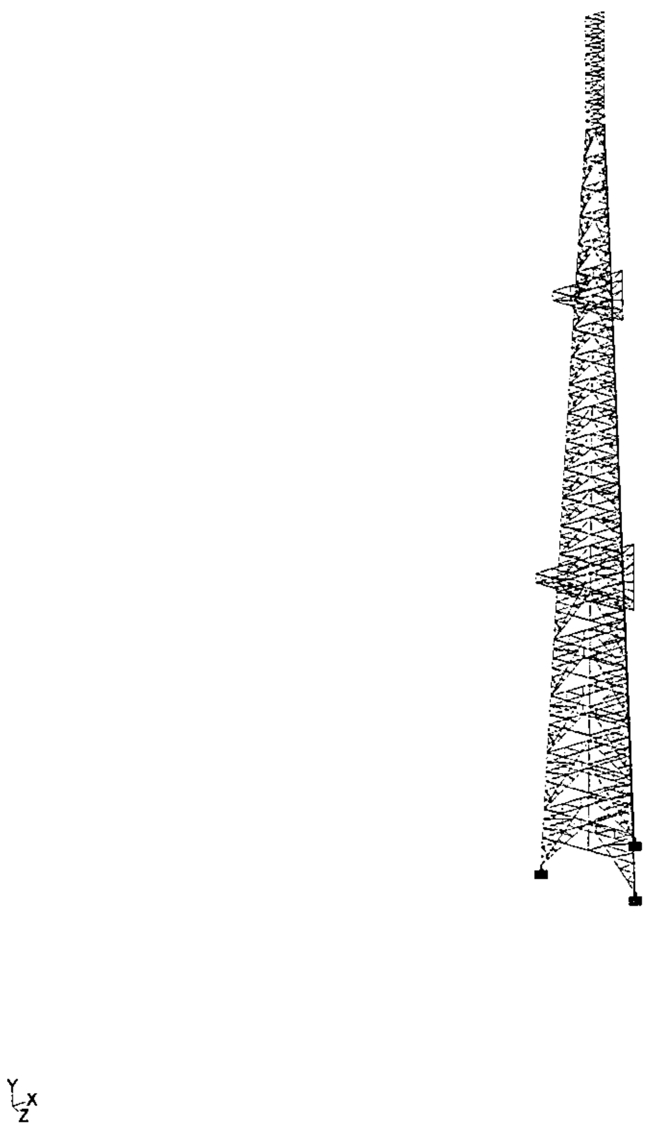
ALL UNITS ARE - KG METE (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
2564 LD	L30 305	PASS	AISC- H1-3	0.379	21
		436.69 C	26.22	-111.18	1.39
2565 LD	L30 305	PASS	AISC- H1-3	0.392	22
		549.40 C	-31.29	111.09	1.39
2566 LD	L30 305	PASS	AISC- H1-3	0.360	24
		510.62 C	26.91	103.19	0.00
2567 LD	L30 305	PASS	AISC- H1-3	0.375	21
		455.06 C	34.67	-104.21	1.39
2568 LD	L30 305	PASS	AISC- H1-3	0.131	24
		113.17 C	-15.79	34.43	2.00
2569 LD	L30 305	PASS	AISC- H2-1	0.344	21
		56.91 T	46.33	90.84	0.00
2570 LD	L30 305	PASS	AISC- H2-1	0.139	22
		97.05 T	-27.10	30.50	0.00
2571 LD	L30 305	PASS	AISC- H1-3	0.462	23
		205.56 C	44.42	-131.74	1.00
2572 LD	L30 305	PASS	AISC- H2-1	0.137	22
		94.93 T	26.28	30.38	0.00
2573 LD	L30 305	PASS	AISC- H1-3	0.466	21
		304.91 C	0.17	-160.49	1.00
2574 LD	L30 308	PASS	AISC- H1-3	0.216	24
		5429.36 C	39.66	21.89	0.00
2575 UPT	PIPX140	PASS	AISC- H1-2	0.390	22
		98043.01 C	0.00	1979.66	0.00
2576 LD	L30 308	PASS	AISC- H1-3	0.208	22
		3782.25 C	-57.78	28.03	0.00
2577 LD	L30 308	PASS	AISC- H1-3	0.212	22
		3920.83 C	-58.95	27.65	1.54
2578 UPT	PIPX140	PASS	AISC- H1-2	0.388	22
		98072.99 C	0.00	1926.38	0.00
2579 LD	L30 308	PASS	AISC- H1-1	0.209	22
		6943.04 C	15.42	-15.36	0.00
2580 LD	L30 308	PASS	AISC- H1-1	0.322	21
		10246.54 C	11.94	-35.31	0.00
2581 UPT	PIPX140	PASS	AISC- H1-2	0.692	21
		182554.31 C	0.00	2777.83	1.00
2582 LD	L30 308	PASS	AISC- H1-1	0.318	21
		10080.69 C	-11.02	-35.47	0.00
2583 LD	L40 4010	PASS	AISC- H1-3	0.063	23
		319.53 C	-21.03	53.49	3.50
2584 LD	L40 4010	PASS	AISC- H1-3	0.070	21
		513.47 C	-13.28	61.83	3.50

