

Toris®

Roof and Floor Deck
Ceiling Systems





inspiring
CREATIVITY
through
PERFORMANCE[®]


Toris®

Roof & Floor Deck Ceiling System

EPIC's Toris® Roof and Floor Deck Ceiling Systems offer an innovative approach to designing modern, visually unobstructed interiors with architectural appeal.

Recessed corners soften the linear plank form of Toris and create a unique appearance with a gently rounded edge.

A dovetail recess hides roofing fasteners – enhancing the architectural appearance. The depth of Toris profiles range from 7" to 2.5", allowing roof clear spans up to an impressive 30 feet. Choose the Toris profile that fits best with project span requirements, depth/gage parameters, and load carrying capacities. All Toris profiles offer a hanging system to accommodate signage, lighting, or utilities. The various features and design innovations of the Toris Roof and Floor Deck Ceiling Systems can lead to their specification in a variety of projects including: airport terminals, schools and universities, office buildings, libraries, gymnasiums, canopies, museums, theaters, natatoriums, or any area where an architectural roof/floor deck ceiling system is desired.

 Skydeck® option: All Toris profiles may be specified to accommodate Solatube® daylighting systems to bring natural light into any design (see page 15).

Roof Deck Ceilings

Acoustic (A)

Toris 7
spans 16'–30'
pgs. 6, 8, 18–19

Toris 5.5
spans 13'–27'
pgs. 6, 9, 18–19

Toris 4
spans 14'–24'
pgs. 6, 10, 18–19

Toris
spans 6'–18'
pgs. 6, 11, 18–19

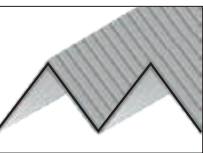
Non-Acoustic

Composite Floor Deck Ceilings

Acoustic (CA)
pgs.20–29

Non-Acoustic (C)
pgs.20–29

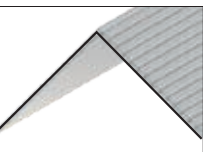
Design Examples:



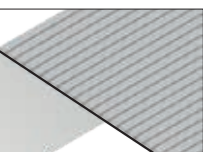
Cathedral Folded Plate



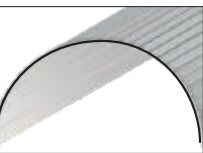
Gambrel Folded Plate



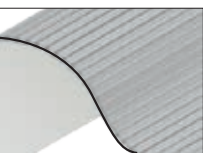
Cathedral



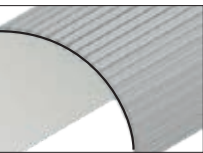
Half Cathedral



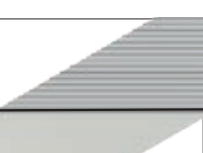
Barrel Vaulted



Serpentine



Half Vaulted



Flat

Toris® Roof Deck Ceiling Systems

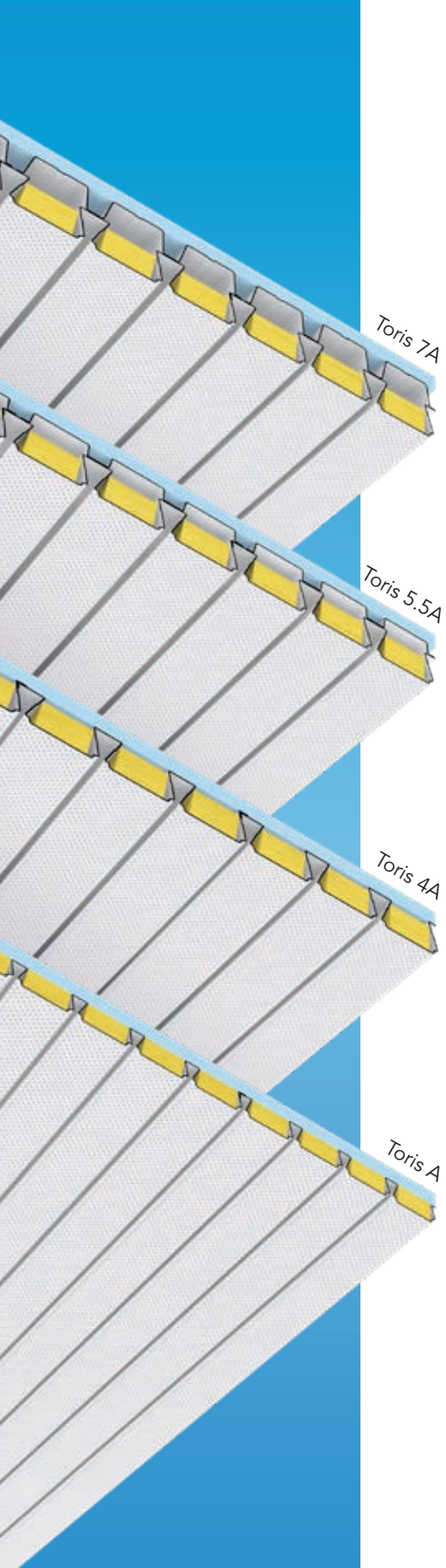
Toris profiles, when painted with a light color, aid in the reflection of natural light when designed in buildings with clerestory windows. These same principles work well with indirect up-lighting. Acoustical Toris profiles reduce the noise levels across all sound frequency ranges. The noise reduction coefficients of each profile can be found in the technical tables beginning on page 8. The Toris rib shape enables the roof deck ceiling to provide a hanging system. Toris hangers placed in the ribs can be used for hanging signage, speakers, lighting, banners and projection screens. Hangers can be purchased and installed as they are needed, and can be relocated, or removed and reused, at any time during the life of the building (see page 17).

U.L. Approved Pipe Hangers for Fire Protection Systems

Use Ankore® and Ankore Lock with Toris 7(A), Toris 5.5(A) and Toris 4(A) or $\frac{3}{8}$ " Wedge Bolt and Wedge Lock with Toris (A). Install per EPIC detail sheet EHI17. Connections and parts have been tested by U.L. under standard #203, and in accordance with NFPA 13.

Diaphragm Resistance

Another benefit of specifying Toris 7(A), Toris 5.5(A), Toris 4(A) and Toris (A) is their inherent ability to resist lateral forces caused by wind or seismic occurrences. The Toris family of products, when properly designed and attached, can provide an effective and efficient diaphragm bracing system for any structure. Contact EPIC Metals for diaphragm tables.



U.S. Patent Number D713,554,
D721,826, D663,045 and D623,773

Canadian Patent Number 151768,
151767, 144931, 131349, 134371
and 134369



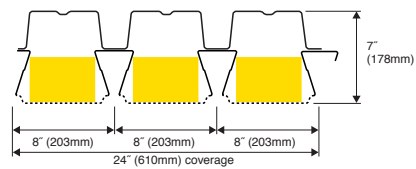
MacArthur Elementary School, Binghamton, New York
Toris A

Toris 7(A) Roof Deck Ceiling System

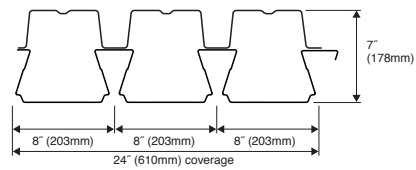
SPANS
16'-30'

ACOUSTIC (TORIS 7A) NON-ACOUSTIC (TORIS 7)

Toris 7A*



Toris 7*



*U.S. Patent Number D713,554
Canadian Patent Number 151768

Toris 7(A) Approvals

IAPMO evaluation report 0226

Toris 7A Noise Reduction Coefficients

Deck Type	Absorption Coefficients						NRC
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
Toris 7A	.52	1.15	.98	1.00	.95	.74	1.00

In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports.

The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

Toris 7A & Toris 7 Section Properties (per foot of width)

Deck Type	Gage	Weight (psf)	I _D (in. ⁴)	S _P (in. ³)	S _N (in. ³)	Allowable Support Reaction (PLF)
Toris 7A	20/20	5.6	10.04	2.31	1.66	803
	18/18	7.5	13.83	3.49	2.59	1343
	16/16	9.5	17.80	4.82	3.68	2062
Toris 7	20/20	5.7	10.68	2.36	1.77	803
	18/18	7.6	14.71	3.56	2.75	1343
	16/16	9.6	18.94	4.92	3.91	2062

*Minimum end support bearing length = 3" (See note 5 below)

Hanger Load Capacities

Deck Type	Gage	Hanger Type	Design Values				Fire Sprinkler Support with Riverts	
			Without Rivets		With Rivets		Max. Pipe Dia. (in)	Rod Dia. (in)
			LRFD Φ _{P_n} (lbs)	ASD P _n /Ω (lbs)	LRFD Φ _{P_n} (lbs)	ASD P _n /Ω (lbs)		
Toris 7(A)	20/20	3/8" Ankore (ANK38)	168	105	698	436	4	3/8
	18/18		252	157	1,357	848	4	3/8
	16/16		346	216	2,180	1,362	4	3/8

NOTES:

1. Resistance Factors, Φ, and Safety Factors, Ω, have been calculated in accordance with AISI S100-16, Chapter K.
2. The structural design professional is responsible to ensure the additional point loads do not exceed the load carrying capacity of the roof deck.
3. Consult EPIC Hanger Installation instructional sheets for detailed information on hanger assemblies with and without rivets.
4. The hangers are limited to static vertical tension loading only.
5. Where hanger spacing is less than 24 inches along the same rib, the combined load to all hangers shall be less than or equal to a single hanger design strength.
6. Sprinkler pipe installations shall comply with NFPA 13.
7. Ends of deck sheets must be fastened to supports at every cell.
8. Do not place hangers at side laps.
9. Do not overtighten nut on hanger rod as this will spread rib and lessen capacity (Finger tight plus 1/2 turn).
10. Hangers have been reviewed by IAMPO for compliance with the IBC, LABC and CBC.

WARNING: FAILURE TO ADHERE TO THE ABOVE NOTES MAY CAUSE HANGERS TO PULL OUT OF DECK RIBS!

Toris 7A & Toris 7 Load Table Uniform Total Service Load (Dead and Live), PSF

Deck Type	No. spans	Gage	Span Length Center to Center of Supports (ft.)														
			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Toris 7A	1	20/20	100/161	94/134	89/113	85/96	80/82	76/68	73/56	70/47	64/40	59/34	55/29	-	-	-	-
		18/18	168/222	158/185	149/156	141/132	134/114	127/93	115/78	106/65	97/55	89/46	83/40	77/34	71/30	-	-
		16/16	258/285	243/238	229/200	214/170	193/146	175/120	159/100	146/84	134/70	123/60	114/51	106/44	98/38	92/33	86/29
Toris 7	1	20/20	100/171	94/143	89/120	85/102	80/88	76/72	73/60	70/50	66/42	60/36	56/31	-	-	-	-
		18/18	168/236	158/197	149/166	141/141	134/121	128/100	118/83	108/69	99/58	91/50	84/42	78/36	73/31	68/27	-
		16/16	258/304	243/253	229/213	217/181	197/155	179/128	163/106	149/89	137/75	126/64	116/54	108/47	100/40	94/35	87/31

If higher loads or longer spans are required, contact EPIC Metals.

NOTES: 1. Loads are based on ASD Design.

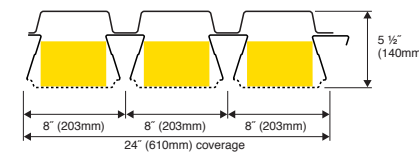
2. Uniform load values listed on the left side of the box, $\frac{100}{50}$, are governed by stress or web crippling and the values listed on the right side, $\frac{100}{50}$, are governed by deflection.
3. The deflection criteria used for generating the tables above were L/240 or 1" maximum. The Engineer of Record shall calculate the allowable uniform load if a different deflection criteria is required.
4. Stress governed values assume a maximum allowable stress of 24 ksi.
5. Minimum end support bearing lengths are shown above. If shorter bearing lengths are used, check safe support reaction table on page 19.

Toris 5.5(A) Roof Deck Ceiling System

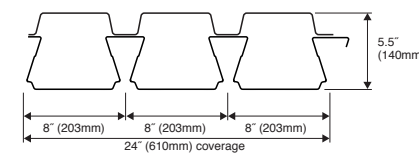
SPANS
13'-27'

ACOUSTIC (TORIS 5.5A) NON-ACOUSTIC (TORIS 5.5)

Toris 5.5A*



Toris 5.5*



*U.S. Patent Number D721,826
Canadian Patent Number 151767

Toris 5.5(A) Approvals

IAPMO evaluation report 0226

Toris 5.5A Noise Reduction Coefficients

Deck Type	Absorption Coefficients						NRC
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
Toris 5.5A	.41	1.15	1.00	1.00	.93	.75	1.00

In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports.

