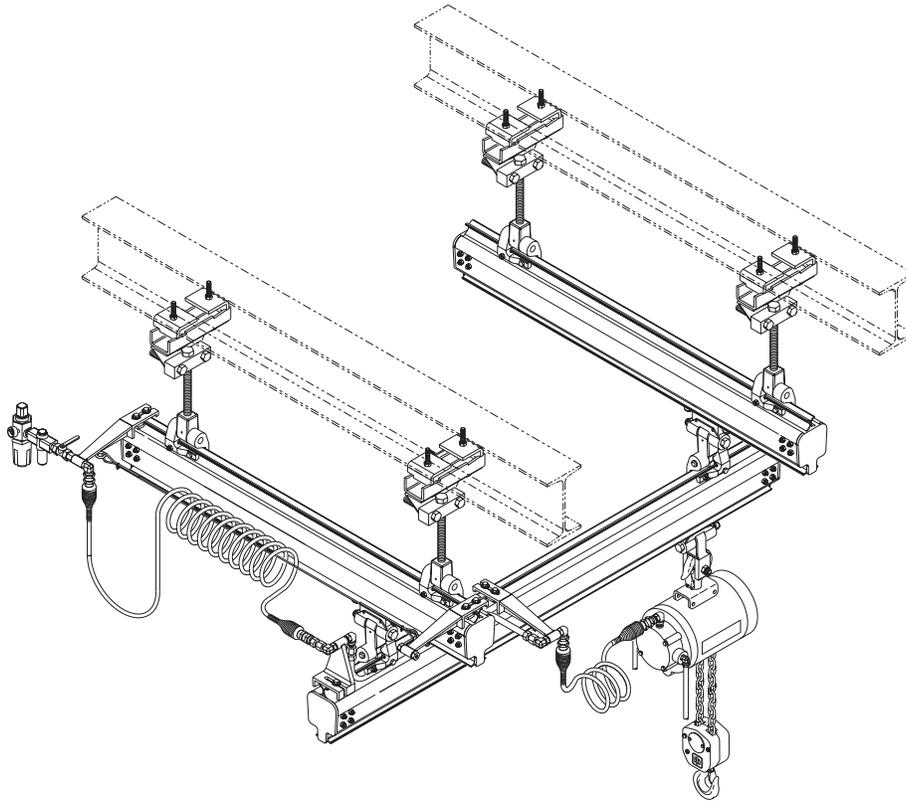


Parts, Installation, Operation and Maintenance Manual for Z Rail Aluminum and Steel Overhead Rail System



(Dwg. MHP1539)



This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the installation, operation and maintenance of these products.

⚠ WARNING

Do not use this Overhead Rail System for lifting, supporting or transporting people. Do not use the system to lift or support loads over people. Always operate, inspect, and maintain this equipment in accordance with applicable safety codes and regulations.

Equipment shown in this manual is intended for industrial use only. Use only Ingersoll-Rand components in installation. All Ingersoll-Rand components are tested and certified to applicable safety standards.

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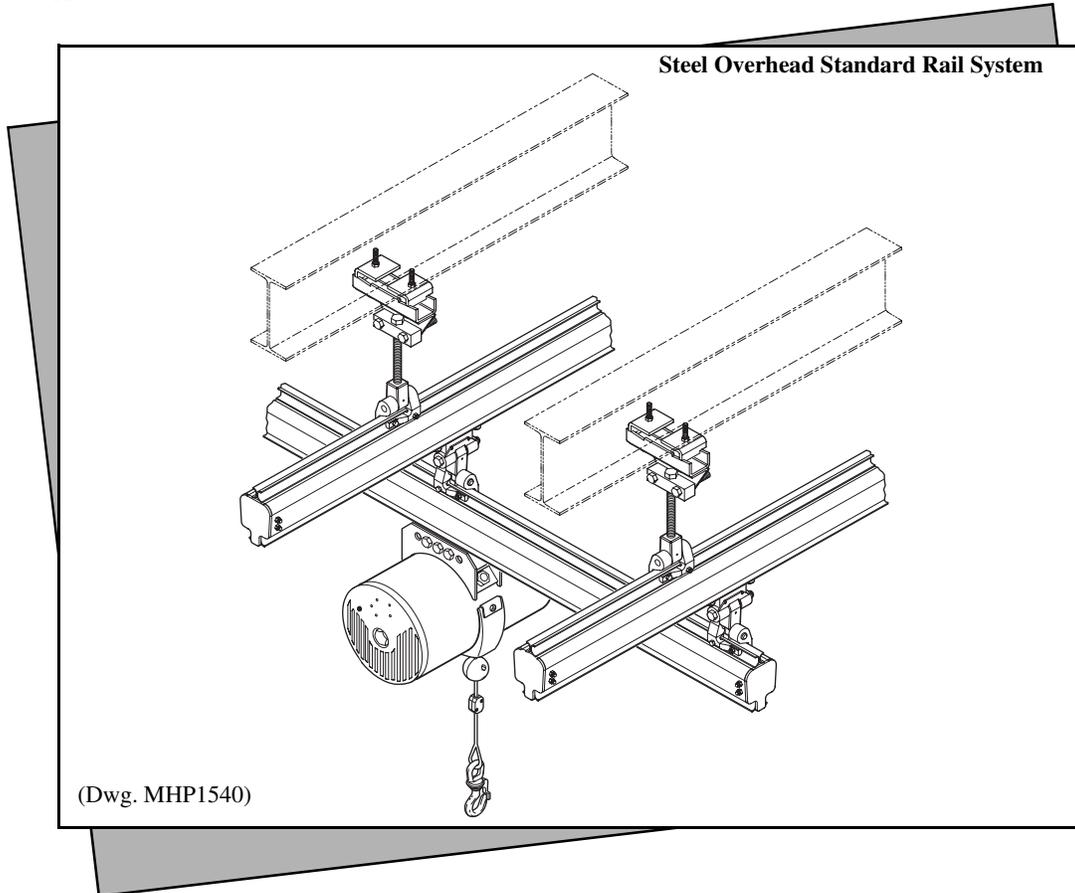
System Order Number: _____

Installation Drawing Number(s): _____

Installation Date: _____

Location: _____

Application: _____



INTRODUCTION

The Z Rail Overhead System provides a wide range of movement for transporting and positioning loads. It is a powerful resource that allows you to handle loads in less time and with greater efficiency. Take the time to review the accompanying safety issues and requirements in this manual. Use them in the installation and everyday service of the system and you will enjoy many trouble-free years of operation.

This manual provides necessary information for the **Ingersoll-Rand** Overhead Rail System.

While its scope cannot be complete unless addressing a specific system in a specific environment, it provides the installer and operator a clearer picture of the systems that can be assembled with **Ingersoll-Rand** equipment and accessories.

SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the product.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following signal words are used to identify the level of potential hazard.

DANGER

- **Danger is used to indicate the presence of a hazard which will cause severe injury, death, or substantial property damage if the warning is ignored.**

WARNING

- **Warning is used to indicate the presence of a hazard which can cause severe injury, death or substantial property damage if the warning is ignored.**

CAUTION

- **Caution is used to indicate the presence of a hazard which will or can cause injury or property damage if the warning is ignored.**

NOTICE

- **Notice is used to notify people of installation, operation or maintenance information which is important but not hazard-related.**

Safety Summary

WARNING

- **Do not use this system for lifting, supporting or transporting people.**
- **The supporting structures and load-attaching devices used in conjunction with these systems must provide a safety factor of at least five times the rated capacity of the system. This is the customer's responsibility. If in doubt, consult a registered structural engineer.**

NOTICE

- **Lifting and handling equipment is subject to different regulations in each country. These regulations may not be specified in this manual.**

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, associated with the final installation. It is the owner's and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. Refer to ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein.

It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hand tools as well as special **Ingersoll-Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Ingersoll-Rand cannot know of, or provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or **Ingersoll-Rand** for technical assistance.

WARNING

- **System installation, maintenance and disassembly procedures require at least two people. Parts are too large and heavy for one person to handle safely.**

CAUTION

- **If a leveling laser is used, wear proper eye protection and follow manufacturer's directions and safety precautions when using the device.**
- **Make certain all ladders or scaffolding used by installation personnel are reliable and capable of supporting the combined weight of the installer and equipment.**
- **When determining the total weight of the suspended load, include all hoists, positioners, handling devices, buckets, hooks, etc. The total weight of the suspended load must not exceed the load rating marked on the rail.**
- **Runways more than 8 ft (2.4 m) in length may require a separate lifting device during installation. Securely attach the runway or bridge to the lifting device and attach a safety cable to the load in case of accidental release from the lifting device.**

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions are intended to avoid unsafe operating practices which might lead to injury or property damage.

Ingersoll-Rand recognizes that most companies who use rail systems have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence. Load ratings are marked on both sides of each rail and are clearly visible to the operator. These ratings are established by **Ingersoll-Rand** through exhaustive testing.

Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in safety and operation of this rail system to operate and maintain this system.
2. When a **"DO NOT OPERATE"** sign is placed on the rail system, do not use until repairs or adjustments have been

- completed and the sign has been removed by designated personnel.
3. Before each shift, visually check the rail system for wear and damage. Never use a rail system that inspection indicates is worn or damaged.
4. Never exceed the rated capacity of the rail system. Refer to labels attached to the rail system.
5. Pay attention to loads suspended from the rail system at all times.
6. Make sure everyone is clear of the load path. Do not lift a load over people.
7. Never use the rail system and attached equipment for lifting or lowering people, and never allow anyone to stand on a suspended load.
8. Do not swing a suspended load.
9. Never suspend a load for an extended period of time.
10. Never leave a suspended load unattended.
11. Never weld or cut a load suspended from the rail system.
12. Do not operate rail system if jamming, overloading, or binding occurs.
13. Avoid collision or bumping of suspended components on the rail system.
14. To move a trolley or bridge rail, push on the load or load connector.

GENERAL RAIL SYSTEM INFORMATION

The **Ingersoll-Rand** Overhead Rail System packages can be custom designed or modular and feature easy, rapid, do-it-yourself installation. The system is weld-free and self-aligning with complete bolt-together capability at all splice joints. The rail and bridge beams are saw-cut square to required length at the factory so that all rail joints are flush when installation is completed.

The ZRS Rail System is available in two sizes and is manufactured from rolled, pre-coated steel to enhance smoothness and quiet operation. ZRS2 is also available with curved rails.

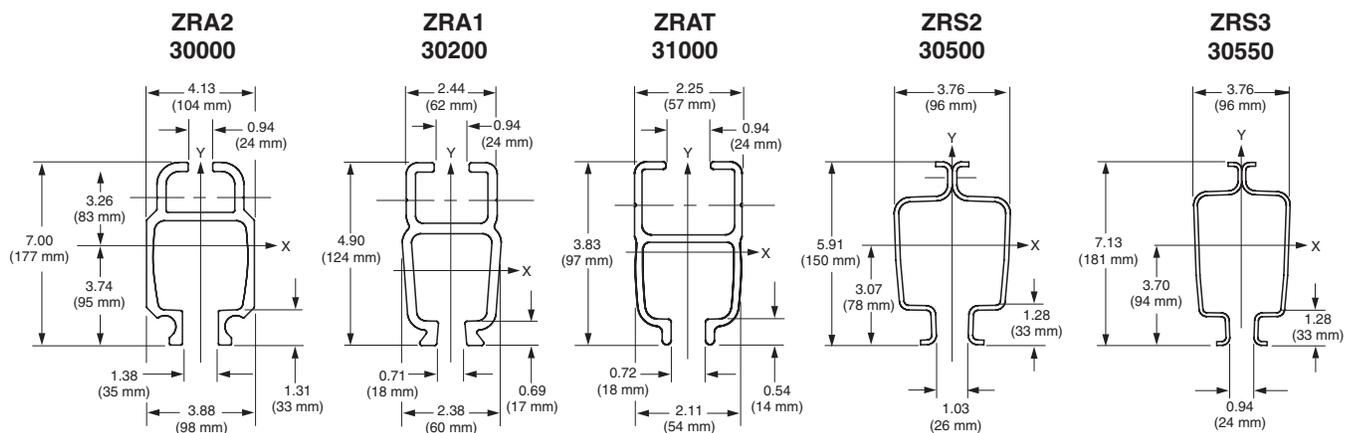
The ZRA Rail System is available in three sizes and is extruded from high-strength aluminum alloy. ZRA1 is also available with curved rails.