APÉNDICE

“B”

Software licensed to Demo User	Job No 1	Sheet No 1	Rev
	Part SELF-SUPPORTING TOWER		
Job Title TORRE AUTOSOPORTADA	Ref		
	By O.G.S.	Date 16-Aug-01	Chd C.M.B.
Client	File Torre.std	Date/Time 09-Sep-2001 14:21	



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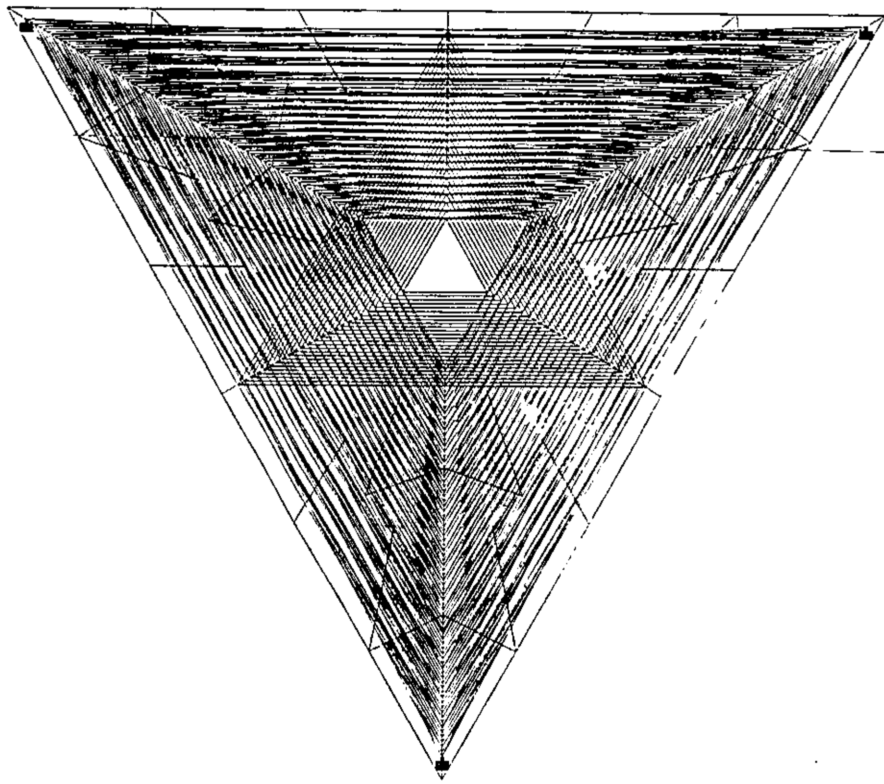

Y–X
Z

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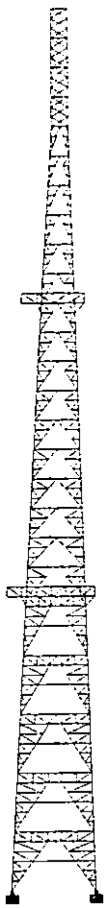

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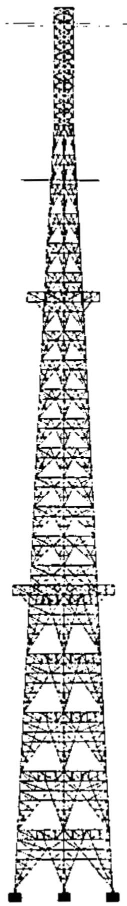