The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

Toris 5.5A & Toris 5.5 Load Table Uniform Total Service Load (Dead and Live), PSF

Deck Type	No. spans	Gage	Span Length Center to Center of Supports (ft.)																
			13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		
Toris 5.5A	1	20/20	124/171	115/137	107/111	100/92	91/76	81/64	73/55	66/47	60/39	55/32	50/27	-	-	-	-		
		18/18	207/235	192/188	171/153	150/126	133/105	119/88	106/75	96/64	87/53	79/44	73/37	67/31	61/26	-	-		
		16/16	309/307	266/246	232/200	204/165	180/137	161/116	144/98	130/84	118/69	108/58	99/48	91/41	83/35	77/30	-		
Toris 5.5	1	20/20	124/182	115/145	107/118	100/97	93/81	83/68	74/58	67/50	61/41	56/34	51/29	-	-	-	-		
		18/18	207/250	192/200	174/162	153/134	136/112	121/94	109/80	98/69	89/56	81/47	74/39	68/33	63/28	-	-		
		16/16	315/327	272/262	237/213	208/175	184/146	164/123	148/105	133/90	121/74	110/61	101/51	93/43	85/37	79/31	73/27		

If higher loads or longer spans are required, contact EPIC Metals.

NOTES: 1. Loads are based on ASD Design.

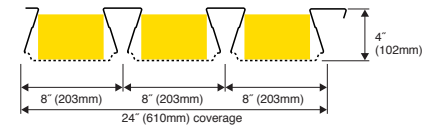
2. Uniform load values listed on the left side of the box, $\frac{100}{50}$, are governed by stress or web crippling and the values listed on the right side, $\frac{100}{50}$, are governed by deflection.
3. The deflection criteria used for generating the tables above were L/240 or 1" maximum. The Engineer of Record shall calculate the allowable uniform load if a different deflection criteria is required.
4. Stress governed values assume a maximum allowable stress of 24 ksi.
5. Minimum end support bearing lengths are shown above. If shorter bearing lengths are used, check safe support reaction table on page 19.

Toris 4(A) Roof Deck Ceiling System Technical Tables

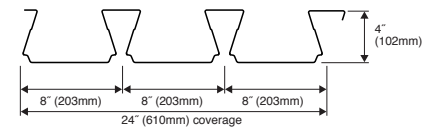
SPANS
14'-24'

ACOUSTIC (TORIS 4A) NON-ACOUSTIC (TORIS 4)

Toris 4A*



Toris 4*



*U.S. Patent Number D663,045
Canadian Patent Number 144931

Toris 4(A) Approvals

IAPMO evaluation report 0226
Class 1-60, 1-75, 1-90 rated per
Factory Mutual Standard 4451

Toris 4A Noise Reduction Coefficients

Deck Type	Absorption Coefficients						NRC
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
Toris 4A	.33	.93	1.01	.90	.89	.67	.95

In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports.

The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

Toris 4A & Toris 4 Section Properties (per foot of width)

Deck Type	Gage	Weight (psf)	I _D (in. ⁴)	S _P (in. ³)	S _N (in. ³)	Allowable Support Reaction (PLF)	
						End*	Int.*
Toris 4A	20	3.3	2.38	0.75	0.77	639	1507
	18	4.3	3.21	1.22	1.17	1081	2491
	16	5.5	4.10	1.63	1.56	1676	3796
Toris 4	20	3.4	2.53	0.77	0.82	639	1507
	18	4.4	3.42	1.24	1.24	1081	2491
	16	5.6	4.36	1.66	1.66	1676	3796

*Minimum end and interior support bearing lengths (See note 5 below):
End = 1.5" Interior = 4"

Hanger Load Capacities

Deck Type	Gage	Hanger Type	Design Values				Fire Sprinkler Support with Riverts	
			Without Riverts		With Riverts		Max. Pipe Dia. (in)	Rod Dia. (in)
			LRFD Φ _{P_n} (lbs)	ASD P _n /Ω (lbs)	LRFD Φ _{P_n} (lbs)	ASD P _n /Ω (lbs)		
Toris 4(A)	20	3/8" Ankore (ANK38)	168	105	698	436	4	3/8
	18		252	157	1,357	848	4	3/8
	16		346	216	2,180	1,362	4	3/8

NOTES:

- Resistance Factors, Φ, and Safety Factors, Ω, have been calculated in accordance with AISI S100-16, Chapter K.
- The structural design professional is responsible to ensure the additional point loads do not exceed the load carrying capacity of the roof deck.
- Consult EPIC Hanger Installation instructional sheets for detailed information on hanger assemblies with and without rivets.
- The hangers are limited to static vertical tension loading only.
- Where hanger spacing is less than 24 inches along the same rib, the combined load to all hangers shall be less than or equal to a single hanger design strength.
- Sprinkler pipe installations shall comply with NFPA 13.
- Ends of deck sheets must be fastened to supports at every cell.
- Do not place hangers at side laps.
- Do not over-tighten nut on hanger rod as this will spread rib and lessen capacity (Finger tight plus 1/2 turn).
- Hangers have been reviewed by IAMPO for compliance with the IBC, IABC and CBC.

WARNING: FAILURE TO ADHERE TO THE ABOVE NOTES MAY CAUSE HANGERS TO PULL OUT OF DECK RIBS!

Toris 4A & Toris 4 Load Table Uniform Total Service Load (Dead and Live), PSF

Deck Type	No. spans	Gage	Span Length Center to Center of Supports (ft.)											
			14	15	16	17	18	19	20	21	22	23	24	
Toris 4A	1	20	61/57	53/46	47/38	42/32	37/27	-	-	-	-	-	-	-
		18	100/77	87/62	76/51	68/43	60/36	54/31	-	-	-	-	-	-
		16	133/98	116/80	102/66	90/55	80/46	72/39	65/34	59/28	-	-	-	-
	2	20	63/137	55/111	48/92	43/77	38/65	34/55	31/47	28/39	25/32	23/27	-	-
		18	96/185	83/150	73/124	65/103	58/87	52/74	47/63	42/52	39/43	35/36	33/31	-
		16	127/236	111/192	98/158	86/132	77/111	69/94	62/81	57/67	52/55	47/46	43/39	-
	3	20	79/107	68/87	60/72	48 Foot Maximum Sheet Length								-
		18	119/145	104/118	91/97	48 Foot Maximum Sheet Length								-
		16	159/185	139/150	122/124	48 Foot Maximum Sheet Length								-
Toris 4	1	20	63/61	55/49	48/41	43/34	38/28	-	-	-	-	-	-	
		18	101/82	88/67	78/55	69/46	61/39	55/33	50/28	-	-	-	-	
		16	136/104	118/85	104/70	92/58	82/49	74/42	66/36	60/29	-	-	-	
	2	20	67/146	58/118	51/98	45/81	40/69	36/58	33/50	30/41	27/34	25/29	-	
		18	101/197	88/160	78/132	69/110	61/93	55/79	50/68	45/56	41/46	38/39	34/33	
		16	136/251	118/204	104/168	92/140	82/118	74/100	66/86	60/71	55/59	50/49	46/42	
	3	20	84/114	73/93	64/76	48 Foot Maximum Sheet Length								-
		18	127/154	110/125	97/103	48 Foot Maximum Sheet Length								-
		16	169/197	148/160	130/132	48 Foot Maximum Sheet Length								-

If higher loads or longer spans are required, contact EPIC Metals.

NOTES: 1. Loads are based on ASD Design.

2. Uniform load values listed on the left side of the box, $\frac{100}{50}$, are governed by stress or web crippling and the values listed on the right side, $\frac{100}{50}$, are governed by deflection.

3. The deflection criteria used for generating the tables above were L/240 or 1" maximum. The Engineer of Record shall calculate the allowable uniform load if a different deflection criteria is required.

4. Stress governed values assume a maximum allowable stress of 24 ksi.

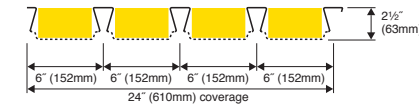
5. Minimum end and interior support bearing lengths are shown above. If shorter bearing lengths are used, check safe support reaction table on page 19.

Toris® (A) Roof Deck Ceiling System Technical Tables

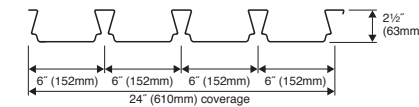
SPANS
6'-18'

ACOUSTIC (TORIS A) NON-ACOUSTIC (TORIS)

Toris A*



Toris*



*U.S. Patent Number D623,773
Canadian Patent Number 131349, 134371 and 134369

Toris (A) Approvals

IAPMO evaluation report 0226
Class 1-60, 1-75, 1-90 rated per
Factory Mutual Standard 4451

Toris A Noise Reduction Coefficients

Deck Type	Absorption Coefficients						NRC
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
Toris A	.18	.78	1.15	.94	.90	.80	.95

In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports.

The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

Toris A & Toris Load Table Uniform Total Service Load (Dead and Live), PSF

Deck Type	No. spans	Gage	Span Length Center to Center of Supports (ft.)													
			6	7	8	9	10	11	12	13	14	15	16	17	18	
Toris A	1	20	209/222	153/140	118/94	93/66	75/48	62/36	52/28	-	-	-	-	-	-	
		18	280/298	206/188	158/126	124/88	101/64	83/48	70/37	60/29	-	-	-	-	-	
		16	356/380	261/239	200/160	158/113	128/82	106/62	89/47	76/37	65/30	-	-	-	-	
	2	20	187/500	137/336	105/225	83/158	67/115	56/87	47/67	40/53	34/42	30/34	-	-	-	
		18	258/500	189/452	145/303	115/212	93/155	77/116	64/90	55/71	47/56	41/46	36/38	32/32	-	
		16	338/500	248/500	190/386	150/271	122/198	100/148	84/114	72/90	62/72	54/59	48/48	42/40	38/34	
	3 or more	20	233/418	171/263	131/176	104/124	84/90	69/68	58/52	50/41	43/33	37/27	-	-	-	
		18	322/500	237/353	181/237	143/166	116/121	96/91	81/70	69/55	59/44	52/36	45/30	-	-	
		16	422/500	310/451	238/302	188/212	152/155	126/116	106/89	90/70	78/56	68/46	59/38	-	-	
Toris	1	20	213/234	157/147	120/99	95/69	77/51	63/38	53/29	-	-	-	-	-		
		18	284/313	209/197	160/132	126/93	102/68	85/51	71/39	61/31	-	-	-	-		
		16	360/398	264/251	203/168	160/118	130/86	107/65	90/50	77/39	66/31	-	-	-		
	2	20	196/500	144/355	110/238	87/167	70/122	58/91	49/70	42/55	36/44	31/36	28/30	-		
		18	267/500	196/475	150/318	119/223	96/163	79/122	67/94	57/74	49/59	43/48	38/40	33/33		
		16	347/500	255/500	195/404	154/284	125/207	103/156	87/120	74/94	64/75	55/61	49/51	43/42		
	3 or more	20	244/441	180/278	138/186	109/131	88/95	73/72	61/55	52/43	45/35	39/28	-	-		
		18	333/500	245/371	188/249	148/175	120/127	99/96	83/74	71/58	61/46	53/38	47/31	-		
		16	433/500	318/472	244/317	193/222	156/162	129/122	108/94	92/74	80/59	69/48	61/40	-		

If higher loads or longer spans are required, contact EPIC Metals.

NOTES: 1. Loads are based on ASD Design.

2. Uniform load values listed on the left side of the box, $\frac{100}{50}$, are governed by stress or web crippling and the values listed on the right side, $\frac{100}{50}$, are governed by deflection.

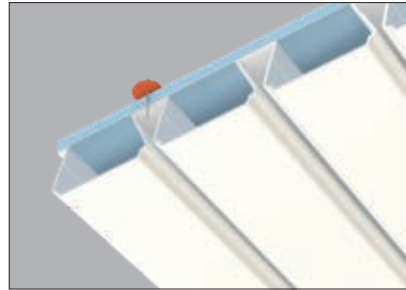
3. The deflection criteria used for generating the tables above were L/240 or 0.75" maximum. The Engineer of Record shall calculate the allowable uniform load if a different deflection criteria is required.

4. Stress governed values assume a maximum allowable stress of 24 ksi.

5. Minimum end and interior support bearing lengths are shown above. If shorter bearing lengths are used, check safe support reaction table on page 19.

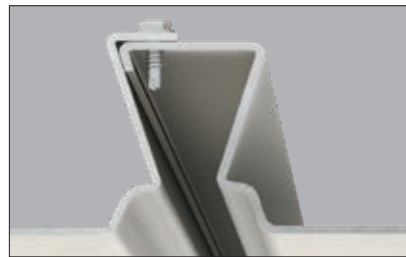


Standard Features with Toris



Conceals Fasteners

All of the Toris panels conceal the roofing system fasteners.



Sidelap

The dovetail ribs of the sidelaps conceal the fasteners.