Runway rails are suspended either from the existing building structure or from free-standing support structures. Bridges are suspended from runways and carry a hoist, balancer, end effector or other positioning device.

Trolleys for both rail systems are equipped with smooth, acetal-resin-molded wheels which resist flattening and feature sealed ball bearings and side guide rollers. Rail suspension hardware features ball and socket hanger rod construction, which allows the rail to swing for low-effort bridge movement. Safety cables are utilized at all suspension points, if ordered.

RAIL SECTIONS

Standard Rails

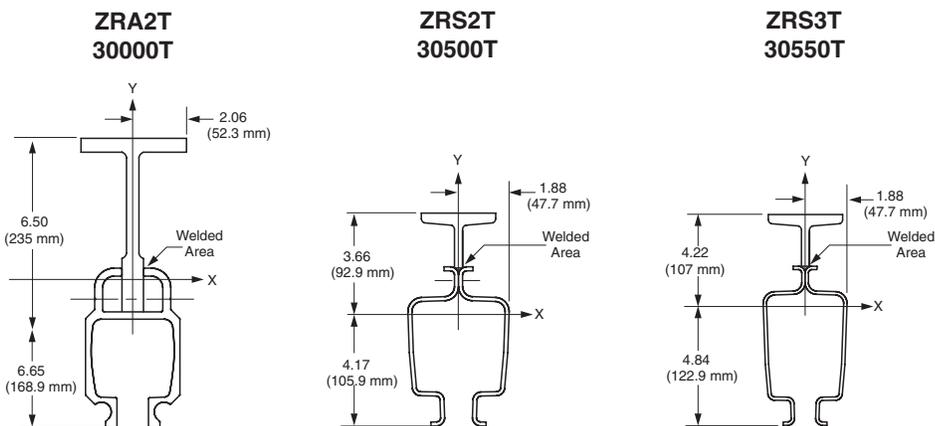


(Dwg. MHP1913)

Table 1

Part No.	Rail Type	Material	Weight Per Foot		Vertical Height	
			lb	kg	in.	mm
30000	ZRA2	Aluminum	7.60	3.45	7.00	177
30200	ZRA1	Aluminum	4.10	1.86	4.90	124
31000	ZRAT	Aluminum	2.15	0.97	3.83	97
30500	ZRS2	Steel	8.00	3.60	5.91	150
30550	ZRS3	Steel	8.90	4.00	7.13	181

Strong Back Rails



(Dwg. MHP2151)

Table 2

Part No.	Rail Type	Material	Weight Per Foot		Vertical Height	
			lb	kg	in.	mm
30000T	ZRA2	Aluminum	14.96	6.78	13.00	330
30500T	ZRS2	Steel	11.62	5.27	7.83	198.8
30550T	ZRS3	Steel	12.52	5.68	9.20	233.6

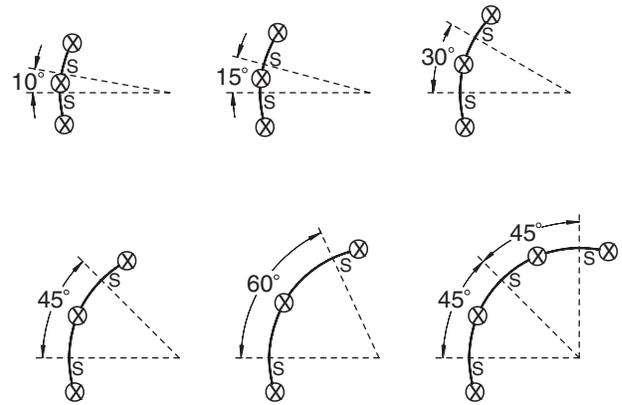
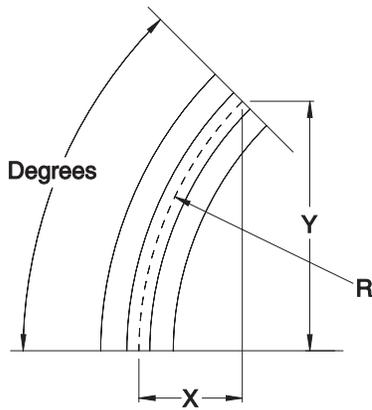
* Strong Back Rails not available in ZRAT or ZRA1.

** Rail sections not shown to scale.

Curved Rails

Curved Rail Suspension Points Diagram

S = Splice Joints
X = Suspension Points



(Dwg. MHP2202)

(Dwg. MHP2201)

Table 3

Rail Type	Degrees	Part No.	'X' Dimension		'Y' Dimension		Weight per foot	
			inches	metres	inches	metres	lbs	kg
ZRA1 R = 36 in. (914 mm)	15	30254	1.2	30.5	9.3	236.2	3.2	1.45
	30	30255	4.8	121.9	18.0	457.2	6.2	2.8
	45	30256	10.5	266.7	25.6	650.2	9.3	4.2
	60	30257	18.0	457.2	31.2	792.5	12.4	5.6
	90	30258	36.0	914.4	36.0	914.4	18.6	8.4
ZRS2 R = 60 in. (1524 mm)	10	30567	0.9	22.9	10.4	264.2	6.9	3.1
	15	30569	2.0	50.8	15.5	393.7	10.4	4.7
	30	30571	8.0	203.2	30.0	762.0	20.9	9.5
	45	30573	17.7	449.6	42.4	1077	31.4	14.2

* Refer to Dwg. MHP2202 on page 6.

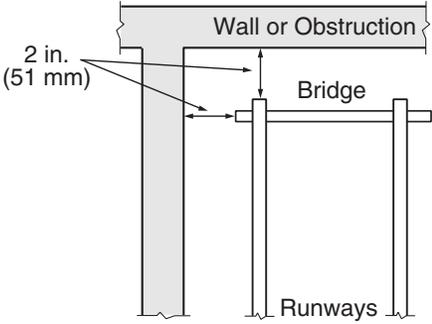
SPACE REQUIREMENTS

Take the necessary time to determine the best installation location to optimize the systems capability. When considering an appropriate location with adequate ratings to support the system and its loads, keep in mind that factors such as snow or standing water may decrease ratings when the system is mounted to the supports of a flat roof. Allow adequate space, clear of system and attachments, for safe traffic flow of personnel and materials to and from the area. Allow clearance for the height of transported loads and necessary work space. For optimum system life, install the system indoors, or under shelter to reduce exposure to weather.

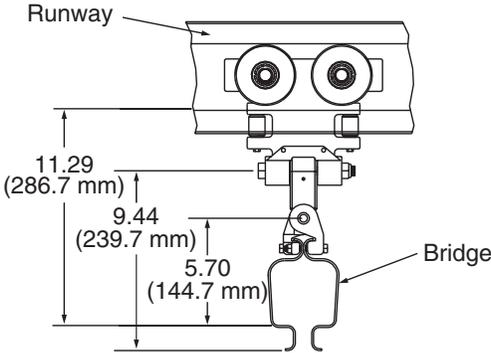
Visually define where to install the system by laying out the runways and bridge on the work space floor, or marking off the proposed runway and bridge placement on the floor with masking tape. This mock-up allows you to walk off the proposed load path and direction of travel.

Refer to Dwgs. MHP1913 on page 5 and MHP1998 on page 7.

The end and side wall clearance will be the same distance for all rail systems covered in this manual. Runway to bridge clearances may vary depending on type of rail, hanger or trolley that is used.



End and Side Clearances

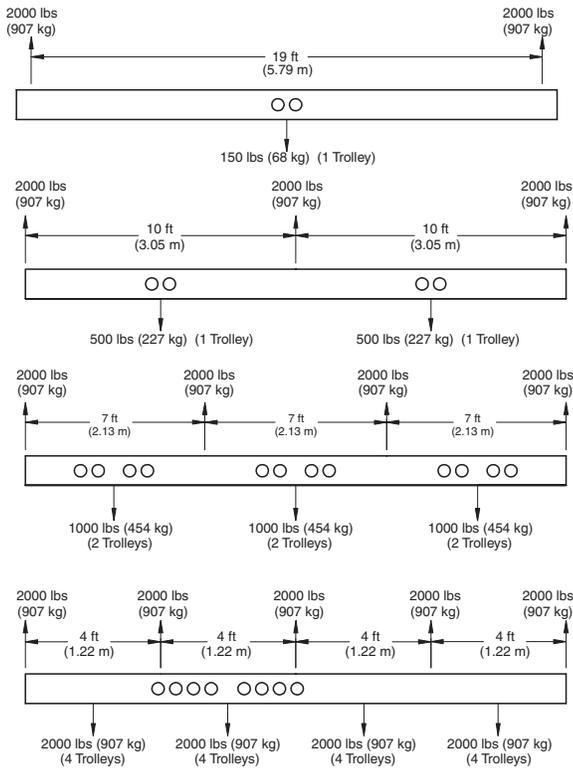


Typical - Runway to Bridge Clearance.
Clearance varies depending on trolley and rail types.

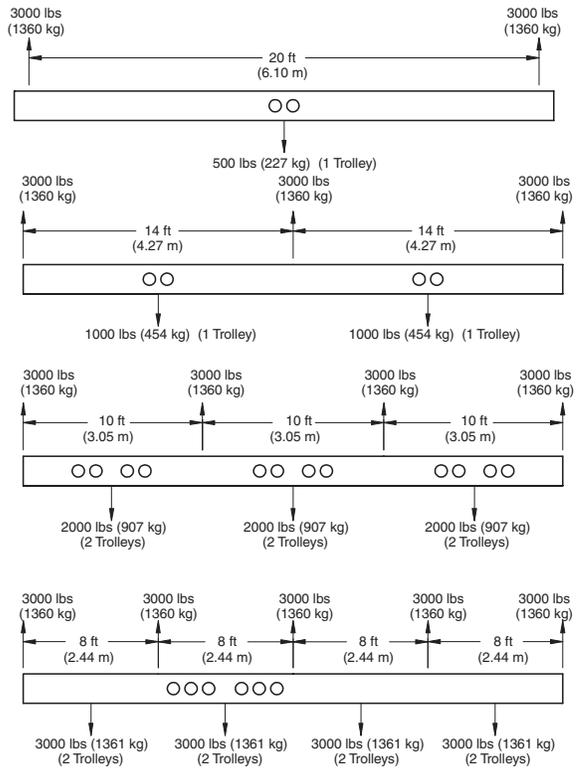
(Dwg. MHP1998)