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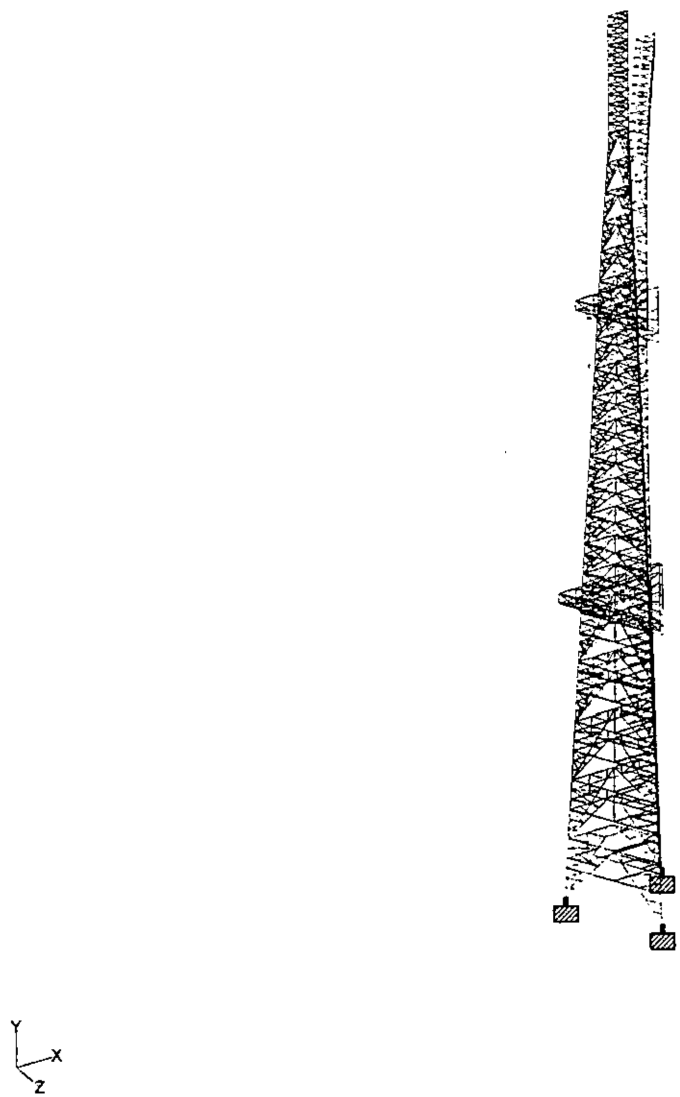

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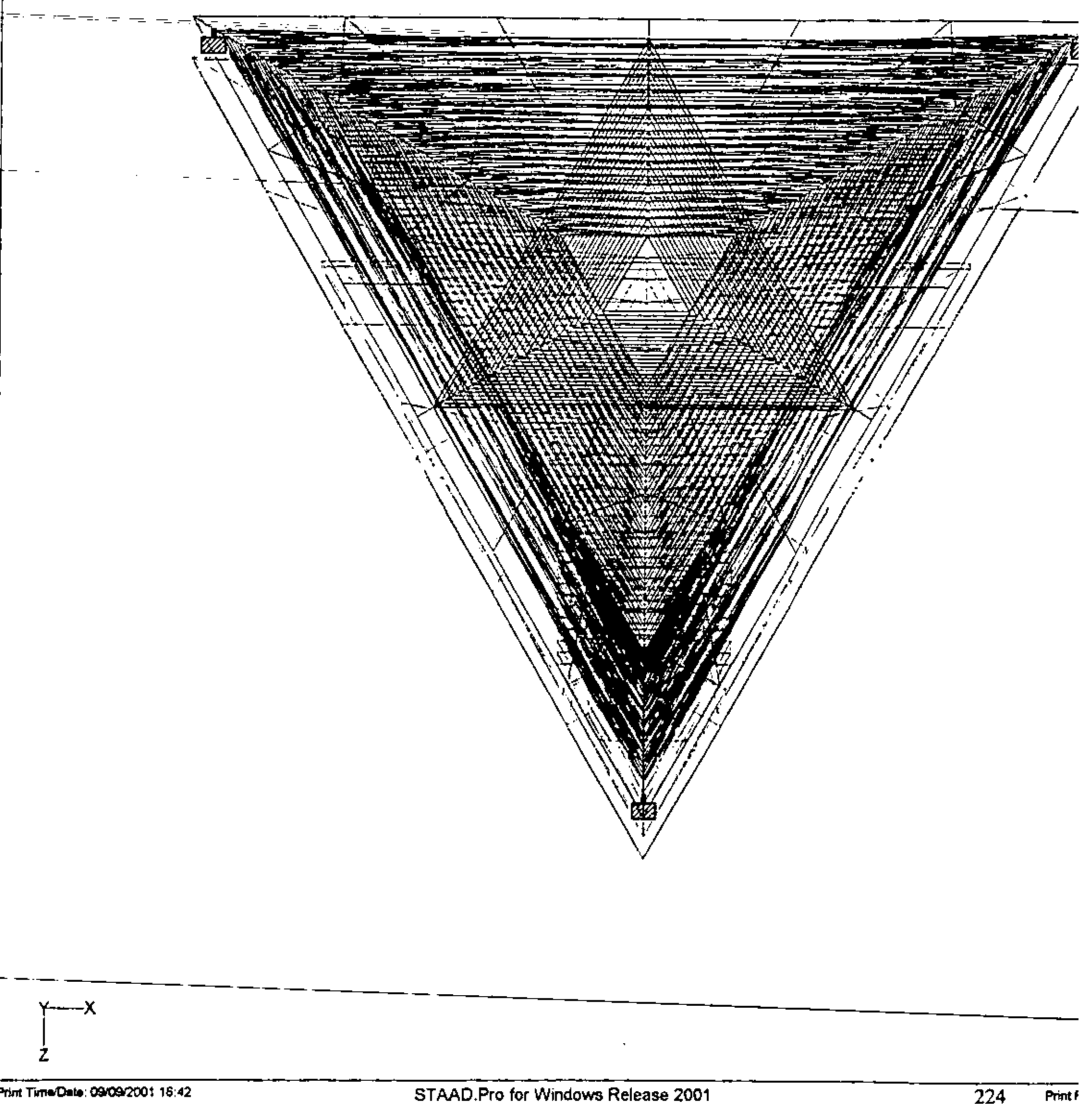