Toris® Options

Toris' Superior Acoustic Properties

Acoustic roof and floor deck ceiling systems are specified as an economical means of reducing noise levels in building interiors, and offer an attractive appearance without adding an additional ceiling. NRC values are the noise absorption averages over a range of frequencies. The higher the NRC value, the greater the amount of noise that is absorbed over the frequency ranges. An NRC value of 1.00 would mean that 100% of the noise that strikes the panel is absorbed, whereas an NRC value of .60 would mean that only 60% of the sound that strikes the panel surface is absorbed and 40% of the sound is reflected back. Lower NRC values can contribute to creating reverberation (an echo effect) that makes speech less intelligible and can create a sense of noise amplification. Many building factors such as room size, layout, shape, materials specified, windows, the number of occupants, and noise sources also affect noise levels. Therefore, EPIC Metals recommends that these factors be considered prior to the preparation of acoustical design specifications. Displayed below, the Toris profiles acoustical perforations are in the large flat area, which are parallel to the floor. This results in significantly better sound absorbing qualities of the Toris panels.

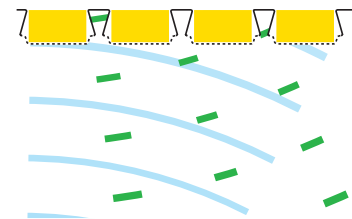
Thermal Insulation

Acoustic Element

Acoustic Perforation

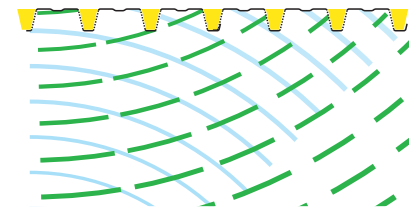
Sound Absorption Comparison

Toris A



Direct Sound
Reflected Sound

NA Deck

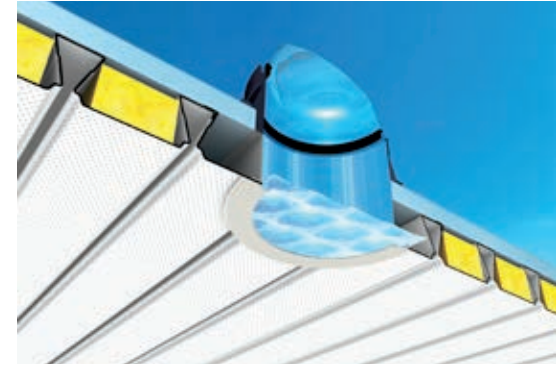


Skydeck®

Natural light makes spaces appear larger and reveals true colors in the interior of buildings. In the past, to incorporate skylights with a long-span roof deck ceiling system required that the skylight be framed with structural steel, detracting from the open appearance of the system. Skydeck with the Solatube® Daylighting System captures ambient light as well as direct light, enabling it to provide exceptional lighting even on cloudy days. Energy costs can be reduced in structures using Skydeck as a day-lighting technique. Skydeck can be an important contributor to achieving Leadership in Energy and Environmental Design (LEED®) points.

EPIC Metals' Skydeck specified to accept Solatube® Daylighting System, transfers up to 500% more daylight than other tubular skylight systems with the brightest, cleanest, and whitest natural light possible. This advantage is particularly significant in low-angle light conditions, such as during the early morning and late afternoon, and in the winter months when the sun is low on the horizon. Skydeck has minimal heat loss or gain between the interior and exterior because the Solatubes work like a dual glazed window.

Solatube® is a registered trademark owned by Solatube International Inc. LEED® is a registered trademark owned by the U.S. Green Building Council and is used with permission.



Toris with Skydeck Option

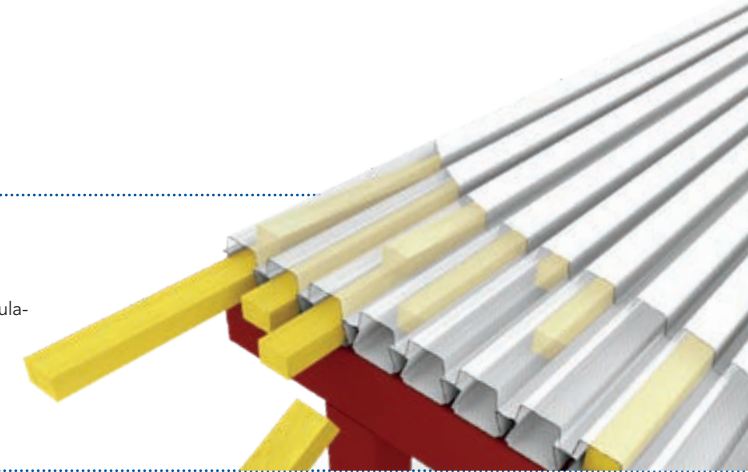
U.S. Patent Number 6,813,864

Windgard® Toris 7A & 5.5A

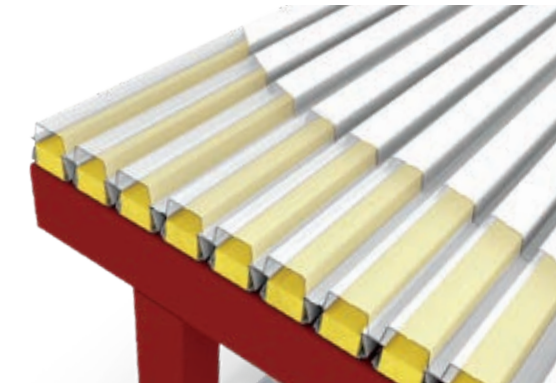
EPIC Metals' structural roof deck ceiling systems utilize acoustic elements to reduce interior noise and sound reverberation. Dislodged or missing acoustic elements can greatly reduce the system's effectiveness to control noise. Dislodging can occur during product transportation or installation in Toris 7A and Toris 5.5A.

EPIC Metals addresses this issue with Windgard, a system used in Toris 7A and Toris 5.5A to ensure that acoustic insulation stays in place from panel fabrication to final installation. The EPIC Windgard system has been laboratory tested to maintain acoustic element positions at wind speeds up to 105 mph. Windgard ensures the acoustic properties are preserved, delivering expected noise reduction coefficients and effectiveness.

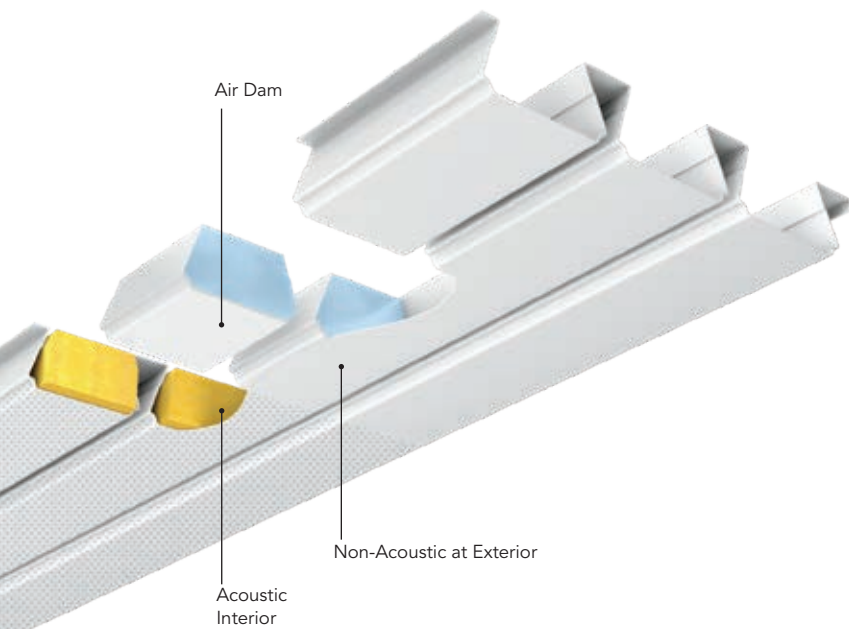
Without Windgard, acoustic insulation can shift or dislodge.



With Windgard, acoustic insulation remains in place.



Toris® Options & Features



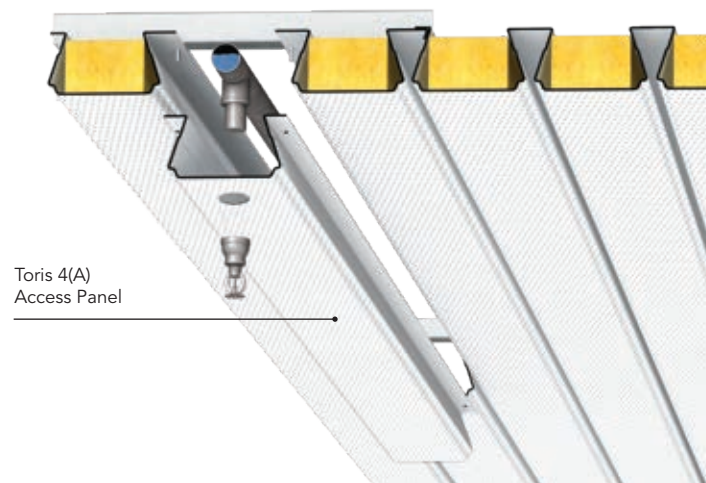
◀ Air Dams

EPIC Metals understands the importance of reducing energy loss in buildings. This is the reason that EPIC pioneered the use of specially designed air dams to prevent air movement in roof and floor deck ceiling panels that cantilever outside of a building. Where these panels are partially inside the building and transition to the outside, a barrier is necessary to prevent the exterior unconditioned air from moving through the conditioned spaces.

EPIC Metals specially designed air dams to help reduce the building energy usage when roof or floor deck ceiling panels extend from the interior of a building to the exterior of the building.

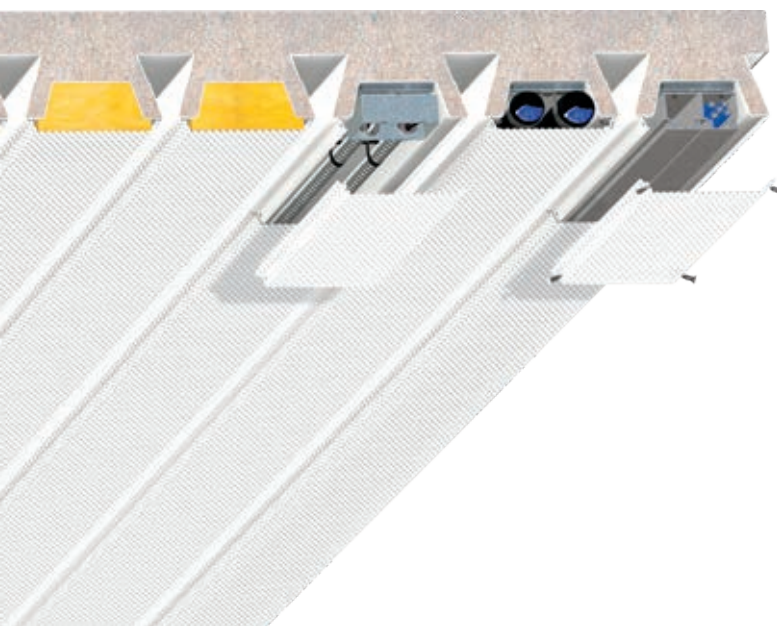
Access Panel ▶

With Toris 7(A), Toris 5.5(A), Toris 4(A) and Toris (A), it is possible to easily access utilities that have been located within the roof deck ceiling system. Access panels come in various sizes and configurations, are placed according to architectural drawings and are provided during the manufacturing process. The removable panels are fabricated to match the finish, size, and shape of the adjacent ceiling surface. The result is a clean, uninterrupted look while providing a simple and convenient access to hidden utilities. Toris (A) access panels lack the clearance for sprinkler lines but can accommodate other utilities.



◀ Toris CA & 4CA Hidden Utilities Feature

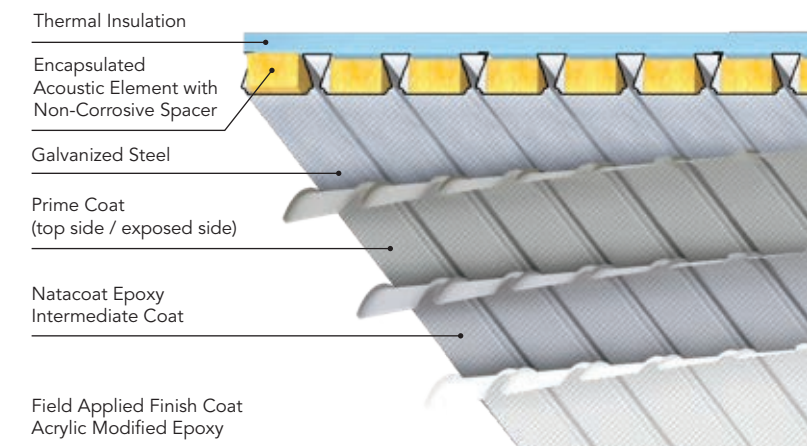
Toris Composite Floor Deck Ceiling Systems provide a concrete form for a structural floor while providing an acoustical/architectural ceiling underneath. This system was engineered to house various hidden utilities within the cells of the deck while providing access through removable panels along the system ribs. It is no longer necessary to expose electrical systems, wire ducts, sprinkler pipes, or strut channels when designing a facility with multiple floors. Toris Composite Floors/Ceilings allow a consistent floor to floor aesthetic while providing architectural appeal.