LOADING CAPACITIES

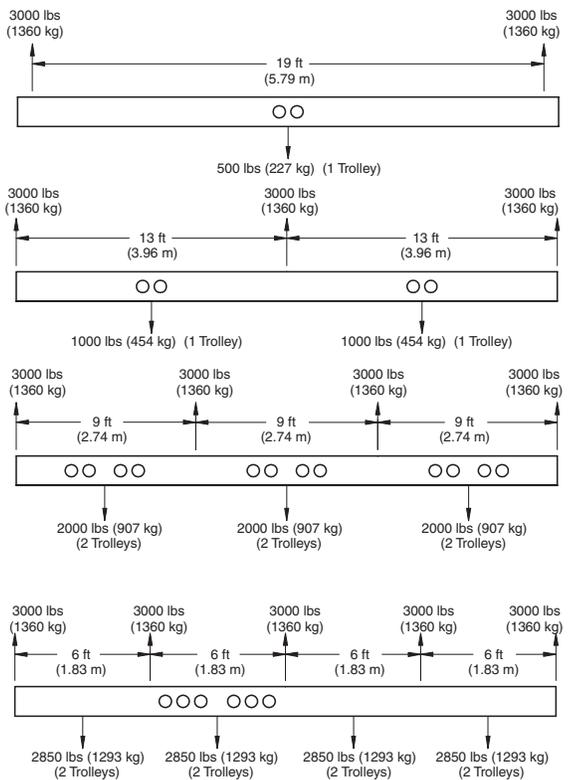
ZRA1



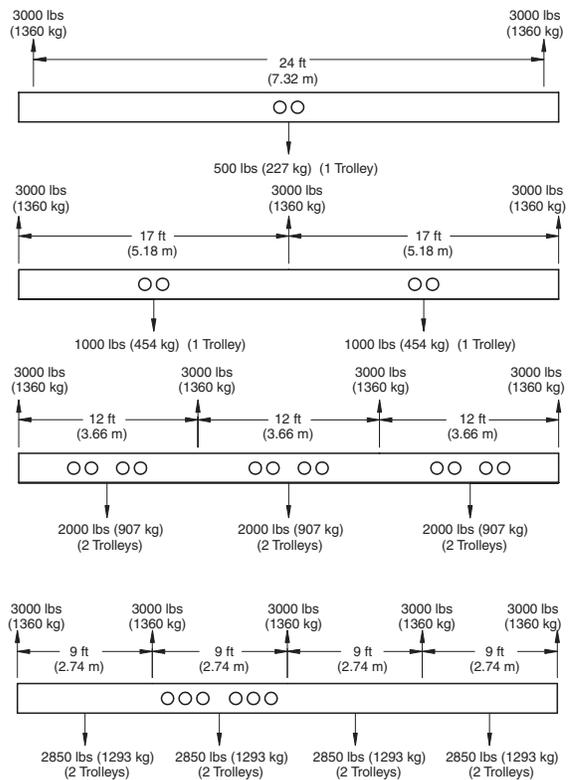
ZRA2



ZRS2



ZRS3



(Dwg. MHP2122)

Note: Contact factory for information regarding ZRA2T, ZRS2T, ZRS3T and ZRSS rails.

Refer to pages 9 through 13 for Loading Capacities charts.

LOADING CAPACITIES - CONTINUED

Part No. 31000 / ZRAT - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.70	0.089	2.20	0.080	2.00	877	398	836	379	766	347
5	60	1.52	1524.0	0.13	3.40	0.11	2.80	0.100	2.50	654	297	535	243	490	222
6	72	1.83	1828.8	0.16	4.10	0.13	3.30	0.120	3.00	454	206	371	168	340	154
7	84	2.13	2133.6	0.19	4.70	0.15	3.90	0.140	3.60	334	151	273	124	250	113
8	96	2.44	2438.4	0.21	5.40	0.17	4.40	0.160	4.10	255	116	209	95	192	87
9	108	2.74	2743.2	0.24	6.10	0.20	5.00	0.180	4.60	202	92	165	75	151	69
10	120	3.05	3048.0	0.27	6.80	0.22	5.50	0.200	5.10	163	74	134	61	123	56
11	132	3.35	3352.8	0.29	7.50	0.24	6.10	0.220	5.60	135	61	111	50	101	46
12	144	3.66	3657.6	0.32	8.10	0.26	6.70	0.240	6.10	113	51	93	42	85	39
13	156	3.96	3962.4	0.35	8.80	0.28	7.20	0.260	6.60	97	44	79	36	73	33
14	168	4.27	4267.2	0.37	9.50	0.31	7.80	0.280	7.10	83	38	68	31	63	28
15	180	4.57	4572.0	0.40	10.20	0.33	8.30	0.300	7.60	73	33	59	27	54	25
16	192	4.88	4876.8	0.43	10.80	0.35	8.90	0.320	8.10	64	29	52	24	48	22
17	204	5.18	5181.6	0.45	11.50	0.37	9.40	0.340	8.60	57	26	46	21	42	19
18	216	5.49	5486.4	0.48	12.20	0.39	10.00	0.360	9.10	50	23	41	19	38	17
19	228	5.79	5791.2	0.51	12.90	0.41	10.50	0.380	9.70	45	21	37	17	34	15
20	240	6.10	6096.0	0.53	13.50	0.44	11.10	0.400	10.20	41	19	33	15	31	14
21	252	6.40	6400.8	0.56	14.20	0.46	11.60	0.420	10.70	37	17	30	14	28	13
22	264	6.71	6705.6	0.59	14.90	0.48	12.20	0.440	11.20	34	15	28	13	25	11
23	276	7.01	7010.4	0.61	15.60	0.50	12.70	0.460	11.70	31	14	25	11	23	11
24	288	7.32	7315.2	0.64	16.30	0.52	13.30	0.480	12.20	28	13	23	11	21	10

Part No. 30200 / ZRA1 - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2000	907	2000	907	2000	907
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	1896	860	1823	827	1671	758
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	1547	702	1266	574	1160	526
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	1137	516	930	422	852	387
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	870	395	712	323	653	296
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	688	312	563	255	516	234
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	557	253	456	207	418	189
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	460	209	377	171	345	157
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	387	175	316	144	290	132
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	330	149	270	122	247	112
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	284	129	232	105	213	97
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	248	112	203	92	186	84
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	218	99	178	81	163	74
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	193	87	158	72	145	66
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	172	78	141	64	129	58
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	154	70	126	57	116	52
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	139	63	114	52	104	47
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	126	57	103	47	95	43
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	115	52	94	43	86	39
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	105	48	86	39	79	36
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	97	44	79	36	73	33
25	300	7.62	7620.0	0.670	16.9	0.550	13.9	0.500	12.7	89	40	73	33	67	30
26	312	7.92	7924.8	0.690	17.6	0.570	14.4	0.520	13.2	82	37	67	31	62	28
27	324	8.23	8229.6	0.720	18.3	0.590	15.0	0.540	13.7	76	35	63	28	57	26
28	336	8.53	8534.4	0.750	19.0	0.610	15.5	0.560	14.2	71	32	58	26	53	24

Note: For European live load deflections contact factory.

LOADING CAPACITIES - CONTINUED

Part No. 30000 / ZRA2 - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	3000	1361	3000	1361	3000	1361
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	3000	1361	3000	1361	3000	1361
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	3000	1361	3000	1361	3000	1361
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	3000	1361	3000	1361	3000	1361
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	3000	1361	2718	1233	2492	1130
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	2625	1191	2148	974	1969	893
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	2126	965	1740	789	1595	723
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	1757	797	1438	652	1318	598
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	1477	670	1208	548	1108	502
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	1258	571	1029	467	944	428
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	1085	492	888	403	814	369
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	945	429	773	351	709	322
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	831	377	680	308	623	283
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	736	334	602	273	552	250
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	656	298	537	244	492	223
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	589	267	482	219	442	200
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	532	241	435	197	399	181
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	482	219	395	179	362	164
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	439	199	359	163	330	149
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	402	182	329	149	301	137
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	369	167	302	137	277	126
25	300	7.62	7620.0	0.667	16.9	0.545	13.9	0.500	12.7	340	154	278	126	255	116
26	312	7.92	7924.8	0.693	17.6	0.567	14.4	0.520	13.2	315	143	257	117	236	107
27	324	8.23	8229.6	0.720	18.3	0.589	15.0	0.540	13.7	292	132	239	108	219	99
28	336	8.53	8534.4	0.747	19.0	0.611	15.5	0.560	14.2	271	123	222	101	203	92

Part No. 30000/30153 / ZRA2T - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	3000	1361	3000	1361	3000	1361
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	3000	1361	3000	1361	3000	1361
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	3000	1361	3000	1361	3000	1361
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	3000	1361	3000	1361	3000	1361
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	3000	1361	3000	1361	3000	1361
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	3000	1361	3000	1361	3000	1361
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	3000	1361	3000	1361	3000	1361
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	3000	1361	3000	1361	3000	1361
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	3000	1361	3000	1361	3000	1361
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	3000	1361	3000	1361	3000	1361
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	3000	1361	3000	1361	3000	1361
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	3000	1361	3000	1361	3000	1361
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	3000	1361	3000	1361	3000	1361
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	3000	1361	3000	1361	3000	1361
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	3000	1361	3000	1361	3000	1361
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	3000	1361	3000	1361	2914	1322
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	3000	1361	2869	1301	2630	1193
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	3000	1361	2602	1180	2385	1082
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	2898	1314	2371	1075	2173	986
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	2651	1203	2169	984	1988	902
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	2435	1104	1992	904	1826	828
25	300	7.62	7620.0	0.667	16.9	0.545	13.9	0.500	12.7	2244	1018	1836	833	1683	763
26	312	7.92	7924.8	0.693	17.6	0.567	14.4	0.520	13.2	2075	941	1697	770	1556	706
27	324	8.23	8229.6	0.720	18.3	0.589	15.0	0.540	13.7	1924	873	1574	714	1443	654
28	336	8.53	8534.4	0.747	19.0	0.611	15.5	0.560	14.2	1789	811	1464	664	1342	609

Note: For European live load deflections contact factory.

LOADING CAPACITIES - CONTINUED

Part No. 30500 / ZRS2 - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2850	1293	2850	1293	2850	1293
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	2850	1293	2850	1293	2850	1293
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	2850	1293	2850	1293	2850	1293
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	2826	1282	2826	1282	2772	1258
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	2473	1122	2316	1050	2123	963
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	2198	997	1830	830	1677	761
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	1811	822	1482	672	1358	616
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	1497	679	1225	556	1123	509
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	1258	571	1029	467	943	428
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	1072	486	877	398	804	365
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	924	419	756	343	693	314
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	805	365	659	299	604	274
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	708	321	579	263	531	241
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	627	284	513	233	470	213
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	559	254	457	207	419	190
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	502	228	411	186	376	171
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	453	205	370	168	340	154
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	411	186	336	152	308	140
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	374	170	306	139	281	127
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	342	155	280	127	257	116
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	314	143	257	117	236	107

Part No. 30500/80802 / ZRS2T - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2850	1293	2850	1293	2850	1293
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	2850	1293	2850	1293	2850	1293
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	2850	1293	2850	1293	2850	1293
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	2850	1293	2850	1293	2850	1293
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	2850	1293	2850	1293	2850	1293
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	2850	1293	2850	1293	2850	1293
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	2850	1293	2850	1293	2850	1293
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	2850	1293	2850	1293	2850	1293
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	2850	1293	2720	1234	2493	1131
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	2833	1285	2318	1051	2124	964
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	2442	1108	1998	906	1832	831
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	2128	965	1741	790	1596	724
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	1870	848	1530	694	1402	636
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	1656	751	1355	615	1242	564
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	1477	670	1209	548	1108	503
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	1326	601	1085	492	995	451
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	1197	543	979	444	898	407
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	1086	492	888	403	814	369
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	989	449	809	367	742	336
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	905	410	740	336	679	308
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	831	377	680	308	623	283

Note: For European live load deflections contact factory.

LOADING CAPACITIES - CONTINUED

Part No. 30500S / ZRS2 (9 Ga. Stainless) - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2850	1293	2850	1293	2850	1293
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	2850	1293	2850	1293	2850	1293
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	2445	1109	2445	1109	2445	1109
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	2095	950	2095	950	2095	950
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	1833	832	1833	832	1792	813
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	1630	739	1544	701	1416	642
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	1467	665	1251	567	1147	520
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	1264	573	1034	469	948	430
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	1062	482	869	394	796	361
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	905	410	740	336	679	308
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	780	354	638	289	585	265
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	680	308	556	252	510	231
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	597	271	489	222	448	203
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	529	240	433	196	397	180
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	472	214	386	175	354	161
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	424	192	347	157	318	144
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	382	173	313	142	287	130
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	347	157	284	129	260	118
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	316	143	258	117	237	107
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	289	131	236	107	217	98
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	265	120	217	99	199	90

Part No. 30550 / ZRS3 - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2850	1293	2850	1293	2850	1293
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	2850	1293	2850	1293	2850	1293
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	2850	1293	2850	1293	2850	1293
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	2850	1293	2850	1293	2850	1293
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	2850	1293	2850	1293	2850	1293
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	2850	1293	2850	1293	2850	1293
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	2831	1284	2555	1159	2342	1063
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	2574	1168	2112	958	1936	878
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	2169	984	1775	805	1627	738
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	1848	838	1512	686	1386	629
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	1593	723	1304	591	1195	542
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	1388	630	1136	515	1041	472
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	1220	553	998	453	915	415
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	1081	490	884	401	811	368
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	964	437	789	358	723	328
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	865	392	708	321	649	294
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	781	354	639	290	586	266
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	708	321	579	263	531	241
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	645	293	528	239	484	220
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	590	268	483	219	443	201
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	542	246	444	201	407	184

Note: For European live load deflections contact factory.

