

# Lindapter®

## Dynamic Load Testing

**Proven steelwork clamping systems independently tested for dynamic loading.**

Lindapter commissioned independent dynamic load testing of its **Hollo-Bolt, Type AF** and **Type AAF** products in order to offer specifiers an economic and technically improved connection compared to welding or through bolting for dynamic load applications.

The independent tests were performed in accordance with EN 1993-1-9: Design of steel structures - Part 1-9: Fatigue. A number of tests were performed at different load levels from 10,000 to 2.5 million cycles in order to determine suitable detail categories.

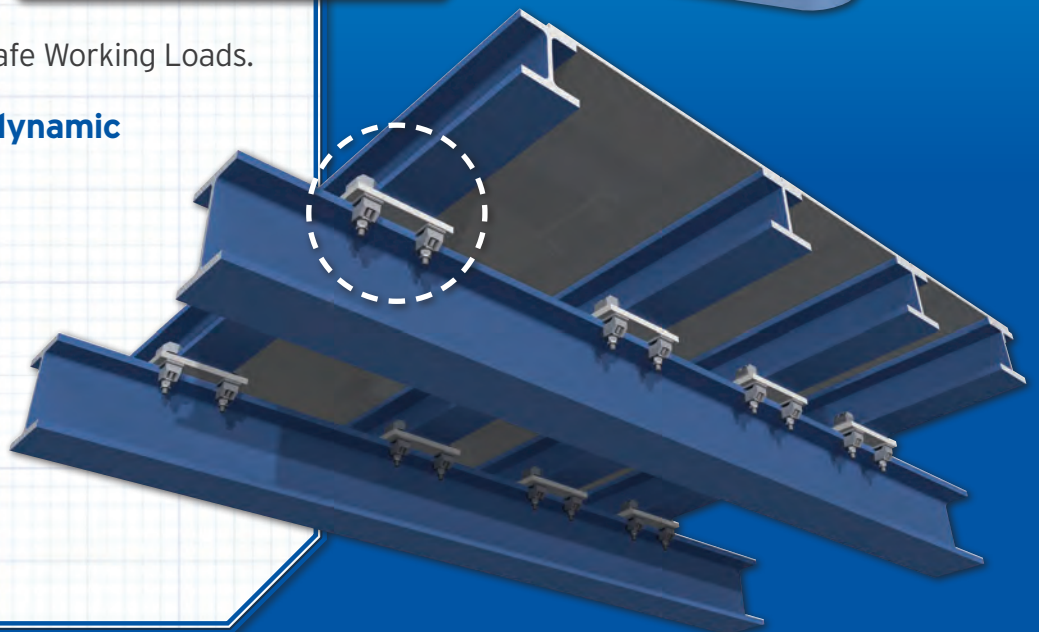
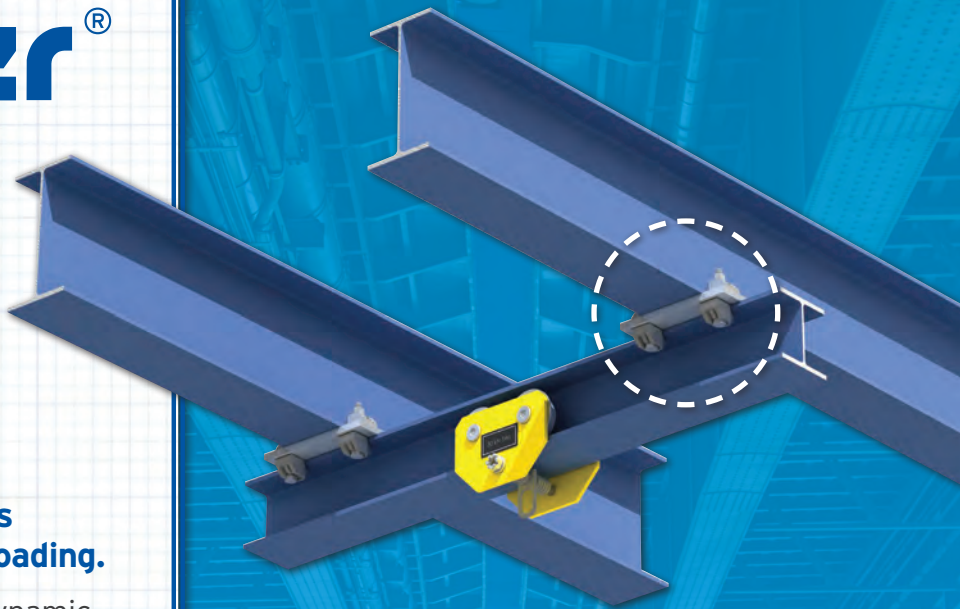
The results from the testing were then used to calculate Safe Working Loads.



**Typical applications with dynamic loads present:**

- Cranes and crane rails
- Lifting equipment
- Conveyor systems
- Manufacturing machinery
- Bridges and bridge refurbishment

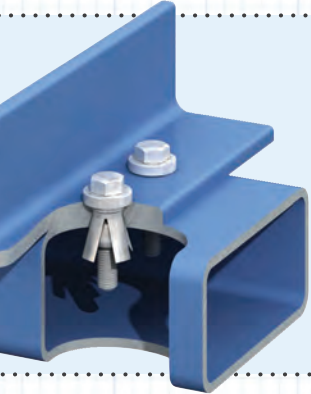
**Independently tested to EN 1993-1-9. See safe working loads overleaf >>>**



**For more information please contact Lindapter's Technical Support Team:**

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## Dynamic Load Data



### Tension Data Holo-Bolt

The following safe working loads in tension for dynamic loading have been calculated using Detail Category 63 according to EN 1993-1-9.