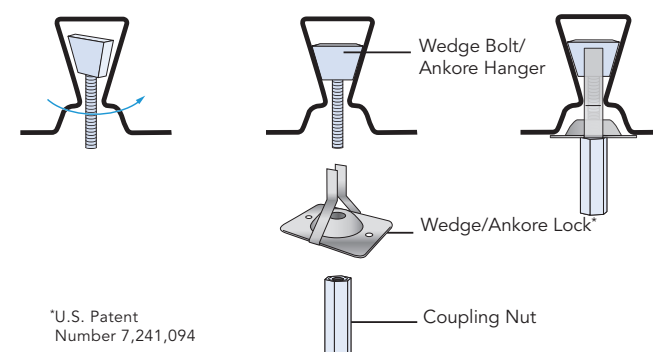
Natacoat® ▶

Natoriums create a highly humid and corrosive interior environment for building materials. EPIC Natacoat is an innovative, specialized coating that has been applied to protect long span, acoustic roof and floor deck ceiling systems in such harsh settings for over 20 years.

Prior to panel fabrication, all surfaces of the galvanized steel are degreased and cleaned by a chemical conversion coating before applying a primer to increase bonding capabilities. Following the prime coat, the panels are fabricated and the Natacoat specialized coating is applied to the ceiling surface. Natacoat is a factory-applied, oven-baked polyamide epoxy. The finish coat is applied after installation. Contact EPIC for special paint specifications for natatoriums or other high humidity applications.



Hanging System ▼



Insert the Toris hanger with the head parallel to the Toris deck. Rotate the hanger 90° and pull down to seat. After the hanger is seated, install the proper hanger lock and nut.

Hangers have been reviewed by IAMPO for compliance with the IBC, LABC and CBC.

*U.S. Patent Number 7,241,094

Toris® Roof Deck Ceiling Systems Specifications

Note: Omit underlined areas for non-acoustic applications

For the additional specification language covering factory reinforced openings to accommodate SkyDeck® for Solatube® skylights, contact EPIC Metals.

PART 1: GENERAL

1.1 SUMMARY

The requirements of this specification section include all materials, equipment, and labor necessary to furnish and install Toris 7A Acoustical, Toris 5.5A Acoustical, Toris 4A Acoustical or Toris A Acoustical Roof Deck System.

- A. Panels shall serve as an acoustical ceiling and a structural roof deck as indicated on the contract drawings.
- B. Acoustical panels shall provide an exposed bottom surface that is substantially flat. The narrow rib openings of the Roof Deck panels shall provide the appearance of a linear ceiling. Fasteners for sidelaps and overlying roofing materials shall be concealed within the depth of the dovetail shaped ribs.
- C. Toris 7A, 5.5A or 4A Acoustical Roof Deck: Toris Ankore hanging devices that are specially configured to fit into the dovetail-shaped ribs of the Toris 7A, 5.5A or 4A Acoustical Roof Deck panels shall be available. These hanging devices shall be utilized wherever any related work is suspended from Toris 7A, 5.5A or 4A Acoustical Roof Deck. Toris Ankore hanging devices shall be furnished by the installer of the related work unless otherwise indicated.
Toris A Acoustical Roof Deck: Toris Wedge Bolt hanging devices that are specially configured to fit into the dovetail-shaped ribs of the Toris A Acoustical Roof Deck panels shall be available. These hanging devices shall be utilized wherever any related work is suspended from Toris A Acoustical Roof Deck. Toris Wedge Bolt hanging devices shall be furnished by the installer of the related work unless otherwise indicated.

1.2 RELATED WORK

The following related work is not part of this specification section:

- A. Structural Steel: Supplementary framing.
- B. Roofing: Other than structural roof deck and accessories. Installation of acoustic elements.
- C. Painting: Preparation for and application of field painting.
- D. Mechanical: Attachments to Roof Deck.
- E. Electrical: Attachments to Roof Deck.

1.3 SUBMITTALS

Submit the following items in accordance with the conditions of the contract and appropriate specification sections:

- A. Product data for Roof Deck and hanging devices including material types, dimensions, finishes, load capacities, and noise reduction coefficients.
- B. Erection drawings for Roof Deck and related accessory items showing profiles and material thicknesses, layout, anchorage, and openings as dimensioned on the structural drawings.

1.4 REFERENCE STANDARDS

- A. Section Properties: Shall be computed in accordance with the American Iron and Steel Institute (AISI) *Specification for Design of Cold-Formed Steel Structural Members.*
- B. Welding: Shall comply with applicable provisions of the *American Welding Society (AWS) D1.3 Structural Welding Code – Sheet Steel.*
- C. Noise Reduction Coefficients: Shall be verified by the results of sound absorption tests conducted in accordance with the ASTM C423 and E795. A minimum NRC of 1.00 shall be provided for Toris 7A and Toris 5.5A. A minimum NRC of 0.95 shall be provided for Toris 4A and Toris A. Copies of the Sound Absorption test shall be submitted upon request.

1.5 QUALITY ASSURANCE

- A. Toris 4A Acoustical or Toris A Acoustical Roof Deck shall have been tested and approved by Factory Mutual Research Corporation for use in Class 1 insulated steel deck roof construction without the use of DensDeck® as a fire barrier.
- B. Toris 4A Acoustical or Toris A Acoustical Roof Deck shall be listed in the FM Approval Guide. All bundles shall bear the appropriate FM approved label.

DensDeck® is a registered trademark owned by Georgia-Pacific Gypsum LLC.

PART 2: PRODUCTS

2.1 MANUFACTURER

- A. In accordance with the requirements of this specification section, provide products manufactured by EPIC Metals, Rankin, PA.
- B. Substitutions: (Under Provisions of Division 01) Not permitted.

2.2 MATERIALS

- A. Roof Deck panels shall be cold-formed from steel sheets conforming to ASTM A653, Grade 40 or equal, having a minimum yield strength of 40,000 psi.
- B. Before forming, the steel sheets shall have received a hot-dip protective coating of zinc conforming to ASTM A924, Class G60 or G90.
Toris 7A and Toris 5.5A Primer Paint Option—The bottom ceiling surface of the panel shall be prime painted at the factory after forming and welding. Before painting, the galvanized steel shall be chemically cleaned and coated with a pretreatment followed by a coat of manufacturer's standard white prime paint and then oven-cured. Compatibility of field applied finish paint shall be the responsibility of the painting contractor.
Toris 4A and Toris A Primer Paint Option—Prior to forming, galvanized steel shall be chemically cleaned and pre-treated followed by an oven-cured epoxy primer and a second coat of oven-cured polyester primer paint applied to both sides in the manufacturer's standard color of off-white. Compatibility of field applied finish paint with factory applied primer paint shall be the responsibility of the painting contractor.
Toris 4A and Toris A Finish Paint Option—Prior to forming, galvanized steel shall be chemically cleaned and pre-treated followed by an oven-cured epoxy primer and a second coat of oven-cured polyester paint applied to both sides. After factory painting is complete, a plastic removable film shall be applied to the bottom surface of the panels to protect paint finish during manufacturing, shipping, and handling. The protective film is to be removed by the erector prior to installation.
Paint Option—For specialized painting systems that are recommended for Natatoriums and other high humidity applications, contact EPIC Metals.
- C. The minimum uncoated thickness of material supplied shall be within 5% of the design thickness.

2.3 FABRICATION

- A. Toris 7A Acoustical Roof Deck shall have continuous dovetail shaped ribs spaced 8" on center. The profile shall be 7" deep.
Toris 5.5A Acoustical Roof Deck shall have continuous dovetail shaped ribs spaced 8" on center. The profile shall be 5.5" deep.
Toris 4A Acoustical Roof Deck panels shall have continuous dovetail-shaped ribs spaced 8" on center. The profile shall be 4" deep.
Toris A Acoustical Roof Deck panels shall have continuous dovetail-shaped ribs spaced 6" on center. The profile shall be 2.5" deep.
- B. The design thickness and minimum section properties shall be indicated on the contract drawings.
- C. Roof Deck panels shall have positive registering sidelaps that can be fastened by welds or screws.
- D. Acoustical Roof Deck panels shall be fabricated with perforated holes. Perforated areas shall be located in the areas between the dovetail-shaped ribs.

2.4 ACCESSORIES

- A. Where panels continue from the interior of the building through to the exterior of the building (for example as a cantilever canopy): the panels will be perforated on the interior and not perforated on the exterior, air dams will be provided to block the movement of conditioned air from the interior of the building to the exterior. Air dam assembly shall have an allowable air infiltration of less than 0.02 cfm/ft² at 1.57 lb/ft²
Toris 4A Acoustical or Toris A Acoustical Roof Deck will be supplied with factory assembled EpicTjoints® to provide a thermal break between panels that span from the interior to the exterior of the building. The EpicTjoints shall have been tested in accordance with ASTM C1363.
- B. Wedge Bolt hanging devices (which include Wedge Locks) or Ankore hanging devices (which include Ankore Locks) shall be installable and relocatable along the length of the interior ribs of the Acoustical Roof Deck panels. Manufacturer's product data shall be consulted for minimum spacing, load capacities, and proper installation procedure of the Wedge Bolt or Ankore Hanging devices.
- C. Sump pans, ridge, valley, transition, and eave plates shall be provided per manufacturer's standards.
- D. Manufacturer's standard profile closures shall be provided as indicated on the contract drawings.

- E. Acoustic elements shall be provided for installation above the perforated holes in the bottom flat area between the dovetail-shaped ribs. To facilitate field painting of the perforated surfaces, the sound absorbing elements shall be supported above the surface on corrosion resistant spacers. Sound absorbing elements and spacers shall be furnished under this specification section for installation by others for Toris 4A and Toris A.
Toris 7A and Toris 5.5A Acoustic sound-absorbing elements shall be factory installed. The acoustic elements will be supported above the bottom panel be either individual stand-offs or continuous mesh to avoid plugging the perforated holes when field painting.
- F. Toris 7A Acoustical, Toris 5.5A Acoustical, Toris 4A Acoustical and Toris A Acoustical panels requiring access openings shall be shown on the structural or architectural drawings. Openings shall be shop-fabricated in the panel area between ribs, 8" wide for Toris 7A, Toris 5.5A or Toris 4A Acoustical and 6" wide for Toris A Acoustical. Access covers shall match the finish and profile of the adjacent deck surface, including perforations.

PART 3: EXECUTION

3.1 GENERAL

Roof Deck panels and accessories shall be installed in strict accordance with the manufacturer's approved erection drawings, installation instructions, the *Steel Deck Institute (SDI) Manual for Construction with Steel Deck*, and all applicable safety regulations.

3.2 BEFORE INSTALLATION

- A. The supporting frame and other work relating to the Acoustical Roof Deck shall be examined to determine if this work has been properly completed.
- B. All components of the Acoustical Roof Deck System shall be protected from significant damage during shipment and handling. If storage at the jobsite is required, bundles or packages of these materials shall be elevated above the ground, sloped to provide drainage, and protected from the elements with a ventilated waterproof covering.

3.3 INSTALLATION

- A. Bundles or packages of Acoustical Roof Deck System components shall be located on supporting members in such a manner that overloading of any individual members does not occur.
- B. Before being permanently fastened, Acoustical Roof Deck panels shall be placed with ends accurately aligned and adequately bearing on supporting members. Proper coverage of the Acoustical Roof Deck panels shall be maintained. Care must be taken by the erector to maintain uniform spacing of the bottom rib opening (equal to the openings in the profiled sheet) at the sidelaps. Consistent coverage shall be maintained so that panels located in adjacent bays will be properly aligned.
- C. Field cutting of the Acoustical Roof Deck panels shall be performed in a neat and precise manner. Only those openings shown on the structural drawings shall be cut. Other openings shall be approved by the structural engineer and cut by those requiring the opening.
- D. Acoustical Roof Deck panels shall be fastened to all supporting members with 3/4" diameter puddle welds at a nominal spacing of 8" on center or less as indicated on the manufacturer's erection drawings.
- E. Mechanical fasteners may be substituted for puddle welds to permanently fasten Acoustical Roof Deck panels to supporting members. The mechanical fastener manufacturer shall provide documentation as to the equivalent load capacity and proper installation procedure for each type of fastener being used.
- F. Sidelaps of Acoustical Roof Deck panels shall be fastened by welds or screws at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings. Sides of Acoustical Roof Deck panels that are located at perimeter edges of the building shall be fastened to supporting members at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings.
- G. Sump pans, ridge, valley, transition, eave plates, and supplied reinforcement for small openings shall be fastened as indicated on the manufacturer's erection drawings.

3.4 AFTER INSTALLATION

- A. Construction loads that could damage the Acoustical Roof Deck such as heavy concentrated loads and impact loads shall be avoided. Planking shall be used in all high traffic areas.
- B. Cleaning the bottom surface of the Acoustical Roof Deck for field painting shall be the responsibility of the painting contractor.
- C. Galvanized coatings that are significantly damaged shall be repaired. Appropriate galvanized repair paint shall be used, and the paint manufacturer's application instructions shall be followed.