LOADING CAPACITIES - CONTINUED

Part No. 30550/80802 / ZRS3T - Live Load Deflections

Rail/Bridge Span				Deflection Limits						Point Load					
ft	in.	m	mm	L/450 in.	L/450 mm	L/550 in.	L/550 mm	L/600 in.	L/600 mm	L/450 lbs	L/450 kg	L/550 lbs	L/550 kg	L/600 lbs	L/600 kg
4	48	1.22	1219.2	0.107	2.7	0.087	2.2	0.080	2.0	2850	1293	2850	1293	2850	1293
5	60	1.52	1524.0	0.133	3.4	0.109	2.8	0.100	2.5	2850	1293	2850	1293	2850	1293
6	72	1.83	1828.8	0.160	4.1	0.131	3.3	0.120	3.0	2850	1293	2850	1293	2850	1293
7	84	2.13	2133.6	0.187	4.7	0.153	3.9	0.140	3.6	2850	1293	2850	1293	2850	1293
8	96	2.44	2438.4	0.213	5.4	0.175	4.4	0.160	4.1	2850	1293	2850	1293	2850	1293
9	108	2.74	2743.2	0.240	6.1	0.196	5.0	0.180	4.6	2850	1293	2850	1293	2850	1293
10	120	3.05	3048.0	0.267	6.8	0.218	5.5	0.200	5.1	2850	1293	2850	1293	2850	1293
11	132	3.35	3352.8	0.293	7.5	0.240	6.1	0.220	5.6	2850	1293	2850	1293	2850	1293
12	144	3.66	3657.6	0.320	8.1	0.262	6.7	0.240	6.1	2850	1293	2850	1293	2850	1293
13	156	3.96	3962.4	0.347	8.8	0.284	7.2	0.260	6.6	2850	1293	2850	1293	2850	1293
14	168	4.27	4267.2	0.373	9.5	0.305	7.8	0.280	7.1	2850	1293	2850	1293	2720	1234
15	180	4.57	4572.0	0.400	10.2	0.327	8.3	0.300	7.6	2850	1293	2585	1172	2369	1075
16	192	4.88	4876.8	0.427	10.8	0.349	8.9	0.320	8.1	2777	1259	2272	1030	2083	945
17	204	5.18	5181.6	0.453	11.5	0.371	9.4	0.340	8.6	2460	1116	2012	913	1845	837
18	216	5.49	5486.4	0.480	12.2	0.393	10.0	0.360	9.1	2194	995	1795	814	1645	746
19	228	5.79	5791.2	0.507	12.9	0.415	10.5	0.380	9.7	1969	893	1611	731	1477	670
20	240	6.10	6096.0	0.533	13.5	0.436	11.1	0.400	10.2	1777	806	1454	660	1333	605
21	252	6.40	6400.8	0.560	14.2	0.458	11.6	0.420	10.7	1612	731	1319	598	1209	548
22	264	6.71	6705.6	0.587	14.9	0.480	12.2	0.440	11.2	1469	666	1202	545	1101	500
23	276	7.01	7010.4	0.613	15.6	0.502	12.7	0.460	11.7	1344	610	1099	499	1008	457
24	288	7.32	7315.2	0.640	16.3	0.524	13.3	0.480	12.2	1234	560	1010	458	926	420

Note: For European live load deflections contact factory.

TOOL REQUIREMENTS

Main System Installation

- “C” clamp
- Drive air powered reversible ratchet/impact
- Drive socket set / impact socket set
- Drive torque wrench
- Chuck drill motor (air or electric)
- Drill bits (min. of 2 each)
- Allen wrench set
- Combination wrench set
- Bubble level
- Tape measure
- Pin punch ball peen hammer
- Heavy polyurethane mallet
- Laser level (optional)
- Hand truck
- Ladders or scaffolding

Safety Cables

- Side cutters
- Combination wrench or socket and wrench

Splicing Rails

- Combination wrench
- Allen wrench

NOTE

All fasteners are standard thread with the exception of swivels which are reverse threaded.

During installation keep parts and tools at least 6 ft (2 m) clear of the workspace area until needed.

NOTICE

- **DO NOT** replace self-locking nuts with standard nuts and lockwashers. All fasteners for rail systems must be grade 5 or better. Use only fasteners provided by Ingersoll-Rand. Nuts that are torque prevailing have torque values.
- **DO NOT** overtighten fasteners or bolts. Overtightening may weaken fasteners. **DO NOT** reuse self-locking nuts.

Torque Specifications Table

Bolt Dia.		Grade 5 Tightening Torque			
		Dry		Lubricated	
Inches	Metric	ft-lb	Nm	ft-lb	Nm
1/4 - 20	M6x1	8	10	6	7
5/16 - 18	M8x1.25	17	23	13	18
3/8 - 16	M10x1.5	31	42	23	31
1/2 - 13	M12x1.75	76	81	57	61
5/8 - 11	M14x2	150	130	112	98

PRE-INSTALLATION CHECKLIST

- | | | |
|--|------------------------------|-----------------------------|
| 1. Is the proposed system location away from normal personnel traffic patterns? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 2. Will the operator be able to clearly see the load along its path of travel at all times? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 3. Is the location within easy and safe reach of the load receiving area? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4. Do personnel and materials have clear access to and from the system? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 5. Will the facility structure and foundation support five times the combined weight of the system, loads and any attachments? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 6. Will the system conflict with utility supply lines, overhead electrical conduit or any utility that could represent a potential danger? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 7. Does the proposed location allow enough space for maximum load travel in the direction you propose? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 8. Is the proposed location in an area easily kept clean and free of obstruction? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 9. Does the proposed location and installation meet all code requirements? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 10. Do the proposed I-Beams and their supports provide sufficient rating to support the system and load weights? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

If you have answered no to any of these questions, please copy and fax this checklist to Ingersoll Rand at 248-293-5800 for a free initial consultation.

The following should be adhered to during installation:

- All track suspension hardware and splices must be accessible for maintenance checks and inspection after installation.
- All bolted constructions must be completely tightened and torqued to specifications as shown in the Torque Specifications Table on page 13.

DANGER

- Check the installation area for conflicts with utility supply lines, overhead electrical conduit or any utility that could present potential danger to the system or personnel.

WARNING

- Use extreme care when installing system and assemblies. Avoid distractions until each part of the system is securely attached.

CAUTION

- The system support structure must be strong enough to support five times the weight of the rail system and maximum loads. Factors such as snow or standing water may decrease ratings when system is mounted to supports of a flat roof.

NOTICE

- Before starting installation, clear the workspace or set-up area of debris or obstructions. Always keep system workspace clear of obstructions, debris, spills and standing water.

INSTALLATION

Prior to installing the rail system, carefully inspect each component for possible shipping damage.

To ensure safe and proper rail system installation make this manual available to the installer.

⚠ WARNING

- A falling load can cause injury or death. Before installing, read “SAFETY INFORMATION” on page 3.

⚠ CAUTION

- Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting rail system to use.

Load rating labels are installed on both sides of the bridges so they are clearly visible to the operator. The total weight of the suspended load must include all handling devices, positioner or hoist, hooks and associated equipment.

Make certain the rail system is properly installed. A little extra time and effort in so doing can contribute a lot toward preventing accidents and helping you get the best service possible.

Ensure the supporting member from which the rail system is suspended is strong enough to support the weight of the rail system plus the weight of a maximum rated load plus a generous factor of at least 500% of the combined weights.

Aluminum rails are available in lengths up to 28 ft (8.5 m) depending on model rail used. Steel rails are available in lengths up to 24 ft (7.3 m) depending on model rail used. For longer runways splice kits are used to connect rail sections. Check that joints are tight, rails are aligned laterally, longitudinally and level. Tighten splice bolts and locknuts, refer to Torque Specifications Table on page 13.

Positioning Overhead Supports

Refer to Dwg. MHP1998 on page 7.

When positioning overhead supports ensure that when mounted, runways and bridge, clearances are maintained. These clearances are 2 in. (51 mm) between runway ends and 3 in. (76 mm) between bridge and anything overhead.

NOTICE

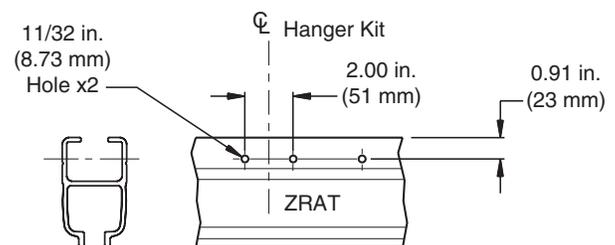
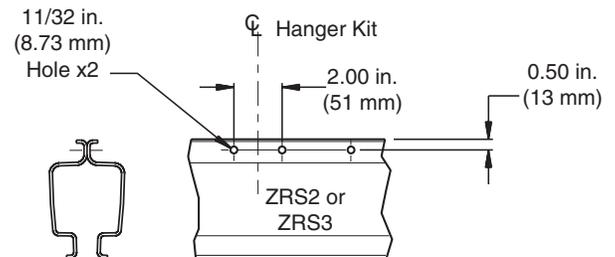
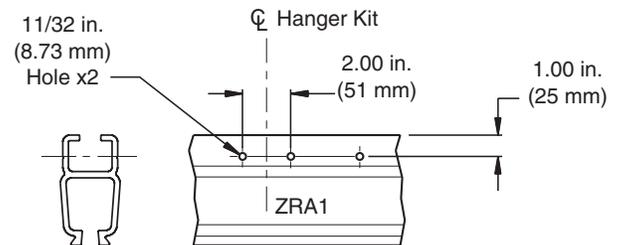
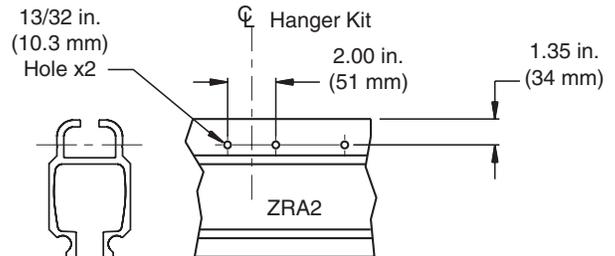
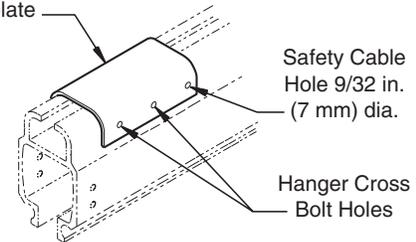
- Consult a registered structural engineer for advice on ability of beams to carry the additional weight of the rail system and load.

Hanger Spacing

Refer to Dwg. MHP2122 on page 8.

1. Evenly divide number of hanger kits between the number of runways that came with your system. This is dependent on the load intended for the system, refer to live load capacity tables on pages 9 through 13.
2. Minimum spacing for hangers is typically 4-18 ft (1-5 m) apart. Hangers should not be more than 1 ft (0.30 m) from either side of a spliced rail and 1 ft (0.30 m) from each end of rail.

Hole Location
Template



(Dwg. MHP1723)

Hanger Assembly

Refer to Dwg. MHP1723 on page 15.

Aluminum rail systems include a template for drilling holes for runway suspension hardware and safety cables. For steel rail systems, use a hanger bracket to position holes for suspension hardware and locate a 0.28 in. (7 mm) safety cable hole 3 in. (76 mm) to the right or left of them.