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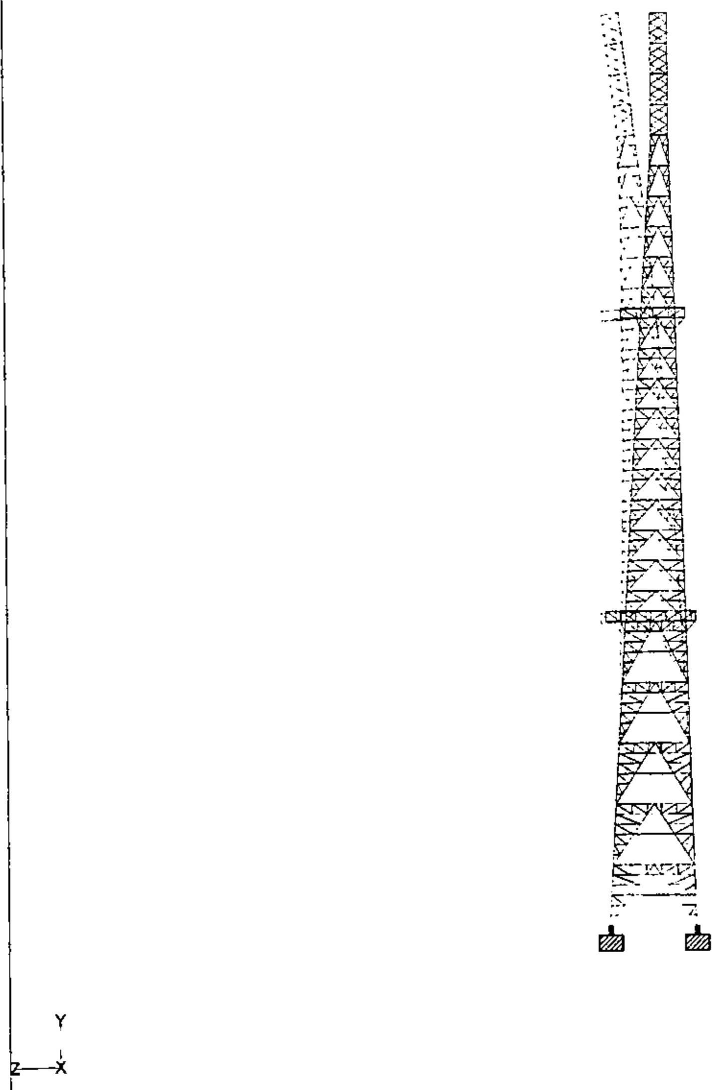

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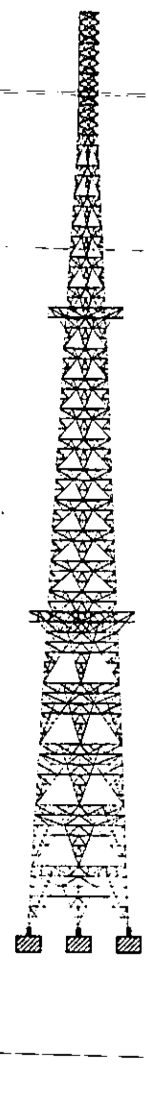

Torre con Parábolas.