Toris® Safe Support Reaction Tables

Safe Support Reaction Tables for End and Interior Supports (PLF)

Deck Type	Gage	Length of Bearing							
		end				int.			
		1"	1.5"	2"	3"	3"	4"	5"	6"
Toris 7(A)	20	566	639	700	803	1378	1507	1622	1725
Toris 5.5(A)	18	965	1081	1179	1343	2287	2491	2670	2832
Toris 4(A)	16	1506	1676	1820	2062	3500	3796	4056	4292
Toris (A)	20	842	950	1041	1193	1922	2103	2262	2406
	18	1413	1583	1726	1966	3176	3458	3707	3932
	16	2181	2429	2637	2987	4843	5252	5612	5938

Simple span: ER = 0.50WL
Double Span: ER = 0.375WL
IR = 1.25WL



Clinica Family Health - Lafayette, Lafayette, Colorado, Toris 5.5A

Toris® Composite Floor Deck Ceiling Systems

Toris Composite Floor Deck Ceiling Systems combine the structural advantages of a flat slab with the time and cost saving advantages of a permanent form. Due to the dovetail rib shape, the slab can support greater loading than a typical reinforced concrete slab of the same depth. The shape of the profile also supplies a simple, economical, and permanent hanging system. The Toris Floor Deck additionally furnishes the total positive reinforcing for the composite slab and serves as a permanent form for the concrete. See page 22 or 23 for unprotected U.L. fire resistance ratings.

Hanging System

Toris 4C(A) and Toris C(A) dovetail ribs provide a simple, economical, and permanent means for hanging piping, ducts, and other mechanical and utility components. Toris hangers are inserted parallel to the ribs and can be placed continuously, spaced across the width of the profile. Hangers can be installed as they are needed, and can be relocated, removed or reused at any time during the life of the building.

Code Compliance

Hangers have been reviewed by IAMPO for compliance with the IBC, LABC and CBC.

U.L. Approved Pipe Hangers for Fire Protection Systems

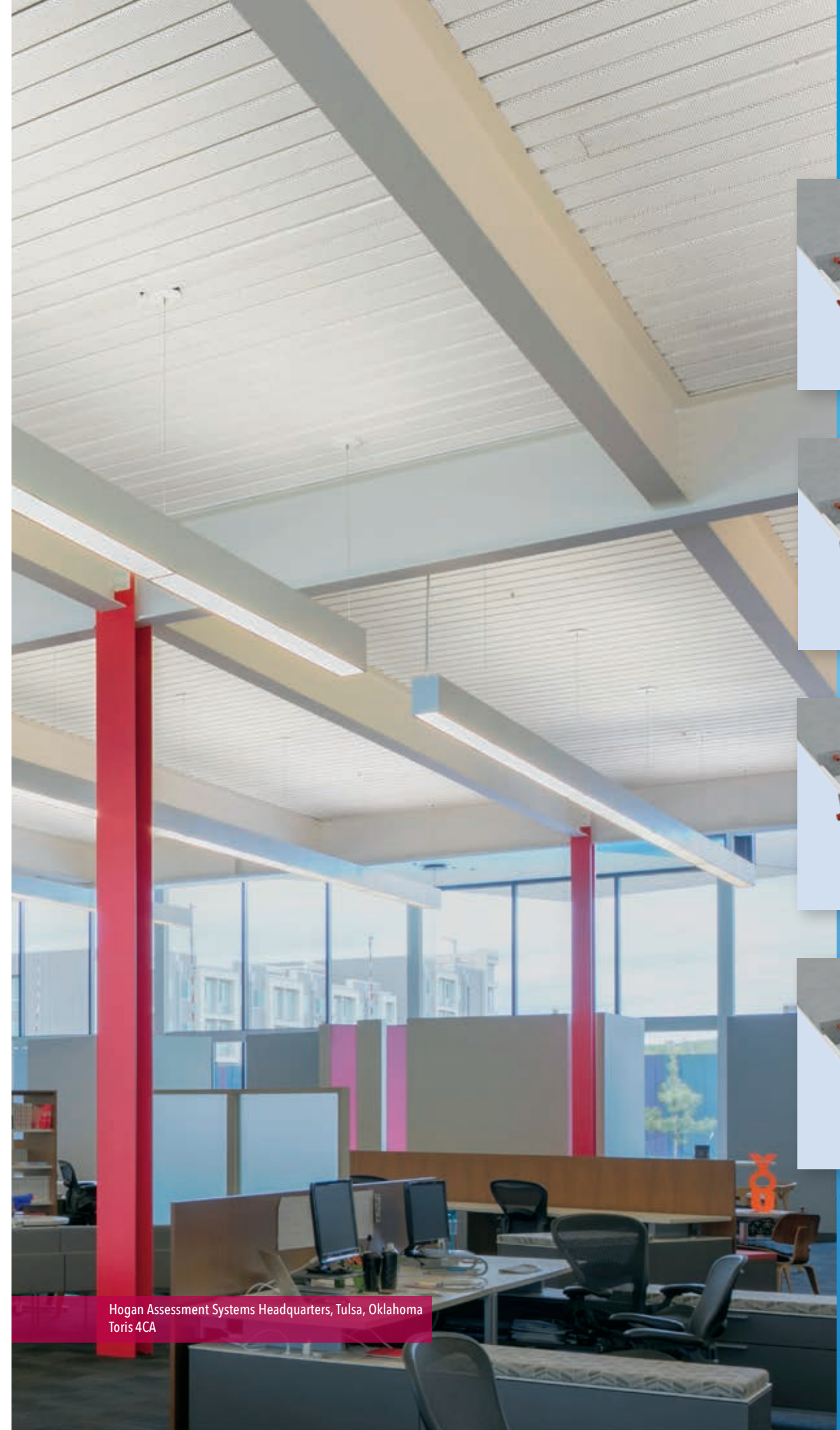
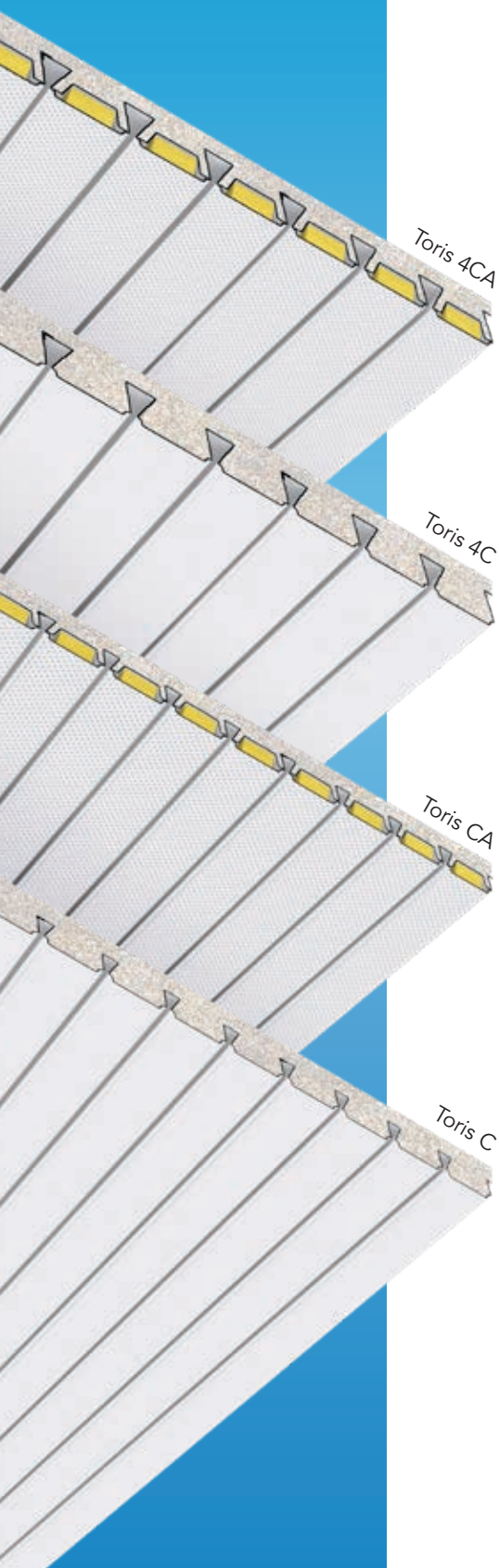
Toris hangers have been rated under U.L. #203—*Pipe Hanger Equipment for Fire Protection Service*. Wedge Bolts and Ankores can be used in accordance with the *National Fire Protection Association Standards For Installation of Sprinkler Systems (NFPA 13)*.

Superior Fire Ratings

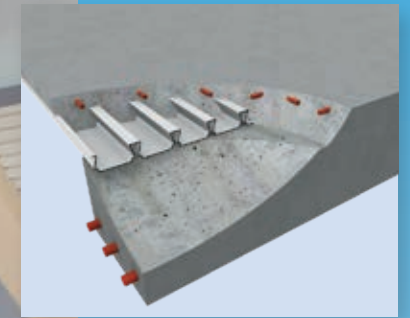
The Toris 4CA and Toris CA Acoustical Composite Floor Deck Ceiling Systems have efficient unprotected fire ratings (see page 22 and 23).

Toris 4C Composite Floor Deck fire ratings under U.L. Design Numbers D980 and Toris C Composite Floor Deck fire ratings under U.L. Design Number D971 are superior to fire ratings of generic composite floor decks. In most instances, the fire ratings of Toris C Composite Floor Deck slabs require from ½" - 1 ¼" less slab depth than generic profile slabs.

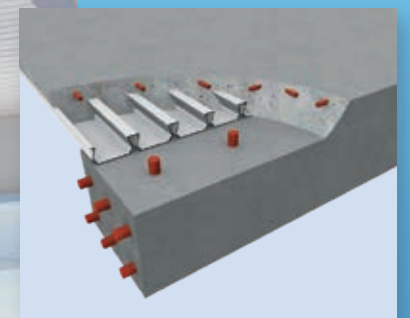
For the unprotected fire ratings shown on page 22 and 23, no spray-applied fireproofing is required on the deck.



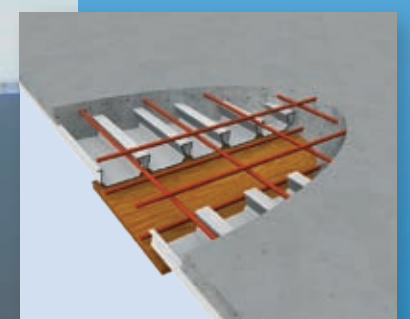
Steel Beam



Reinforced Concrete Beam



Precast Beam



Slab Beam

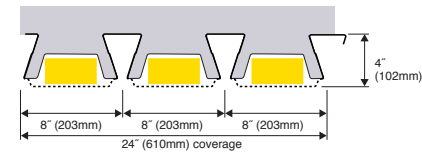
Hogan Assessment Systems Headquarters, Tulsa, Oklahoma
Toris 4CA

Toris® 4CA & 4C Composite Floor Deck Ceiling System Technical Tables

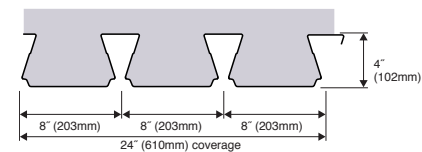
SPANS
10'-32'

ACOUSTIC (TORIS 4CA) NON-ACOUSTIC (TORIS 4C)

Toris 4CA



Toris 4C



Hanger Load Capacities

Deck Type	Gage	Hanger Type	Minimum Concrete Strength (psi)	Minimum Concrete Slab Thickness (in)	Design Values		Fire Sprinkler Support	
					LRFD ΦP_n (lbs)	ASD P_n/Ω (lbs)	Max. Pipe Dia. (in)	Rod Dia. (in)
Toris 4CA	20	3/8" Ankore (ANK38)	3,000	6	1,633	1,021	4	3/8
	18							
	16							
Toris 4C	20	3/8" Ankore (ANK38)	3,000	6	2,440	1,525	4	3/8
	18							
	16							

- NOTES:
1. Resistance Factors, Φ , and Safety Factors, Ω , have been calculated in accordance with AISI S100-16, Chapter K.
 2. The structural design professional is responsible to ensure the additional point loads do not exceed the load carrying capacity of the floor deck.
 3. Consult EPIC Hanger Installation instructional sheets for detailed information on hanger assemblies.
 4. The hangers are limited to static vertical tension loading only.
 5. Sprinkler pipe installations shall comply with NFPA 13.
 6. Ends of deck sheets must be fastened to supports at every cell.
 7. Do not place hangers at side laps.
 8. Do not overtighten nut on hanger rod as this will spread rib and lessen capacity (Finger tight plus 1/2 turn).
 9. Hangers have been reviewed by IAMPO for compliance with the IBC, LABC and CBC.
- WARNING: FAILURE TO ADHERE TO THE ABOVE NOTES MAY CAUSE HANGERS TO PULL OUT OF DECK RIBS!

