Bearing design spread sheet based on AASHTO 16th Edition 1197 Interim (Method A) AASHTO LRFD by ARP visit www.pretread.com or email pretread@eim.ae for more information.

Elastomeric Bridge Bearing Design

Design spreadsheet based on AASHTO 16th Edition 1197 Interim (Method A) AASHTO LRFD

Bearing type (P - Plain R - reinforced		R				
Bearing type (F - Fixed, E - expansion)		E		FoS	1.2	
Dead Load rotation.	Ø	0.002	Radian [Slope of girder at the bearing]			
Dead Load (unfactored)	DL	393.4	kips.	kN	1750	
Live Load W/O impact (unfactored)	LL	223	kips.	kN	990	
Bearing design load	P	739	Kips. [LL + DL]	kN	3288	
Horizontal movement - long	Δs	1.18	in. [sum of range of movements from all sources]			
Shear modulus	G	0.120	ksi [AASHTO table 14.6.5.2-1]			
Load application parallel to bearing plain	F_{xy}	52.455	kips.	kN	233.33	
Inner layer thickness	hri	0.787402	in. [Arbitrary design value >= 0.40 in]			
Cover layer thickness	hrc	0.23622	in. [Arbitrary design value <= 0.7*hri]			
DESIGN CHECK		30.00	%	OK	hrc<= 70% of hri	
Number of inner layers	n	3	Nos. [Arbitrary design value]			
Total elastomer thickness	hrt	2.834646	in. (2hrc + n*hri)>= 2 Delta s			
DESIGN CHECK	2Δs	2.362	OK		hrt>= 2*Delta s	
DESIGN CHECK	ra	7.78	OK		ra=< 8	
Bearing length	L	31.49606	in. [Arbitrary design value]			
Bearing width	W	27.55906	In.[Arbitrary design value]			
Bearing area	A	868.0017	in². [L* W]			
Shape factor (Inner layers)	Si	9.333	[Si= LW/(2hri(L+W))]			
Shape factor (Cover layers)	Sc	31.111	[Sc = LW/(2hrc(L+W))]			
Average compressive stress	σs	0.85158	ksi. [σs= P/A]	σs <σall	OK	
Allowable compressive stress	σall	1.12000	ksi. [1.0*GS]	0.985789		
DESIGN CHECK	Amin	856	OK		Amin=<A	
Modifier constant	k	0.6	[AASHTO table 14.3.1]			
Compression modulus (Inner layer)	Eci	37.992	ksi. [Eci = 3G(1+(2kSi²))]			
Compression modulus (Cover layer)	Ecc	418.4933	ksi. [3G(1+(2kSc²))]			
Compressive strain (Inner layer)	εci	0.019	[P/(A*Eci)]			
Compressive strain (Cover layer)	εcc	0.002	[P/(A*Ecc)]			
Instantaneous deflection	Δc	0.044925	in.[Δc=∑εchr][BOPP max=0.2in. in deck joint location]			
Allowable rotation	ØAll	0.008554	Radians [Ø All = σs/(0.5GS(L/hrt)²]			
DESIGN CHECK	Øreq	0.007	OK		Theta All>= Theta req.	
Average compressive stress (LL only)	σ L	0.256406	kips. [LL/A]			
Allowable fatigue stress	Fsr	24	kips. [AASHTO tab.10.3.1A category A over 200000 cycles]			
Shim steel grade		33	kips [1997 interim AASHTO Divi II,C18.4.1.1.2]			
Shim thickness	ts	0.19685	in. [Arbitrary design value] BOPP min=11gage = 1/8"			
DESIGN CHECK (Shim thickness)	ts min	0.06096	In. Meets AASHTO equations 14.6.5.3.7-1&2, & BOPP			
Total bearing height	T	3.62205	in. [Including shims]			
DESIGN CHECK	L/3	10.49869	OK		T<=L/3	
CUSTOMER	M/s. Client		Qty.....			
PROJECT	Ref: Project		.25/1/XXXX			

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Inputs required for Bridge Bearing design:

1. DL – Dead Load - by client
2. LL – Live Load – by client
3. Rotation in radians – by client
4. FoS – Factor of Safety – by client
5. Horizontal movement – by client
6. Load for above horizontal movement - by client
7. Available space – determining bearing Length – by client
8. Available space – determining bearing Width - by client
9. Available space – determining bearing Height – by client
10. MS Shim thickness – by bearing manufacturer
11. Internal Elastomer Layer thickness – by bearing manufacturer
12. Cover layer thickness – by bearing manufacturer
13. Value of Elastomer Shear Modulus. – by client -
14. Elastomer Hardness (Duro) – by client

Results available from ARP Spread Sheet

1. Inner layer thickness
2. Cover layer thickness
3. MS Shim thickness
4. Compression modulus (Inner layer)
5. Compression modulus (Cover layer)
6. Compressive strain (Inner layer)
7. Compressive strain (Cover layer)
8. Instantaneous deflection
9. Allowable rotation
10. Average compressive stress
11. Allowable fatigue stress
12. Shape factor (Cover layers)
13. Shape factor (Inner layers)
14. Bearing stability against size.
15. Value of- P Total load.

Check lists as results " **OK** " **NO** " " **NA** " confirming to AASHTO LRFD requirements.

1. Cover layer thickness
2. Total Elastomer thickness
3. Cover layer /inner layer ratio
4. Average compressive stress
5. Allowable compressive stress
6. Load against bearing area
7. Allowable rotation against required
8. MS Shim thickness against required.
9. Bearing stability against size.