1. Use a pin punch to mark the hanger mount bolt holes and safety cable hole on both sides of the rail.

NOTICE

- **Drilling rail from each side will provide easier bolt alignment and installation.**

2. Drill the safety cable hole with a 9/32 in. drill.
3. Drill the hanger bolt holes with an 11/32 or 13/32 in. drill, depending upon rail type. Refer to Dwg. MHP1723 on page 15.
4. Repeat Steps 1-3 for each hanger.
5. Install one hanger in the runway for each hanger point.
6. Align hangers with drilled holes. Install hanger bracket bolts and nuts and tighten to specifications.

Alignment

Refer to Dwg. MHP1613 on page 16.

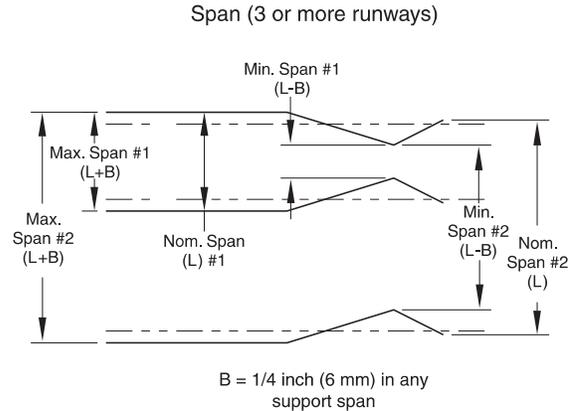
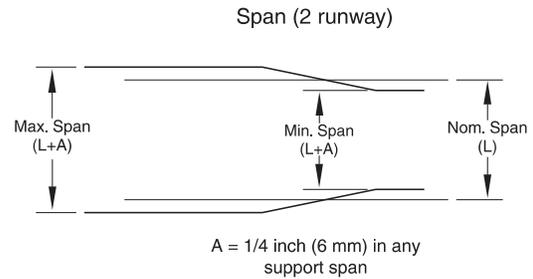
1. Place a level on each runway between hangers and level runways.
2. Place a straight piece of material between runways and level runways with each other. *In most applications an empty rail section may be used as a guide. If using a laser to level the system, use the top outside edge of the rail channel as your guide.* The swivels serve as the adjusting mechanism.

Ingersoll-Rand Rail Systems must be installed level and parallel as described in these instructions.

⚠ WARNING

- **Failure to comply with these specifications may void the warranty and can result in accelerated components wear and possibly component failure.**

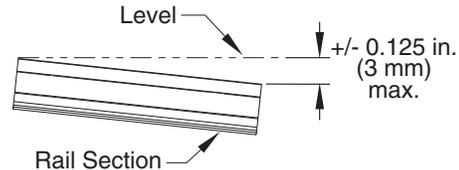
1. **Longitudinal leveling:** Systems with multiple runways and single rail systems shall be level to within 0.25 in. (6 mm) in overall length. The maximum rate of change shall be no more than 0.125 in. (3 mm) on 20 ft (6 m) centers.



(Dwg. MHP1613)

2. **Elevation (runway to runway):** Bridge systems shall be level to within 0.25 in. (6 mm) in span of the bridge. The maximum rate of change shall be no more than 0.125 in. (3 mm) on 20 ft (6 m) rail centers.

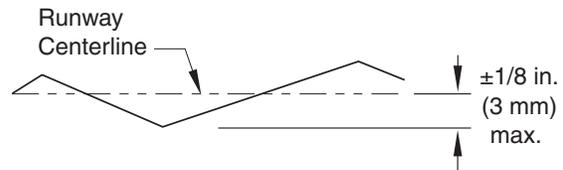
Level Tolerance Along Runway



(Dwg. MHP2283)

3. **Centering runway to runway:** Shall be within 0.1875 in. (4 mm) in overall length of the system. The maximum rate of change shall be no more than 0.125 in. (3 mm) on 20 ft (6 m) rail centers.

Runway Straightness



(Dwg. MHP1711)

4. **Centering for a single rail:** Systems which are parallel to a conveyor or work station shall be centered to the parallel delivery system to within ±0.50 in. (12 mm) in overall length of the monorail system. The maximum rate of change shall be no more than 0.125 in. (3 mm) on 20 ft (6 m) centers.

Suspending Runway Sections



- **Do not lean on or use Overhead Rail System as a support or balance when installing the system.**

Rigid and Block Standard Hangers

NOTICE

- **Before installing these hanger types, rails must be leveled prior to drilling holes.**

Rigid Mount Hanger

Refer to Dwg. MHP1533 on page 24.

1. Align runway beam with I-Beam.
2. Place beam toe clamp (2) over both sides of I-Beam.
3. Install suspension plate assembly (5) in runway rail.
4. Secure with locknuts (1).
5. Tighten to specifications. Refer to “Torque Specifications Table” on page 13.
6. Install safety cable kit (342). Refer to “Safety Cable” section on page 18.

Block Mount Hanger

Refer to Dwg. MHP1533 on page 24.

1. Drill holes for rail hanger (6) in beam. Use rail hanger as template for hole placement. Refer to Dwg. MHP1723 on page 15.
2. Install rail hanger (6) using capscrew (7) and locknuts (11).
3. Tighten to specifications, refer to “Torque Specifications Table” on page 13.
4. Install suspension rail bracket (9) to runway rail and secure using capscrews (10) and locknut (16).
5. Align rail hanger (6) in center of suspension rail bracket (9) and secure using capscrews (8) and locknut (11).
6. Install safety cable kit (342). Refer to “Safety Cable” section on page 18.

Beam Hangers

NOTICE

- **Before installing these hanger types, rails must be leveled prior to drilling holes.**

Refer to Dwg. MHP1724 on page 26.

1. Drill holes for rail hanger (6) in runway beam. Use rail hanger as template for hole placement. Refer to Dwg. MHP1723 on page 15.
2. Place beam toe clamps (2) over both sides of I-Beam.
3. Install beam clamp (3) and beam clamp hanger plate (4) using capscrews (12), washers (5) and locknuts (1) to I-Beam and beam toe clamps (2).
4. Install rail hanger (6) to beam clamp hanger plate (4) using capscrews (7) and locknuts (11).
5. Install suspension rail bracket (9) to runway rail and secure using capscrews (10) and locknuts (16).
6. Align rail hanger (6) in center of suspension rail bracket (9) and secure using capscrews (8) and locknuts (11).
7. Install safety cable kit (342). Refer to “Safety Cable” section on page 18.

Close and Adjustable Hangers

Close Hanger

Refer to Dwg. MHP1726 on page 28.

1. Turn beam toe clamps (2) away from center of I-Beam overlapping each end of wide or standard flange beam clamp (3).
2. Install mounting screw (44) through center hole in beam clamp (3).
3. Press beam clamp assembly to the underside of I-Beam. Rotate toe clamps on I-Beam to provide maximum amount of support for the system.
4. Tighten nuts (1) on top of beam toe clamps (2), to square washer (5) and capscrews (12).
5. Install clevis (28) on mounting screw (44).
6. Drill hole approximately 3/16 in. (4.76 mm) through capscrew and clevis using clevis hole as template.
7. Install capscrew and nut assembly (42) through clevis (28) and mounting screw (44).
8. Install suspension rail bracket (9) to runway using capscrews (10) and nuts (16).
9. Install clevis between bracket (9) and secure with capscrew (8) and nut (11).

Adjustable Hanger

Refer to Dwg. MHP1548 on page 28.

1. Turn beam toe clamps (2) away from center of I-Beam overlapping each end of wide or standard flange beam clamp (3).
2. Press beam clamp assembly to the underside of I-Beam. Rotate toe clamps on I-Beam to provide maximum amount of support for the system.
3. Tighten nuts (1) on top of beam toe clamps (2), to capscrews (12).
4. Install capscrew (18) through center of adjustment block (19).
5. Depending upon hanger kit used, attach adjustment block with capscrews (7) and nuts (11) to wide or standard flange beam clamp hanger plate (4).
6. Install brackets (22) on capscrew (18) and insert in clevis (28).
7. Drill hole approximately 3/16 in. (4.76 mm) through capscrew and clevis using clevis pin hole as template.
8. Install pin (42) through clevis (28) and capscrew.
9. Install suspension rail bracket (9) to runway using capscrews (10) and nuts (16).
10. Install clevis between bracket (9) and secure with capscrew (8) and nut (11).

Adjustable Hanger Cross Brace

Refer to Dwg. MHP1650 on page 36.

Note: Cross braces should be used when hanger meets or exceeds 24 in. (610 mm) in length.

1. Drill 3/16 in. (4.76 mm) through hole in clevis (28). This hole will be used later to drill through mounting screw (18) and (44).
2. Install nut (21) to each end of threaded rod (24). Thread nut completely to allow for adjustment.
3. Install threaded rod (24) into connectors (22).
4. Install nut (21) to secure it to connector.
5. Install hanger bracket (20) to beam clamp assembly.
6. Install beam clamp assembly (77) to I-Beam.
7. Insert threaded rod (24) into beam clamp.
8. A 45° angle must be maintained between the hanger brace and threaded rod to provide the proper support.

9. Install second nut (21) secure to threaded rod.
10. Tighten nuts on threaded rod to specifications. Refer to "Torque Specifications Table" on page 13.

NOTICE

- **Check runway alignment to ensure cross bracing does not bend or deflect the hanger assembly adjustment rod.**
11. Adjust cross brace threaded rod (24) length to remove any deflection.
 12. After installation drill 3/16 in. (4.76 mm) through hole in clevis (28) and capscrew (18).
 13. Install capscrew and nut assembly (43).

Splicing Runway Sections

Refer to Dwg. MHP1562 on page 42.

1. Install capscrews (49) or (50) through mounting lugs on side of runways.
2. Tighten mounting lug capscrews and nuts (16) or (50). Refer to "Torque Specifications Table" on page 13.

Safety Cable

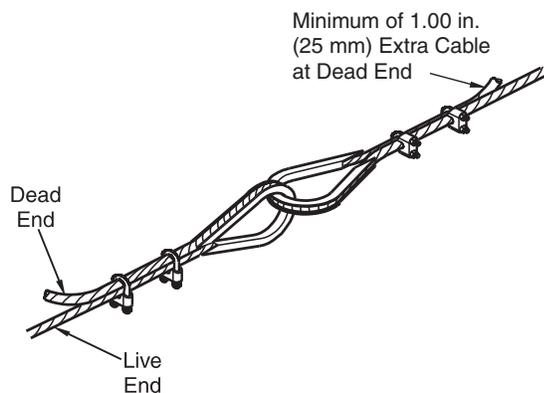
After the suspension hardware is properly attached and securely bolted into place, safety cables **must** be installed.

Refer to Dwg. MHP1999 on page 43.

1. Route wire rope (13) through hole in rail and around the cross header. Use two thimbles to make interlocked connection and route wire rope around thimbles (14), then apply first clamp (15) 1 in. (25 mm) from the dead end of the wire rope.

WARNING

- **Loop end of wire rope clamp must go around dead end not live part of wire rope. Refer to Dwg. MHP2224 on page 18.**



(Dwg. MHP2224)

2. Snug nuts, but do not tighten. Apply second clamp (15) adjacent to thimble. Snug nuts, but do not tighten. For maximum holding power they should be installed six to seven times the diameter of the wire rope apart.
3. Take up slack by applying tension to the thimble and wire rope, then tighten all nuts to 15 ft-lb (21 Nm) torque. Safety cables must be installed to allow free movement of hanger kit, yet provide minimum free drop of components if primary support should fail. **Wire rope must pass through hole in rail 9/32 in. (7 mm) dia.**

Inspection Gate Installation

CAUTION

- **One rail hanger assembly must be installed within 1 foot on each side of the inspection gate, for all rail types.**

NOTICE

- **Drilling rail from each side will provide easier capscrew alignment and installation.**
- **Ensure inspection gate will open or move freely between rail sections.**

ZRAT, ZRA1 and ZRA2 Rail

Refer to Dwg. MHP2284 on page 44.

1. Install suspension bracket to rail section. Use rail-drilling template to locate hole position; align center of template with the end of the rail section.