Holo-Bolt (Hexagonal head, carbon steel)						
Number of cycles		SWL (Tension) 5:1 Factor of Safety				
from	Up to	M8 (kN)	M10 (kN)	M12 (kN)	M16 (kN)	M20 (kN)
-	1 x 10 <sup>4</sup>	4.00	8.50	10.50	21.00	35.00
1 x 10 <sup>4</sup>	2 x 10 <sup>4</sup>	1.84	3.65	5.82	11.43	20.20
2 x 10 <sup>4</sup>	6 x 10 <sup>4</sup>	1.28	2.53	4.03	7.93	14.01
6 x 10 <sup>4</sup>	2 x 10 <sup>5</sup>	0.86	1.69	2.70	5.31	9.38
2 x 10 <sup>5</sup>	6 x 10 <sup>5</sup>	0.60	1.17	1.87	3.68	6.50
6 x 10 <sup>5</sup>	2 x 10 <sup>6</sup>	0.40	0.79	1.25	2.46	4.35
2 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	0.29	0.58	0.92	1.82	3.21
5 x 10 <sup>6</sup>	1 x 10 <sup>7</sup>	0.26	0.50	0.80	1.58	2.79
1 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	0.22	0.44	0.70	1.37	2.43
Greater than	2 x 10 <sup>7</sup>	0.16	0.32	0.51	1.00	1.76

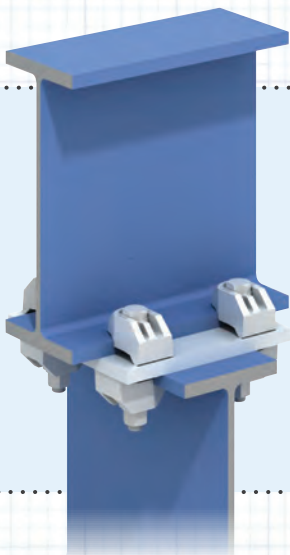


### Shear Data Holo-Bolt

The following safe working loads in shear for dynamic loading have been calculated using Detail Category 100 according to EN 1993-1-9.



Holo-Bolt (Hexagonal head, carbon steel)						
Number of cycles		SWL (Shear) 5:1 Factor of Safety				
from	Up to	M8 (kN)	M10 (kN)	M12 (kN)	M16 (kN)	M20 (kN)
-	1 x 10 <sup>4</sup>	5.00	10.00	15.00	30.00	40.00
1 x 10 <sup>4</sup>	2 x 10 <sup>4</sup>	3.67	7.44	10.74	21.81	30.69
2 x 10 <sup>4</sup>	6 x 10 <sup>4</sup>	2.95	5.98	8.62	17.51	24.64
6 x 10 <sup>4</sup>	2 x 10 <sup>5</sup>	2.32	4.70	6.78	13.76	19.37
2 x 10 <sup>5</sup>	6 x 10 <sup>5</sup>	1.86	3.77	5.44	11.05	15.55
6 x 10 <sup>5</sup>	2 x 10 <sup>6</sup>	1.46	2.96	4.28	8.68	12.22
2 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	1.22	2.47	3.56	7.23	10.17
5 x 10 <sup>6</sup>	1 x 10 <sup>7</sup>	1.06	2.15	3.10	6.29	8.86
1 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	0.92	1.87	2.70	5.48	7.71
Greater than	2 x 10 <sup>7</sup>	0.67	1.36	1.96	3.97	5.59



### Tension Data Type AF & Type AAF

The following safe working loads in tension for dynamic loading have been calculated using Detail Category 50 (for bolts) according to EN 1993-1-9.



Type AF & Type AAF (4 bolt connections, property class 8.8)					
Number of cycles		SWL (Tension) per 4 bolt connection (8.8) Type AF 5:1 FoS / Type AAF 4.5:1 FoS			
from	Up to	M12 (kN)	M16 (kN)	M20 (kN)	M24 (AF only) (kN)
-	1 x 10 <sup>4</sup>	34.00	64.00	105.20	160.00
1 x 10 <sup>4</sup>	2 x 10 <sup>4</sup>	22.30	41.54	64.82	93.39
2 x 10 <sup>4</sup>	6 x 10 <sup>4</sup>	15.46	28.80	44.94	64.75
6 x 10 <sup>4</sup>	2 x 10 <sup>5</sup>	10.35	19.28	30.09	43.35
2 x 10 <sup>5</sup>	6 x 10 <sup>5</sup>	7.18	13.37	20.86	30.06
6 x 10 <sup>5</sup>	2 x 10 <sup>6</sup>	4.18	8.95	13.97	20.12
2 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	3.54	6.60	10.29	14.83
5 x 10 <sup>6</sup>	1 x 10 <sup>7</sup>	3.08	5.74	8.95	12.90
1 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>	2.68	5.00	7.80	11.23
Greater than	2 x 10 <sup>7</sup>	1.94	3.62	5.65	8.14

*Lateral slip resistance = 10% of published tension values for short term use*

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