Toris 4CA Noise Reduction Coefficients*

Absorption Coefficients							NRC
125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz		
.33	.84	.87	.92	.83	.79	.85	

* In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports. The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

Toris 4CA Fire Ratings (U.L. Design Number D980)

Restrained Fire Rating	Total Slab Depth (in.)	Type and Density of Concrete (pcf)
1 hour	6.5	RW (147)
1 hour	6	LW (110)
1 1/2 hours	7	RW (147)
1 1/2 hours	6	LW (110)
2 hours	7.5	RW (147)
2 hours	6.25	LW (110)
3 hours	8.25	RW (147)
3 hours	7	LW (110)

NOTE: Toris 4CA can achieve the loads shown on page 24 with the fire ratings indicated above.

RW = Regular Weight Concrete
LW = Lightweight Concrete

Toris 4C Fire Ratings (U.L. Design Number D980)

Restrained Fire Rating	Total Slab Depth (in.)	Type and Density of Concrete (pcf)
1 1/2 hours	6	RW (147)
1 1/2 hours	6	LW (110)
2 hours	6.5	RW (147)
2 hours	6	LW (110)
3 hours	7.5	RW (147)
3 hours	6.5	LW (110)

NOTE: Toris 4C can achieve the loads shown on page 25 with the fire ratings indicated above.

RW = Regular Weight Concrete
LW = Lightweight Concrete

Suggested Temperature and Shrinkage Reinforcement

Slab Depth (in.)	Welded Wire Fabric Mesh
6-7	6 x 6 - W1.4 x W1.4
7 1/2 - 9	6 x 6 - W2.5 x W2.5

See U.L. Fire Resistance Directory for temperature and shrinkage reinforcement of fire rated assemblies. U.L. Fire Rated Slabs require 6 x 6 - W1.4 x W1.4 mesh.

Toris 4CA & Toris 4C Section Properties

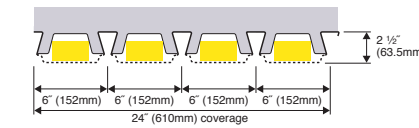
Deck Type	Gage	Weight (psf)	A_s (in. ²)	I_D (in. ⁴)	S_p (in. ³)	S_N (in. ³)
Toris 4CA	20	4.7	1.39	2.70	0.88	0.98
	18	5.8	1.70	3.52	1.32	1.29
	16	6.9	2.03	4.41	1.73	1.64
Toris 4C	20	3.4	0.98	2.53	0.77	0.82
	18	4.4	1.30	3.42	1.24	1.24
	16	5.6	1.65	4.36	1.66	1.66

Toris® CA & C Composite Floor Deck Ceiling System Technical Tables

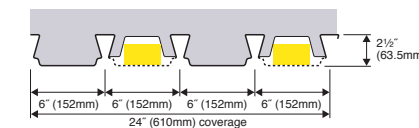
SPANS
6'-24'

ACOUSTIC (TORIS CA, CA50%) NON-ACOUSTIC (TORIS C)

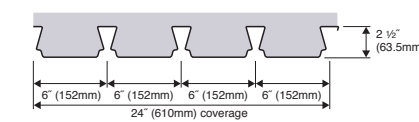
Toris CA



Toris CA 50%



Toris C



Hanger Load Capacities

Deck Type	Gage	Hanger Type	Minimum Concrete Strength (psi)	Minimum Concrete Slab Thickness (in)	Design Values		Fire Sprinkler Support	
					LRFD ΦP_n (lbs)	ASD P_n/Ω (lbs)	Max. Pipe Dia. (in)	Rod Dia. (in)
Toris CA	20	3/8" Wedge Bolt (38WB250)	3,000	4.5	838	524	6	3/8
	18							
	16							
Toris C	20	3/8" Wedge Bolt (38WB250)	3,000	4.5	2,291	1,432	8	3/8
	18							
	16							

- NOTES:
1. Resistance Factors, Φ , and Safety Factors, Ω , have been calculated in accordance with AISI S100-16, Chapter K.
 2. The structural design professional is responsible to ensure the additional point loads do not exceed the load carrying capacity of the floor deck.
 3. Consult EPIC Hanger Installation instructional sheets for detailed information on hanger assemblies.
 4. The hangers are limited to static vertical tension loading only.
 5. In cases where the supported fire sprinkler pipe exceeds 4" in diameter, a 3/8" to 1/2" increaser coupling nut and 1/2" rod shall be used.
 6. Sprinkler pipe installations shall comply with NFPA 13.
 7. Ends of deck sheets must be fastened to supports at every cell.
 8. Do not place hangers at side laps.
 9. Do not overtighten nut on hanger rod as this will spread rib and lessen capacity (Finger tight plus 1/2 turn).
 10. Hangers have been reviewed by IAMPO for compliance with the IBC, LABC and CBC.
- WARNING: FAILURE TO ADHERE TO THE ABOVE NOTES MAY CAUSE HANGERS TO PULL OUT OF DECK RIBS!

Toris CA Noise Reduction Coefficients*

Type	Absorption Coefficients						NRC
	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	
100% A	.15	.67	.86	.88	.91	.81	.85
50% A**	.21	.68	.74	.75	.54	.40	.70

* In accordance with ASTM C423 and E795. Consult EPIC Metals for other test results and individual reports. The NRC is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., rounded off to the nearest .05.

** Estimates

Toris CA Fire Ratings (U.L. Design Number D971)

Restrained Fire Rating	Total Slab Depth (in.)	Type and Density of Concrete (pcf)
1 hour	6.25	RW (147)
1 hour	5	LW (110)
1 1/2 hours	6.75	RW (147)
1 1/2 hours	5.5	LW (110)
2 hours	7	RW (147)
2 hours	5.75	LW (110)
3 hours	7.75	RW (147)
3 hours	6.75	LW (110)

NOTE: Toris CA can achieve the loads shown on page 26 with the fire ratings indicated above. RW = Regular Weight Concrete, LW = Lightweight Concrete

Toris C Fire Ratings (U.L. Design Number D971)

Restrained Fire Rating	Total Slab Depth (in.)	Type and Density of Concrete (pcf)
1 hour	4.5	RW (147)
1 hour	4.5	LW (110)
1 1/2 hours	5	RW (147)
1 1/2 hours	4.5	LW (110)
2 hours	5.5	RW (147)
2 hours	4.75	LW (110)
3 hours	6.75	RW (147)
3 hours	5.5	LW (110)

NOTE: Toris C can achieve the loads shown on page 27 with the fire ratings indicated above. RW = Regular Weight Concrete, LW = Lightweight Concrete

Suggested Temperature and Shrinkage Reinforcement

Slab Depth (in.)	Welded Wire Fabric Mesh
4	6 x 6 - W1.4 x W1.4
4 1/2 - 5	6 x 6 - W2.1 x W2.1
5 1/2 - 8	6 x 6 - W2.9 x W2.9

See U.L. Fire Resistance Directory for temperature and shrinkage reinforcement of fire rated assemblies. U.L. Fire Rated Slabs require 6 x 6 - W1.4 x W1.4 mesh.

Toris CA & Toris C Section Properties

Deck Type	Gage	Weight (psf)	A_s (in. ²)	I_D (in. ⁴)	S_p (in. ³)	S_N (in. ³)
Toris CA	20	4.3	1.26	0.99	0.64	0.46
	18	5.2	1.52	1.25	0.81	0.61
	16	6.1	1.80	1.51	0.99	0.78
Toris C	20	2.8	0.83	0.77	0.48	0.44
	18	3.7	1.10	1.03	0.64	0.60
	16	4.7	1.39	1.31	0.81	0.78

Toris® 4CA & 4C Composite Floor Deck Ceiling System Technical Tables

SPANS
10'-32'

Toris 4CA Composite Floor Deck Systems

Slab Depth and Weight	Design Thickness (in.)	Maximum Clear Span Without Shoring (ft.-in.)			Uniform Service Load Capacity (LRFD), psf																											
					Simple Span Condition (See Note 2)																Continuous Span Condition (Negative Moment Reinforcement REQUIRED. See Note 3)											
		Single Span	Double Span	Triple Span	10'0"	11'0"	12'0"	13'0"	14'0"	15'0"	16'0"	17'0"	18'0"	20'0"	22'0"	24'0"	26'0"	28'0"	30'0"	32'0"												
3 ksi Regular Weight Concrete (147 pcf)	6" 50 PSF	0.0358	14-8	15-7	G	360	324	294	268	247	198	155	121	94	56	-	-	41	-	-	-											
		0.0474	16-3	17-9	G	388	349	317	290	266	212	166	131	102	61	-	-	46	-	-	-											
		0.0600	17-2	19-10	G	364	328	297	271	249	227	179	140	110	67	-	-	50	-	-	-											
	6.5" 56 PSF	0.0358	13-11	14-10	15-4	400	341	280	233	195	165	140	119	102	74	42	-	53	-	-	-											
		0.0474	15-10	16-11	G	400	400	365	334	307	268	211	167	132	81	47	-	62	-	-	-											
		0.0600	16-8	19-0	G	400	400	381	345	316	290	268	226	179	142	88	52	-	68	43	-	-										
	7" 62 PSF	0.0358	13-4	14-3	14-9	400	386	317	263	221	187	159	135	116	85	57	-	61	46	-	-											
		0.0474	15-5	16-3	G	400	400	387	323	272	231	198	170	146	105	63	-	81	53	-	-											
		0.0600	16-3	18-3	G	400	400	393	360	331	305	281	224	179	114	70	-	88	58	-	-											
	7.5" 68 PSF	0.0358	12-9	13-8	14-2	400	400	356	296	248	210	178	152	130	96	71	42	69	53	-	-											
		0.0474	15-1	15-8	G	400	400	400	362	305	259	222	191	165	124	83	48	91	70	44	-											
		0.0600	15-10	17-7	G	400	400	400	400	371	343	318	276	222	143	91	54	113	77	50	-											
8" 75 PSF	0.0358	12-3	13-1	13-8	400	400	396	329	276	234	199	170	146	108	80	57	77	59	45	-												
	0.0474	14-9	15-1	15-7	400	400	400	400	340	289	247	213	184	138	105	64	102	81	59	-												
	0.0600	15-6	16-11	G	400	400	400	400	400	347	299	258	224	171	115	71	129	98	66	41												
8.5" 81 PSF	0.0358	11-10	12-3	13-3	400	400	400	364	305	258	220	188	161	120	89	65	86	66	50	-												
	0.0474	14-5	14-7	15-1	400	400	400	400	375	319	273	235	204	153	117	83	114	90	71	49												
	0.0600	15-3	16-5	G	400	400	400	400	400	384	330	285	248	189	143	91	143	115	85	56												
9" 87 PSF	0.0358	11-5	11-6	12-10	400	400	400	399	335	284	242	207	178	132	98	72	95	74	56	41												
	0.0474	14-2	14-2	14-8	400	400	400	400	400	351	300	259	224	169	129	98	126	99	78	61												
	0.0600	14-11	15-11	G	400	400	400	400	400	400	362	314	273	208	161	114	156	127	102	73												

Toris 4C Composite Floor Deck Systems

Slab Depth and Weight	Design Thickness (in.)	Maximum Clear Span Without Shoring (ft.-in.)			Uniform Service Load Capacity (LRFD), psf																											
					Simple Span Condition (See Note 2)																Continuous Span Condition (Negative Moment Reinforcement REQUIRED. See Note 3)											
		Single Span	Double Span	Triple Span	10'0"	11'0"	12'0"	13'0"	14'0"	15'0"	16'0"	17'0"	18'0"	20'0"	22'0"	24'0"	26'0"	28'0"	30'0"	32'0"												
3 ksi Regular Weight Concrete (147 pcf)	6" 67 PSF	0.0358	11-10	12-7	13-0	362	324	293	267	216	163	123	92	67	-	-	-	41	-	-	-											
		0.0474	15-0	15-5	15-11	385	346	313	285	246	187	143	108	81	41	-	-	46	-	-	-											
		0.0600	15-11	17-9	G	355	318	287	261	239	211	162	124	94	50	-	-	50	-	-	-											
	6.5" 74 PSF	0.0358	11-5	12-2	12-7	383	308	250	205	169	141	117	98	81	49	-	-	53	-	-	-											
		0.0474	14-8	14-10	15-4	400	398	361	329	301	243	187	144	110	61	-	-	62	-	-	-											
		0.0600	15-7	17-1	G	400	400	371	335	305	279	257	211	164	126	72	-	68	43	-	-											
	7" 80 PSF	0.0358	11-0	11-9	12-2	400	346	281	231	191	159	133	111	93	64	-	-	61	46	-	-											
		0.0474	14-4	14-5	14-10	400	400	377	312	261	220	186	158	135	84	44	-	81	53	-	-											
		0.0600	15-3	16-7	G	400	400	383	349	320	295	268	210	165	98	54	-	88	58	-	-											
	7.5" 86 PSF	0.0358	10-8	11-5	11-9	400	385	314	258	214	178	149	125	105	73	49	-	69	53	-	-											
		0.0474	13-10	13-11	14-5	400	400	400	349	292	246	209	177	151	111	64	-	91	70	44	-											
		0.0600	14-11	16-1	G	400	400	431	393	361	332	307	265	209	129	76	-	113	77	50	-											
8" 92 PSF	0.0358	10-4	11-0	11-5	400	400	348	286	238	198	166	169	117	82	56	-	77	59	45	-												
	0.0474	13-5	13-6	14-0	400	400	400	386	324	273	232	198	169	124	87	46	102	81	59	-												
	0.0600	14-8	15-7	G	400	400	400	400	400	351	300	258	223	165	101	57	129	98	66	41												
8.5" 98 PSF	0.0358	10-0	10-5	11-1	400	400	382	315	262	219	184	154	130	92	63	42	86	66	50	-												
	0.0474	13-0	13-2	13-7	400	400	400	400	357	301	256	219	187	138	101	65	114	90	71	49												
	0.0600	14-6	15-2	15-8	400	400	400	400	400	387	331	285	246	186	131	78	143	115	85	56												
9" 104 PSF	0.0358	9-9	9-11	10-10	400	400	400	345	287	240	202	170	143	102	71	47	95	74	56	41												
	0.0474	12-8	12-10	13-3	400	400	400	400	391	330	281	240	206	152	112	82	126	99	78	61												
	0.0600	14-3	14-9	15-3	400	400	400	400	400	400	364	313	271	205	155	102	156	127	102	73												