NOTICE

- **Drilling rail from each side will provide easier bolt alignment and installation.**
2. Repeat above step for connecting rail section.
 3. Install suspension bracket (140) to each rail section. Use capscrew (10) and locknut (11).
 4. Install inspection gate (145). Use capscrew (10) and locknut (11).
 5. Install connecting rail section.
 6. Install capscrew (10) and locknut (11) to inspection gate.

NOTICE

- **Ensure the inspection gate will move freely between rail sections.**
7. Install splice bolt kit (339) to secure both ends of the inspection gate.

ZRS2 and ZRS3 Rail

Refer to Dwg. MHP1562 on page 42 and MHP2284 on page 44.

CAUTION

- **One rail hanger assembly must be installed within 1 foot of each side of the inspection gate.**

1. Align inspection gate with end of rail section.
2. Install capscrew (50) and locknut (51) to upper lug.
3. Install connecting rail section.
4. Install capscrew (50) and locknut (51) to upper lug.

NOTICE

- **Ensure the inspection gate will move freely between rail sections.**
5. Install capscrew (50) and locknut (51) to lower lugs of inspection gate and rail.

Bridge to Runway Sections

1. Lift bridge to runway height.
2. Align bridge end trucks with runway sections.
3. Slide bridge and festooning into runway sections.
4. Immediately install runway end stops at the end of each runway.

End and Redundant Stops

Refer to Dwg. MHP1554 on page 45.

1. Install a redundant end stop (48) and align with second set of holes from end of the runway.
2. Install capscrews (46) and locknut (17). Tighten only when rail system is fully assembled. Tighten until locknut (17) contacts rail surface.
3. Install an end stop (47) and align with first set of holes from end of runway.

Air System

Most rail systems will require an air supply which is clean and free from water, water vapor and oil. 6.9 bar/690 kPa (100 psi) at the handling device is normally required to provide rated capacity. Do not exceed 6.9 bar/690kPa (100 psi).

NOTICE

- **Do not use an air line lubricator of any kind. Oil may damage internal components.**

Check rail system manufacturer's specifications for correct air supply requirements.

1. Install air system as described in "INSTALLATION" section on page 15.
2. Connect air supply to handling device.
3. Turn on air supply and check system for leaks.
4. Operate handling device.

Refer to "AIR SUPPLY PARTS LIST" on page 39 in parts section for air supply kits.

Air System Installation

Refer to Dwg. MHP1535 on page 38.

Runway

1. Assemble swivel compression fittings (108) to pre-coiled hose (109).
2. Install hose fittings (111) to each end of rubber hose (112).
3. Install adapter fitting (115) to one end of fitting (111).
4. Connect adapter (110) to one end of pre-coiled hose (109).
5. Align bracket (120) with each end of rail.
6. Determine which side of bracket to install filter/regulator (102). Regulator should be installed at the column or wall side of bracket.
7. Install filter/regulator (102) to bracket (120).
8. Install elbow fitting (107) to bracket (120).
9. Install eyebolt and nut assemblies (125) to brackets (120). The eye portion of the bolts will face each other when brackets are installed.
10. Install thimble (124) to eyebolt (125).

11. Thread cable (123) through the center of pre-coiled hose (109).
12. Thread cable (123) through the eyebolt (125) and thimble (124).
13. Install clamps (122) to cable (123). Do not tighten, rather snug the bolts so cable will not slip through clamp.
14. Install brackets (120) to top of rail with the eyebolts toward each other, using bolts (117), lockwashers (118), washers (119) and plates (121).
15. Tighten clamps (122) at one end of cable.
16. At opposite end of cable thread excess cable through clamps increasing tension until cable supports the weight of precoiled hose.
17. Tighten clamp (122).
18. Connect adapter fitting (115) to lifting unit inlet.
19. Rotate shut off valve to the closed position.
20. Connect plant air supply or column air supply to regulator (102) inlet.

NOTICE

- **Do not open shutoff until all equipment is installed.**

21. Rotate shutoff valve to open position.
22. Adjust regulator to 100 psi (6.9 bar).

Bridge

1. Install elbow fitting (107), adapter fitting (110) and hose end fitting (111) to one end of hose (112).
2. Install hose (112) with fittings to stanchion bracket (106). Run end of hose through rail drill hole adequate for hose size pull through.
3. Install fittings (110), (109) and (107) to hose end.
4. Install hose end with fittings to bracket (120).
5. Install fitting (107) to other side of bracket (120).
6. Install precoil fitting to both sides of precoil hose (109).
7. Install one end of precoil hose to fitting (107).

Electrification System

1. Install electrification system, as described in "INSTALLATION" section on page 15.
2. Connect electrical power supply to handling device.
3. Turn on power.
4. Operate handling device.

Refer to "ELECTRIFICATION PARTS LIST" on page 41 in parts section for electrification kits.

Electrification System Installation

Refer to Dwg. MHP1538 on page 40.

1. Align bracket (120) with each end of rail.
2. Determine which side of bracket to install the anchor bracket (136). Anchor bracket must be installed closest to pivot or wall end.
3. Install eyebolt and nut assemblies (125) to brackets (120). Eye portion of bolts will face each other when brackets are installed.
4. Install thimble (124) to eyebolt (125).
5. Thread cable trolleys (134) and towing trolley (130) onto cable (123). Ensure towing trolley is nearest the handling device. Wheels of towing trolley sit below cable.
6. Thread cable (123) through eyebolt (125) and thimble (124).

7. Install clamps (122) to cable (123). Do not tighten, rather snug the capscrews so cable will not slip through clamp.
8. Install brackets (120) to top of boom with the eyebolts toward each other, using capscrews (117), lockwashers (118), washers (119) and plates (121).
9. Tighten clamps at one end of cable.
10. At opposite end of cable thread excess cable through clamps increasing tension until cable can support the weight of the trolleys and electrical cable.
11. Tighten clamp (122).
12. Connect electrical supply and test handling device.

Final Adjustment Check

1. Runway and bridge sections must be level within 1/8 in. (3 mm) throughout entire span.
2. Runway to runway elevation must be within 1/4 in. (6 mm) throughout the length of the rail sections.
3. Centering runway to runway must be within 1/2 in. (13 mm). Runways must be straight, parallel and at the same elevation.
4. Height difference tolerance between rail sections and suspension points should not exceed + or - 5/16 in. (8 mm).
5. Longitudinal leveling: Overall length 1/4 in. (6 mm) maximum. Rate of change for lengths over a 20 ft (6 m) center 1/8 in. (3 mm) maximum.
6. Elevation for multiple runways: Overall length 1/4 in. (6 mm) maximum. Rate of change for lengths over a 20 ft (6 m) center 1/8 in. (3 mm) maximum.
7. Centering monorail systems: Overall length 1/2 in. (13 mm) maximum. Rate of change for lengths over a 20 ft (6 m) center 1/8 in. (3 mm) maximum.

CAUTION

- **The Overhead Rail System is designed to operate with a minimum of effort. If rails and bridge are not level to specification, unsecured loads may move to the lower end of the rail or bridge when unattended.**

Trolleys

WARNING

- **Check runways and bridges are level, prior to installing trucks and trolleys. Trucks and trolleys may roll out of the channel if end stops are not in place. Stay clear of the ends of all runway and bridge sections until end stops are in place.**

1. Remove one end stop and redundant end stop from one end of the bridge.
2. Determine correct trolley locations on bridge to allow maximum use of bridge and ease of supply connection to festooning trolleys. Refer to “Air and Electrification System Installation” on page 19.
3. Install hoist or positioner. Refer to applicable installation manual.
4. Install festooning, positioner or hoist and load trolleys into bridge.
5. Reinstall bridge end stop and redundant end stop.
6. Install end stop and redundant end stop, capscrews and locknuts and tighten to specifications. Refer to “Torque Specifications Table” on page 13.

Testing

Prior to initial use, all new, altered or repaired Z Rails shall be tested to ensure proper operation.

Installation Test

Step 1

Verify that rail systems, hoist, positioner or handling device move freely throughout entire intended work space without binding.

Step 2

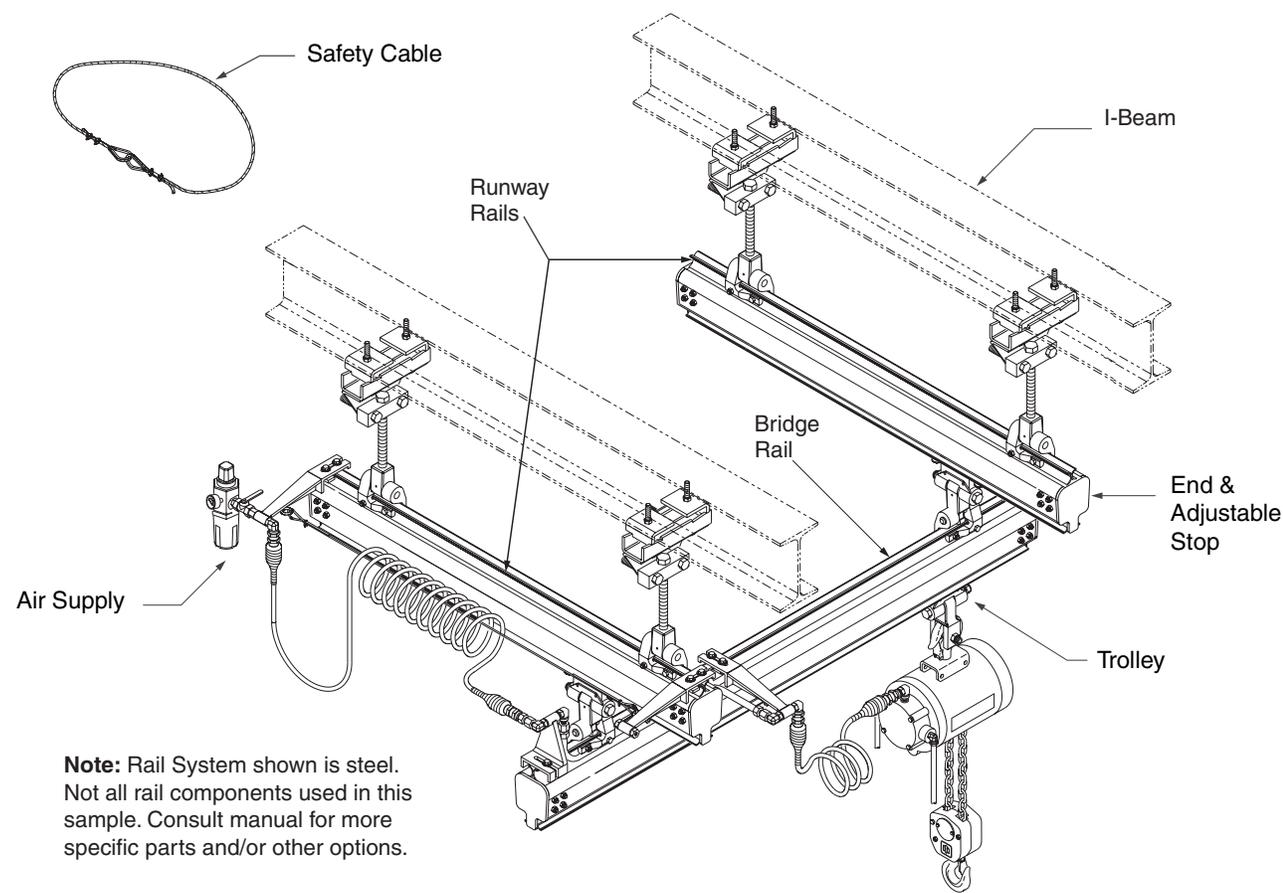
Lift a test load *while standing clear of the system*. This load should be 1/4 the maximum load. Notice any problems that may occur while lifting this load. Repeat step 1 with this load. At each testing step, correct any problems that may occur while testing system, and retest if necessary before continuing to the next step.

Step 3

Repeat steps 1 and 2, lifting the maximum rated load. Correct any problems that may occur while lifting this load, and retest if necessary before putting system into service. If you encounter a problem you do not know how to correct, call your nearest **Ingersoll-Rand** office or distributor.

SERVICE NOTES

RUNWAY AND BRIDGE PARTS DRAWING



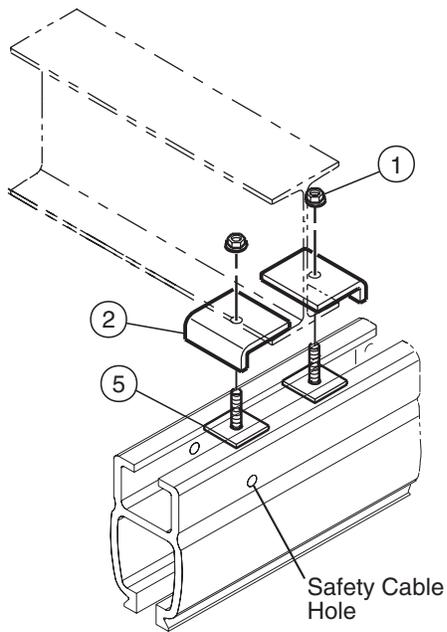
(Dwg. MHP2177)

RUNWAY AND BRIDGE PARTS LIST

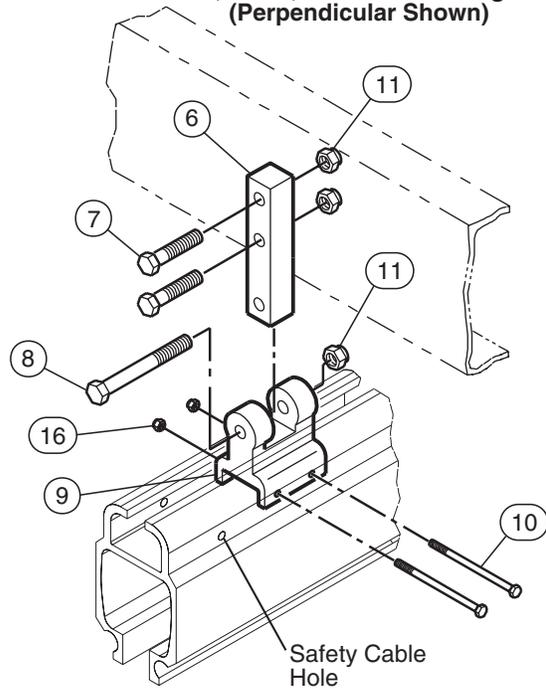
Item No.	Description of Part	Size or Length		Part Number				
		ft	m	ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
500	Runway Rail - Aluminum	5	1.53	-	30200-050-2	-	-	-
		8	2.44		-	30000-080-2		
		10	3.05		30200-100-2	-		
		12	3.66		-	30000-120-2		
		15	4.57		30200-150-2	-		
		16	4.88		-	30000-160-2		
		20	6.10		30200-200-2	-		
		24	7.32		-	30000-240-2		
501	Runway Rail - Steel	5	1.53	-	-	-	30500-050-2	30550-050-2
		10	3.05				30500-100-2	30550-100-2
		15	4.57				30500-150-2	30550-150-2
		21	6.40				30500-210-2	30550-210-2
502	Bridge Beams	6	1.83	ZRAT0406	ZRA10406	ZRA20406	ZRS20406	ZRS30406
		8	2.44	ZRAT0608	ZRA10608	ZRA20608	ZRS20608	ZRS30608
		10	3.05	ZRAT0810	ZRA10810	ZRA20810	ZRS20810	ZRS30810
		12	3.66	ZRAT1012	ZRA11012	ZRA21012	ZRS21012	ZRS31012
		14	4.27	-	ZRA11214	ZRA21214	ZRS21214	ZRS31214
		16	4.88		ZRA11416	ZRA21416	ZRS21416	ZRS31416
		18	5.49		ZRA11618	ZRA21618	ZRS21618	ZRS31618
		20	6.10		ZRA11820	ZRA21820	ZRS21820	ZRS31820
		21	6.40		-	ZRA21921	ZRS21921	ZRS31921
		22	6.71			ZRA22022	-	-
		24	7.32			ZRA22224	-	-
		26	7.92	ZRA22426		-	-	

BLOCK AND RIGID STANDARD HANGER PARTS DRAWING

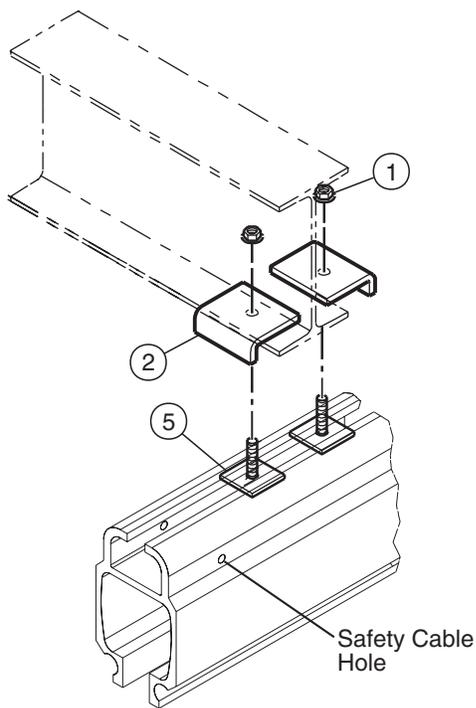
ZRAT/ZRA1 Runway, Rigid Mount Hanger Kit



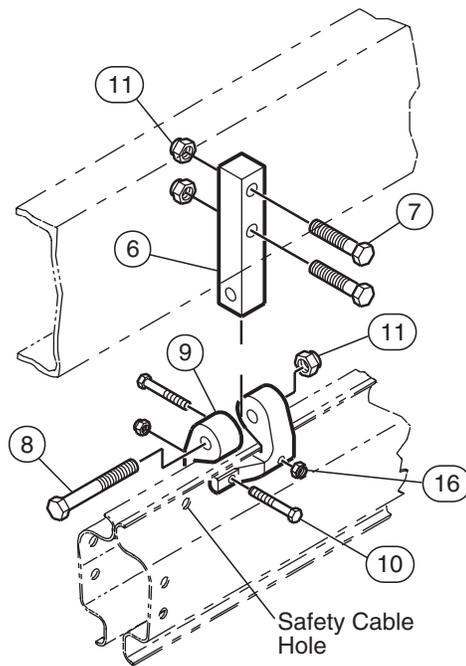
ZRAT, ZRA1, ZRA2 Block Hanger Kit (Perpendicular Shown)



ZRA2 Runway, Rigid Mount Hanger Kit



ZRS2 and ZRS3 Block Hanger Kit (Parallel Shown)



(Dwg. MHP1533)

BLOCK AND RIGID STANDARD HANGER PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
1	Locknut, Flanged	2	75589			---	
2	Beam Toe Clamp	2	30160			---	
5	Suspension Plate Assembly **	2	30218		30109	---	
6	Hanger Block, Runway Parallel to Header Steel	1	30197				
	Hanger Block, Runway Perpendicular to Header Steel	1	30162				
7	Capscrew	2	72646				
8	Capscrew	1	72623				
9	Suspension Rail Bracket	See ()	30266 (1)		30165 (1)	30801-A (2)	
10	Capscrew	2	70968	71481	70967		
11	Locknut	3	75587				
13	Bushing †	1	65075				
16	Locknut	2	75582	75583	75582		

** Welded at factory.

NOTE 1: Item 9 part number 30801-A may also be ordered in stainless steel material, order by number 30801-S.

NOTE 2: Refer to page 43 for Safety Cable Kits.

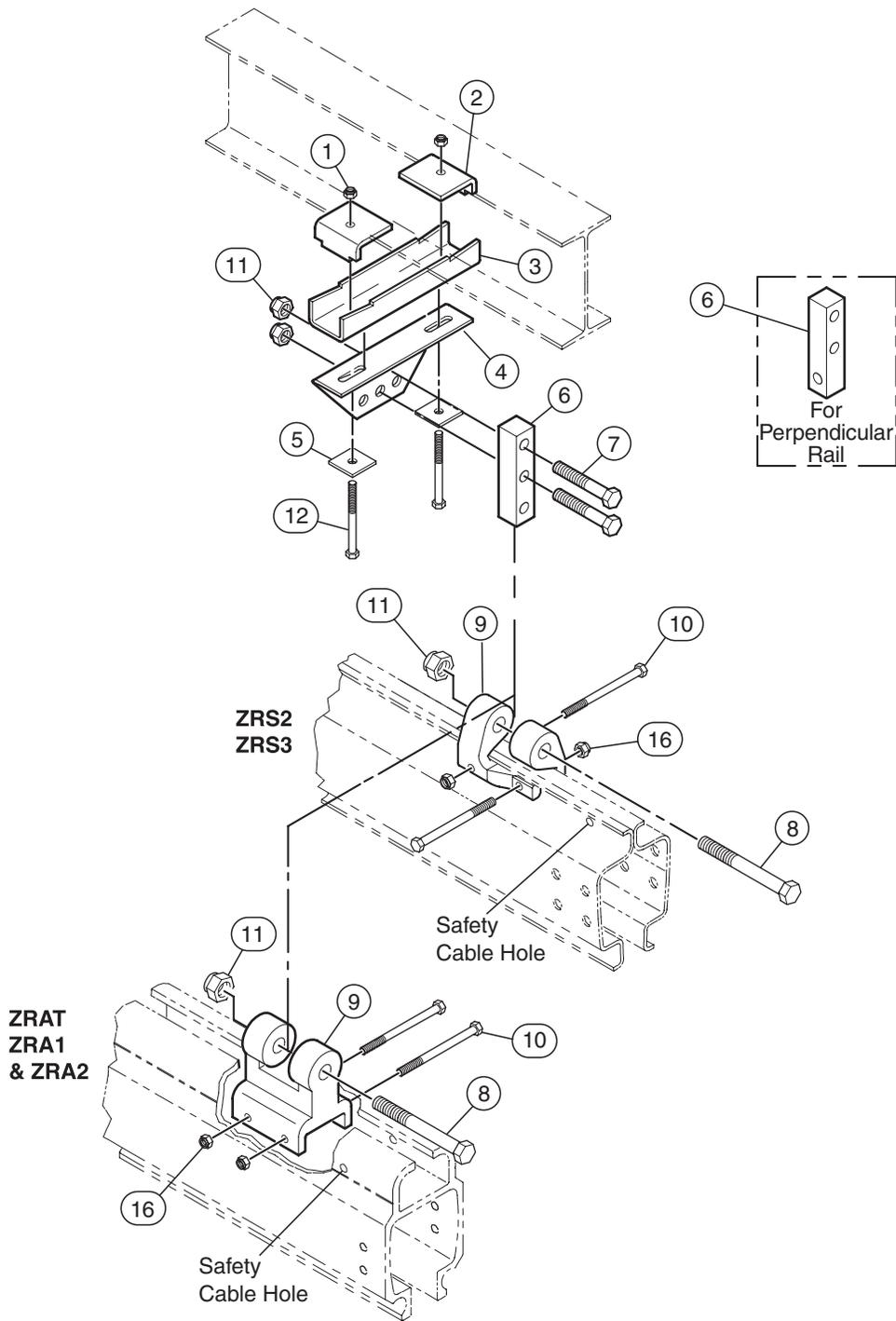
NOTE 3: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

† Item not illustrated.

Item No.	Rail Model	Hanger Type *	Flange Width	Orientation to Header Steel	Kit Number			
					Aluminum and Steel	Stainless		
314	ZRAT	Rigid	Not Applicable	Perpendicular	30227	Not Applicable		
		Block		Parallel	30289			
		ZRA1		Rigid	Perpendicular		30285	
				Block	Parallel		30227	
	ZRA2	Rigid		Perpendicular	30289		30285	
		Block		Parallel	30052		30198	
		ZRS2		Rigid	Perpendicular		30193	30816S
				Block	Parallel		30816	30813S
	ZRS3	Rigid		Perpendicular	30813		30816S	
		Block		Parallel	30813		30813S	

* Rigid hangers cannot be used in parallel fashion.