3 ksi Light Weight Concrete (110 pcf)

3 ksi Light Weight Concrete (110 pcf)

□ No Shoring ■ Shoring Required in Shaded Areas

□ No Shoring ■ Shoring Required in Shaded Areas

COMPOSITE SLAB DESIGN NOTES:

- Design is based on ANS/SDI Standard for Composite Steel Floor Decks.
- Simple span conditions for composite design assume no continuity of negative moments. Slab cracking at supports must be considered by the EOR for serviceability design.
- Continuous span conditions are based on continuity over interior supports which requires appropriate negative moment reinforcing steel over supports.
- Deflection limit of the composite slab is L/360 under total load.
- Loads appearing in shaded areas require shoring. Do not exceed unshored spans shown above.
- Composite slab spans are center-to-center of supports.
- All loads are assumed to be statically applied. For dynamic loads Consult EPIC Metals.
- Slab weight has already been subtracted from the Uniform Service Load Capacity (LRFD) values shown above.

DECK DESIGN AS A WET CONCRETE FORM:

- Maximum clear spans without shoring are based on the Steel Deck Institute recommendations for sequential loading and using LRFD methods. The table is based on 0.6fy steel yield stress and deflection limits of L/180 or 0.75", whichever is less.
- Construction loads are 20 psf uniform loading or 150 lb concentrated load at midspan per SDI recommendations. If heavier construction loads or less form deflection is required, reduce spans or use temporary shoring.
- Runways and planking is recommended during wet concrete placement.
- Minimum bearing length is 1.5" at end supports and 4" at interior supports.
- Listed slab weights include weight of 16 gage deck.
- The slump of the concrete will influence the amount of water/cement leakage. Cleanup of the exposed ceiling surface will be required for leakage.
- 48 foot max sheet length (recommended).
- For temporary shoring of architecturally exposed ceilings: It is recommended to use extra wide shoring support bearing surface and/or to reduce the maximum clear span shoring distances shown in the above table so that permanent indentations to the deck/ceiling (under the shoring supports) do not occur.
- The determination of the time for removal of supporting shores may be controlled by the presence of construction loads or deflection limitations. The removal of shores may have to occur after the concrete has reached its full compressive strength fc, modulus Ec and stiffness, particularly in those instances where the construction loads may be as high as the specified live load. If shoring is removed too early, more significant deflection may occur and may even result in permanent damage. The strength and stiffness of the concrete during the various stages of construction should be substantiated by job-constructed and job-cured test specimens (cylinders). See ACI 318-99 (Chapter 6).

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- Loads appearing in shaded areas require shoring. Do not exceed unshored spans shown above.
- Composite slab spans are center-to-center of supports.
- All loads are assumed to be statically applied. For dynamic loads Consult EPIC Metals.
- Slab weight has already been subtracted from the Uniform Service Load Capacity (LRFD) values shown above.

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Toris® CA & C Composite Floor Deck Ceiling System Technical Tables

SPANS
6'-24'

Toris CA Composite Floor Deck Systems

Slab Depth and Weight	Design Thickness (in.)	Maximum Clear Span Without Shoring (ft.-in.)		Uniform Service Load Capacity (LRFD), psf																							
				Simple Span Condition (See Note 2)												Continuous Span Condition (Negative Moment Reinforcement REQUIRED. See Note 3)											
				Single Span	Double Span	Triple Span	6'0"	8'0"	10'0"	12'0"	14'0"	15'0"	16'0"	17'0"	18'0"	19'0"	20'0"	16'0"	18'0"	20'0"	22'0"	24'0"					
3 ksi Regular Weight Concrete (147 pcf)	4.5" 40 PSF	0.0358	12-8	12-8	12-8	400	341	237	175	96	71	52	-	-	-	-	131	81	49	-	-	-					
		0.0474	13-4	13-4	13-8	400	400	336	189	105	78	57	41	-	-	-	142	88	54	-	-	-					
		0.0600	13-11	14-10	15-4	400	400	337	201	112	84	62	45	-	-	-	152	95	58	-	-	-					
	5" 46 PSF	0.0358	12-2	12-2	12-2	400	391	272	199	135	101	76	56	40	-	-	147	109	72	43	-	-					
		0.0474	12-10	12-10	13-0	400	400	386	259	146	111	83	62	45	-	-	197	125	79	48	-	-					
		0.0600	13-5	14-1	14-7	400	400	387	276	157	119	90	67	49	-	-	205	134	85	52	-	-					
	5.5" 52 PSF	0.0358	11-10	11-10	11-10	400	400	307	230	162	136	106	80	59	43	-	173	129	97	63	-	-					
		0.0474	12-5	12-5	12-5	400	400	400	288	198	151	115	88	66	48	-	214	161	110	70	42	-					
		0.0600	13-0	13-5	13-11	400	400	400	337	211	162	124	95	72	53	-	226	181	118	76	46	-					
	6" 58 PSF	0.0358	11-4	11-4	11-4	400	400	342	257	188	158	134	109	83	62	45	200	149	113	86	54	-					
		0.0474	12-1	12-1	12-1	400	400	400	332	233	197	155	119	91	69	51	247	186	143	96	61	-					
		0.0600	12-8	12-11	13-4	400	400	400	375	277	214	166	129	99	76	57	246	214	149	104	67	-					
	6.5" 64 PSF	0.0358	10-10	10-10	10-10	400	400	378	283	215	181	153	130	111	85	64	229	171	129	99	75	-					
		0.0474	11-9	11-9	11-9	400	400	400	378	265	225	192	157	122	94	72	268	213	163	127	84	-					
		0.0600	12-4	12-5	12-10	400	400	400	400	315	269	216	170	133	103	79	267	232	197	139	92	-					
	7" 71 PSF	0.0358	10-5	10-5	10-5	400	400	400	309	242	204	173	148	126	108	87	257	193	146	112	86	-					
		0.0474	11-6	11-6	11-6	400	400	400	400	299	253	216	186	159	124	97	288	240	184	143	112	-					
		0.0600	12-1	12-1	12-4	400	400	400	400	355	303	260	217	172	136	106	288	250	219	174	122	-					
7.5" 77 PSF	0.0358	10-1	10-1	10-1	400	400	400	336	265	228	193	165	141	121	104	272	215	163	125	96	-						
	0.0474	11-3	11-3	11-3	400	400	400	400	333	282	241	207	179	155	126	308	267	206	160	125	-						
	0.0600	11-10	11-10	11-11	400	400	400	400	396	337	289	250	217	173	138	308	267	235	195	155	-						

Toris C Composite Floor Deck Systems

Slab Depth and Weight	Design Thickness (in.)	Maximum Clear Span Without Shoring (ft.-in.)		Uniform Service Load Capacity (LRFD), psf																							
				Simple Span Condition (See Note 2)												Continuous Span Condition (Negative Moment Reinforcement REQUIRED. See Note 3)											
				Single Span	Double Span	Triple Span	6'0"	8'0"	10'0"	12'0"	14'0"	15'0"	16'0"	17'0"	18'0"	19'0"	20'0"	16'0"	18'0"	20'0"	22'0"	24'0"					
3 ksi Regular Weight Concrete (147 pcf)	4.5" 55 PSF	0.0358	9-10	10-0	10-4	400	360	238	153	79	54	-	-	-	-	109	64	-	-	-	-						
		0.0474	11-7	11-7	12-0	400	400	347	178	92	65	44	-	-	-	131	76	41	-	-	-						
		0.0600	12-5	13-2	13-7	400	400	351	200	106	76	53	-	-	-	148	87	49	-	-	-						
	5" 61 PSF	0.0358	9-5	9-7	9-11	400	400	280	181	117	84	59	-	-	-	130	93	55	-	-	-						
		0.0474	11-1	11-2	11-6	400	400	369	243	135	99	71	49	-	-	177	113	66	-	-	-						
		0.0600	12-1	12-8	13-1	400	400	400	279	153	113	82	58	40	-	-	205	129	77	43	-	-					
	5.5" 67 PSF	0.0358	9-0	9-3	9-6	400	400	321	209	141	116	89	63	43	-	-	151	109	79	46	-	-					
		0.0474	10-7	10-9	11-1	400	400	400	281	188	140	104	76	53	-	-	206	153	98	57	-	-					
		0.0600	11-9	12-2	12-7	400	400	400	347	211	159	119	88	64	44	-	226	179	112	68	-	-					
	6" 73 PSF	0.0358	8-8	8-11	9-2	400	400	356	239	162	134	111	92	66	46	-	173	125	91	66	-	-					
		0.0474	10-3	10-4	10-8	400	400	400	321	222	186	144	108	80	57	-	236	175	132	85	49	-					
		0.0600	11-6	11-9	12-2	400	400	400	386	280	214	164	124	93	68	48	247	213	155	98	59	-					
	6.5" 79 PSF	0.0358	8-5	8-7	8-11	400	400	391	270	183	152	126	105	88	69	48	196	142	104	76	55	-					
		0.0474	9-10	10-0	10-4	400	400	400	363	251	211	178	147	112	83	60	267	199	150	114	73	-					
		0.0600	11-3	11-4	11-9	400	400	400	400	322	272	216	167	128	97	72	267	231	197	135	86	-					
	7" 85 PSF	0.0358	8-1	8-4	8-7	400	400	400	301	205	170	142	119	99	82	68	219	160	117	86	62	-					
		0.0474	9-7	9-8	10-0	400	400	400	400	281	236	200	170	145	114	86	288	223	168	128	98	-					
		0.0600	10-11	11-0	11-5	400	400	400	400	360	305	260	217	169	131	100	288	248	217	172	117	-					
7.5" 92 PSF	0.0358	7-11	8-1	8-4	400	400	400	333	227	189	158	132	111	92	77	242	177	131	96	70	-						
	0.0474	9-3	9-5	9-9	400	400	400	400	311	262	222	189	161	138	116	308	247	187	143	109	-						
	0.0600	10-7	10-8	11-1	400	400	400	400	399	338	289	248	214	171	133	308	266	233	192	150	-						

☐ No Shoring ■ Shoring Required in Shaded Areas

COMPOSITE SLAB DESIGN NOTES:

- Design is based on ANSI/SDI Standard for Composite Steel Floor Decks.
- Simple span conditions for composite design assume no continuity of negative moments. Slab cracking at supports must be considered by the EOR for serviceability design.
- Continuous span conditions are based on continuity over interior supports which requires appropriate negative moment reinforcing steel over supports.
- Deflection limit of the composite slab is L/360 under total load.
- Loads appearing in shaded areas require shoring. Do not exceed unshored spans shown above.
- Composite slab spans are center-to-center of supports.
- All loads are assumed to be statically applied. For dynamic Loads Consult EPIC Metals.
- Slab weight has already been subtracted from the Uniform Service Load Capacity (LRFD) values shown above.

DECK DESIGN AS A WET CONCRETE FORM:

- Maximum clear spans without shoring are based on the Steel Deck Institute recommendations for sequential loading and using LRFD methods. The table is based on 0.6Fy steel yield stress and deflection limits of L/180 or 0.75", whichever is less.
- Construction loads are 20 psf uniform loading or 150 lb concentrated load at midspan per SDI recommendations. If heavier construction loads or less form deflection is required, reduce spans or use temporary shoring.
- Runways and planking is recommended during wet concrete placement.
- Minimum bearing length is 1.5" at end supports and 3" at interior supports.
- Listed slab weights include weight of 16 gage deck.
- The slump of the concrete will influence the amount of water/cement leakage. Cleanup of the exposed ceiling surface will be required for leakage.
- 48 foot max sheet length (recommended).
- For temporary shoring of architecturally exposed ceilings: It is recommended to use extra wide shoring support bearing surface and/or to reduce the maximum clear span shoring distances shown in the above table so that permanent indentations to the deck/ceiling (under the shoring supports) do not occur.
- The determination of the time for removal of supporting shores may be controlled by the presence of construction loads or deflection limitations. The removal of shores may have to occur after the concrete has reached its full compressive strength f_c, modulus E_c and stiffness, particularly in those instances where the construction loads may be as high as the specified live load. If shoring is removed too early, more significant deflection may occur and may even result in permanent damage. The strength and stiffness of the concrete during the various stages of construction should be substantiated by job-constructed and job-cured test specimens (cylinders). See ACI 318-99 (Chapter 6).

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Toris® C(A) & 4C(A) Composite Floor Deck Ceiling Systems Specifications

Notes: Omit underlined areas for non-acoustic applications.

PART 1: GENERAL

1.1 SUMMARY

The requirements of this specification section include all materials, equipment and labor necessary to furnish and install Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck System.

- A. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck shall serve as permanent metal form and total positive reinforcement for concrete floor slabs as indicated on the contract drawings.
- B. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck shall provide an exposed bottom surface that is substantially flat. The narrow rib openings of the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall provide the appearance of a linear ceiling. Sidelap fasteners shall be concealed within the depth of the dovetail-shaped ribs.
- C. Toris 4CA Acoustical Floor Deck: Toris 4C Ankore hanging devices (supplied with ankore locks) that are specially configured to fit into the dovetail-shaped ribs of the Toris 4CA Acoustical Roof Deck panels shall be available. These hanging devices shall be utilized wherever any related work is suspended from Toris 4CA Acoustical Roof Deck. Toris 4C Ankore hanging devices shall be furnished by the installer of the related work unless otherwise indicated.

Toris CA Acoustical Floor Deck: Toris C Wedge Bolt hanging devices (supplied with Wedge Locks) that are specially configured to fit into the dovetail-shaped ribs of the Toris CA Acoustical Composite Floor Deck panels shall be available. These hanging devices shall be utilized whenever any related work is suspended from an Toris CA Acoustical Composite Floor Deck slab. Toris CA Acoustical Wedge Bolt hanging devices shall be furnished by the installer of the related work unless otherwise indicated.

1.2 RELATED WORK

The following related work is not part of this specification section:

- A. Cast-In-Place Concrete: Concrete fill, welded wire fabric, reinforcing steel, and temporary shoring.
- B. Structural Steel: Supplementary framing and shear studs.
- C. Fireproofing: Preparation for and application of fireproofing to supporting steel members.
- D. Ceilings: Attachments to Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck.
- E. Painting: Preparation for and application of field painting.
- F. Mechanical: Attachments to Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck.
- G. Electrical: Attachments to Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck.

1.3 SUBMITTALS

Submit the following items in accordance with the conditions of the contract and appropriate specification sections:

- A. Product data for Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck and Toris 4C or Toris C hanging devices including material types, dimensions, finishes, load capacities, and U.L. fire resistance ratings.
- B. Erection drawings for Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck and related accessory items showing profiles and material thicknesses, layout, anchorage, openings as dimensioned on the structural drawings, and shoring requirements.

1.4 REFERENCE STANDARDS

- A. Section Properties: Shall be computed in accordance with the *American Iron and Steel Institute (AISI) Specification for the Design of Cold-Formed Steel Structural Members*.
- B. Welding: Shall comply with applicable provisions of *American Welding Society (AWS) D1.3 Structural Welding Code-Sheet Steel*.

- C. Fire Resistance Classification: Shall be acceptable for use in *Underwriters Laboratories Fire Resistance Design No. D980* (Toris 4CA Acoustical) or *Underwriters Laboratories Fire Resistance Design No. D971* (Toris CA Acoustical). All Toris 4CA Acoustical and Toris CA Acoustical Composite Floor Deck panels used in rated fire resistance designs shall bear the appropriate U.L. classification marking.
- D. Cast-In-Place Concrete: Shall be in accordance with applicable sections of chapters 3, 4, and 5 of *American Concrete Institute (ACI) 318 Building Code Requirement for Reinforced Concrete*. Minimum compressive strength shall be 3000 psi. Admixtures containing chloride salts shall not be used. Additionally, all concrete constituents including but not limited to aggregates, sand, and water shall be closely monitored to assure that the chlorides do not exceed the limits proscribed in ACI 318.
- E. Noise Reduction Coefficient: Shall be verified by the results of sound absorption tests conducted in accordance with ASTM C423 and E795. A minimum NRC of 0.85 shall be provided (100% acoustic). Copies of the sound absorption test shall be submitted upon request.

PART 2: PRODUCTS

2.1 MANUFACTURER

- A. In accordance with the requirements of this specification section, provide products manufactured by EPIC Metals, Rankin, PA.
- B. Substitutions: (Under Provisions of Division 01) Not permitted.

2.2 MATERIALS

- A. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck ceiling panels shall be cold-formed from steel sheets conforming to ASTM A653, Grade 40 and Grade 33 or equal, having a minimum yield strength of 40,000 psi and 33,000 psi.
- B. Before forming, the steel sheets shall have received a hot-dip protective coating of zinc conforming to ASTM A924, Class G60 or G90.
Primer Paint Option—Prior to forming, galvanized steel shall be chemically cleaned and pre-treated followed by (on the ceiling surface) an oven-cured epoxy primer and a second coat of oven-cured polyester primer paint applied in the manufacturer's standard color of off-white. Compatibility of field applied finish paint with factory applied primer paint shall be the responsibility of the painting contractor.
Finish Paint Option—Prior to forming, galvanized steel shall be chemically cleaned and pre-treated followed by (on the ceiling surface) an oven-cured epoxy primer and a second coat of oven-cured polyester paint. After factory painting is complete, a plastic removable film shall be applied to the bottom surface of the panels to protect paint finish during manufacturing, shipping, and handling. The protective film is to be removed by the erector prior to installation.
Paint Option—For specialized painting systems that are recommended for Natatoriums and other high humidity applications, contact EPIC Metals.
- C. The minimum uncoated thickness of material supplied shall be within 5% of the design thickness.

2.3 FABRICATION

- A. Toris 4CA Acoustical Composite Floor Deck panels shall have continuous dovetail-shaped ribs spaced 8" on center. The profile shall be 4" deep.
Toris CA Acoustical Composite Floor Deck panels shall have continuous dovetail-shaped ribs spaced 6" on center. The profile shall be 2.5" deep.
- B. The design thickness and minimum section properties shall be indicated on the contract drawings.
- C. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall have full depth positive registering sidelaps that can be fastened together by welds or screws.
- D. Whenever possible, Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be fabricated to provide a minimum three span condition.
- E. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be fabricated from sections formed with dovetail-shaped ribs. The sections shall be perforated in the areas between the dovetail-shaped

ribs as indicated on the contract drawings. All perforated areas shall be covered with "cap" sections formed from galvanized steel sheets and factory attached to the underlying perforated sections. The combination of these sections shall form units that contain cavities suitable for sound absorbing elements.

2.4 ACCESSORIES

- A. Toris 4C Ankore hanging devices (which include Ankore locks) or Toris C Wedge Bolt hanging devices (which include Wedge Locks) shall be installable and relocatable anywhere along the length of the interior ribs of the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels.
- B. Column closures, end closures, and side closures shall be provided as required by the manufacturer's standards.
- C. Manufacturer's standard flexible or metal type rib profile closures shall be provided as indicated on the contract drawings.
- D. Slab edge forms of 10 gage or less material thickness shall be provided as indicated on the contract drawings.
- E. Reinforcement for small openings that are shown on the structural drawings and do not require supplementary framing shall be provided based on the manufacturer's recommendations.
- F. Acoustic elements shall be factory installed above the perforated holes in the bottom flat area between the dovetail-shaped ribs. To facilitate field painting of the perforated surfaces, the sound absorbing elements shall be supported above the surface on corrosion resistant spacers. Sound absorbing elements and spacers shall be factory installed.

PART 3: EXECUTION

3.1 GENERAL

Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels and accessories shall be installed in strict accordance with the manufacturer's approved erection drawings, installation instructions, the *Steel Deck Institute (SDI) Manual for Construction with Steel Deck*, and all applicable safety regulations.

3.2 BEFORE INSTALLATION

- A. The need for temporary shoring shall be investigated. Shoring tables published by the manufacturer shall be consulted to determine if shoring will be required. Unshored spans shall be reduced if greater construction loads are anticipated or if less deflection of the deck as a form is allowable.
- B. The supporting frame and other work relating to Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck shall be examined to determine if this work has been properly completed. Temporary shoring, if required, shall be in place prior to installation of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels.
- C. All components of the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck System shall be protected from significant damage during shipment and handling. If storage at the jobsite is required, bundles or packages of these materials shall be elevated above the ground, sloped to provide drainage, and protected from the elements with a ventilated waterproof covering.

3.3 INSTALLATION

- A. Bundles or packages of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck System components shall be located on supporting members in such a manner that overloading of any of the individual members does not occur. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall not be placed on concrete supporting members until after the members have adequately cured or properly designed formwork is in place.
- B. Before being permanently fastened, Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be placed with ends accurately aligned and adequately bearing on supporting members or formwork. Proper coverage of the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be maintained. Care must be taken by the erector to maintain uniform spacing of the bottom rib opening (equal to the openings in the profiled sheet) at the sidelaps.

- C. Field cutting of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be performed in a neat and precise manner. Only those openings shown on the structural drawings shall be cut. Other openings shall be approved by the structural engineer and cut by those requiring the opening.
- D. Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be fastened to all supporting members with ¾" diameter puddle welds at a nominal spacing of 8' on center or less as indicated on the manufacturer's erection drawings.
- E. Sidelaps of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels shall be fastened together by welds or screws at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings. Sides of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels that are located at perimeter edges of the building shall be fastened to supporting members at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings.
- F. Column closures, end closures, side closures, rib closures, slab edge forms, and supplied reinforcement for small openings shall be fastened as indicated on the manufacturer's erection drawings.
- G. Shear studs may be substituted for puddle welds to permanently fasten Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels to steel supporting members. The shear stud manufacturer shall provide instructions for welding studs through Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck.
- H. Mechanical fasteners may be substituted for puddle welds to permanently fasten Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck panels to supporting members. The mechanical fastener manufacturer shall provide documentation as to the equivalent load capacity and proper installation procedure for each type of fastener being used.

3.4 WORK BY OTHER TRADES

- A. The slump of the concrete will determine the amount of concrete leakage and cleanup that will be required to the ceiling surface. On all projects some cleanup of the ceiling surface will be required.

3.5 AFTER INSTALLATION

- A. Construction loads that could damage the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck such as heavy concentrated loads and impact loads shall be avoided. Planking shall be used in all high traffic areas.
- B. Prior to placement of concrete, the top surface of Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck shall be cleaned of all debris, grease, oil, and other foreign substances. Cleaning the bottom surface of the Toris 4CA Acoustical or Toris CA Acoustical Composite Floor Deck for field painting shall be the responsibility of the painting contractor.
- C. Galvanized coatings that are significantly damaged shall be repaired. An appropriate galvanized repair paint shall be used, and the paint manufacturer's application instructions shall be followed.
- D. The determination of the time for removal of supporting shores may be controlled by the presence of construction loads or deflection limitations. The removal of shores may have to occur after the concrete has reached its full compressive strength f'c, modules Ec and stiffness, particularly in those instances where the construction loads may be as high as the specified live load. If shoring is removed too early, more significant deflection may occur and may even result in permanent damage. The strength and stiffness of the concrete during the various stages of construction should be substantiated by job-constructed and job-cured test specimens (cylinders). See ACI 318-99 (Chapter 6).

3.6 PROTECTION

When the Toris 4C or Toris C Composite Floor Slab is used in an exterior application (such as a balcony) the Toris 4C or Toris C steel deck shall be adequately protected by field priming and painting with a rust inhibitive paint or by stuccoing the deck. The surface of the concrete shall also be adequately sealed. The composite deck provides the positive reinforcement for the slab; therefore, the finish on the steel deck must be specified by the architect and engineer for the environment it will be used in to protect the steel deck for the life of the structure.



Designer's Responsibility & Warranty

Designer's Responsibility

The information presented in this brochure has been prepared in accordance with generally recognized engineering principles. We recommend that this information not be used or relied upon for any application without a thorough review by a licensed professional engineer, designer, or architect who will be competent to evaluate the significance and limitations of this material and who will accept responsibility for the application of this material for any specific application.

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Since hazards may be associated with the handling, installation, or use of steel and its accessories, prudent construction practices should always be followed. We recommend that the parties involved in such handling, installation, or use review all applicable manufacturer's material safety data sheets, applicable rules and regulations of the Occupational Safety and Health Administration and other government agencies having jurisdiction over such handling, installation, or use, and other relevant construction practice publications, including the Steel Deck Institute (SDI) *Manual for Construction with Steel Deck*.

Warranty

EPIC Metals warrants that materials to be furnished, insofar as they are manufactured by EPIC Metals, shall be free from structural defects. In the event of the failure of the material within one year from the date of delivery, and providing that such failure is attributed to defects found to have existed at the time of delivery, EPIC Metals' liability hereunder shall be limited to furnishing necessary replacement material. EPIC Metals assumes no liability for damages, losses, or injuries, direct or consequential, that may arise from use or inability to use the products.

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