BEAM HANGER PARTS DRAWING



(Dwg. MHP1724)

BEAM HANGER PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number					
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3	
1	Locknut, Flanged	2	75589					
2	Beam Toe Clamp	2	30062					
3	Beam Clamp - Standard Flange *	1	30091					
	Beam Clamp - Wide Flange *		30154					
4	Beam Clamp Hanger Plate - Standard Flange	1	30188					
	Beam Clamp Hanger Plate - Wide Flange		30189					
5	Washer, Square	2	30094					
6	Hanger Block, Runway Parallel to Header Steel	1	30162					
	Hanger Block, Runway Perpendicular to Header Steel		30197					
7	Capscrew	2	72646					
8	Capscrew	1	72623					
9	Suspension Rail Bracket	See ()	30266 (1)		30165 (1)		30801-A (2)	
10	Capscrew	2	70968		71481		70967	
11	Locknut	3	75587					
12	Capscrew	2	72037					
13	Bushing †	1	65075					
16	Locknut	2	75582		75583		75582	

* Standard Hanger Kits will accommodate 2.5 in. to 5 in. (63.5 mm to 127 mm) flange width. Wide Flange Hanger Kits will accommodate 5 in. to 10 in. (127 mm to 254 mm) flange width.

NOTE: Refer to page 43 for Safety Cable Kits.

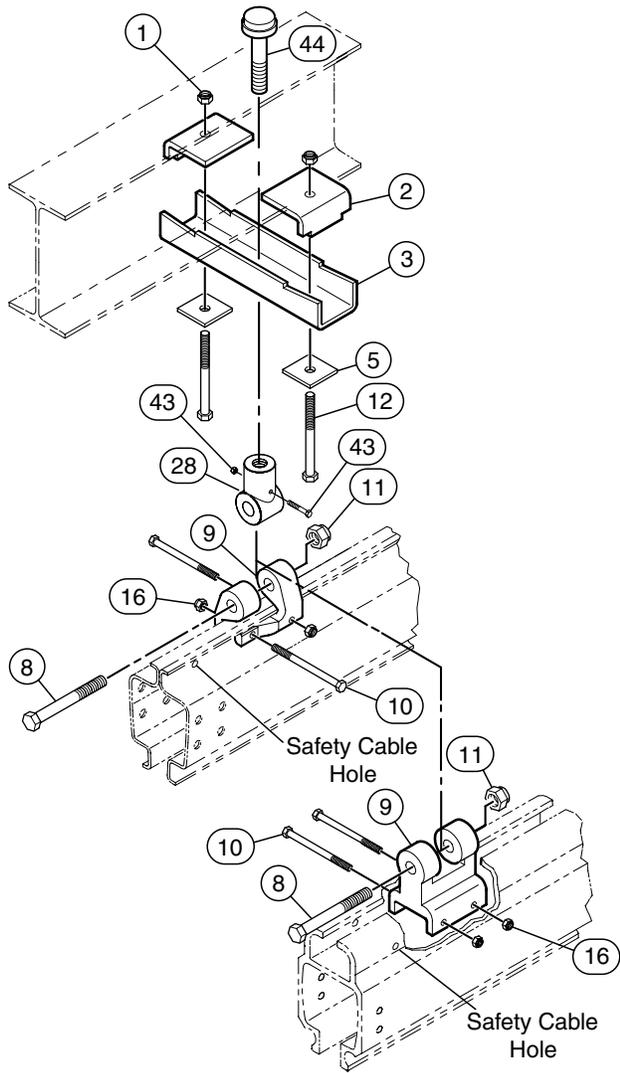
† Item not illustrated.

NOTE: When placing an order for metric on all capscrews and locknuts place the letter “M” after a part number; example: part number 75587 would be 75587M.

Item No.	Rail Model	Hanger Type	Flange Width	Orientation to Header Steel	Kit Number	
					Aluminum and Steel	Stainless
315	ZRAT/ZRA1	Beam	Standard	Parallel	30290	
			Wide		30291	
			Standard	Perpendicular	30292	
			Wide		30293	
	ZRA2		Standard	Parallel	30199	
			Wide		30900	
			Standard	Perpendicular	30901	
			Wide		30902	
	ZRS2/ZRS3	Standard	Parallel	30817		30817S
		Wide		30818		30818S
		Standard	Perpendicular	30819		30819S
		Wide		30820		30820S

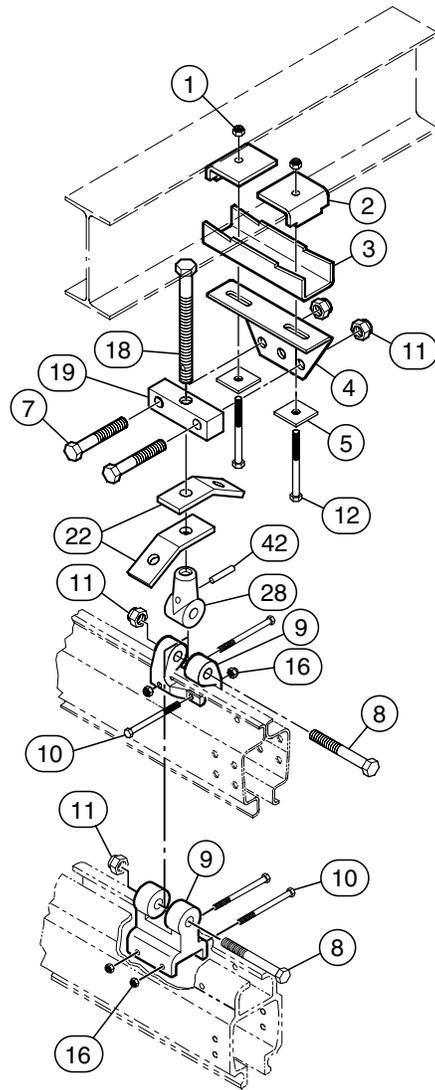
CLOSE AND ADJUSTABLE HANGER PARTS DRAWING

Close Hanger



(Dwg. MHP1726)

Adjustable Hanger



(Dwg. MHP1548)

Rod Length	ZRAT/ZRA1	ZRAT/ZRA1	ZRA2	ZRA2	ZRS2	ZRS3
6 in.	30287-006	30288-006	30195-006	30196-006	30814-006	30815-006
12 in.	30287-012	30288-012	30195-012	30196-012	30814-012	30815-012
18 in.	30287-018	30288-018	30195-018	30196-018	30814-018	30815-018
24 in.	30287-024	30288-024	30195-024	30196-024	30814-024	30815-024
36 in.	30287-036	30288-036	30195-036	30196-036	30814-036	30815-036
48 in.	30287-048	30288-048	30195-048	30196-048	30814-048	30815-048
60 in.	30287-060	30288-060	30195-060	30196-060	30814-060	30815-060
72 in.	30287-072	30288-072	30195-072	30196-072	30814-072	30815-072

NOTE: Dash numbers refer to length in inches.

CLOSE AND ADJUSTABLE HANGER PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
1	Locknut, Flanged	2	75589				
2	Beam Toe Clamp	2	30062				
3	Beam Clamp, Standard Flange*	1	30091				
	Beam Clamp, Wide Flange*		30154				
4	Beam Clamp Hanger Plate, Standard Flange	1	30188				
	Beam Clamp Hanger Plate, Wide Flange		30189				
5	Washer, Square	2	30094				
7	Capscrew	2	72646				
8	Capscrew	1	72623				
9	Suspension Rail Bracket	See ()	20266 (1)		30165 (1)	30801 (2)	
10	Capscrew	2	70968		71481	70967	
11	Locknut	3	75587				
12	Capscrew	2	72037				
16	Locknut	1 or 3	75582		75583	85582	
18	Capscrew	1	72043				
19	Adjustment Block	1	30194				
22	Bracing Connector	2	30097				
28	Adjustable Rail Hanger Assembly	1	30190				
	Male Clevis (Close Rail Hanger Assembly)		30163				
42	Pin	1	77058				
43	Capscrew & Nut Assembly	1	99118				
44	Mounting Screw	1	30174				

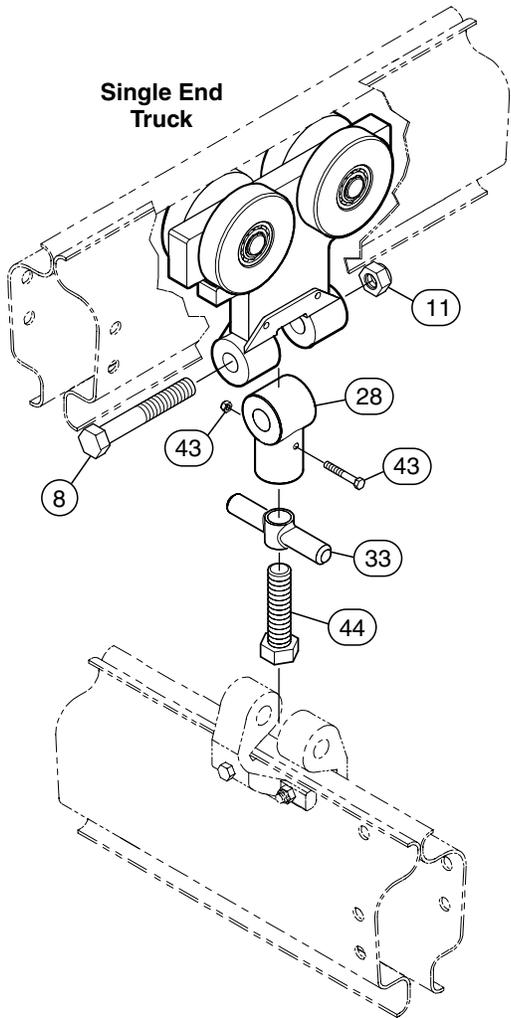
* Standard Flange Hanger Kits will accommodate 2.5 in. to 5 in. (63.5 mm to 127 mm) flange width. Wide Flange Hanger Kits will accommodate 5 in. to 10 in. (127 mm to 254 mm).

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

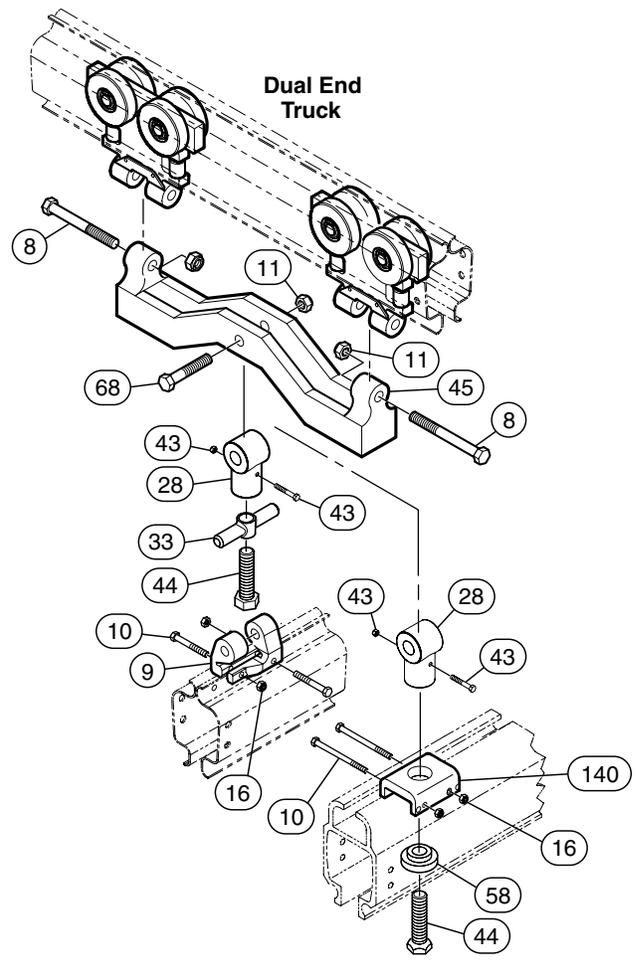
Item No.	Rail Model	Hanger Type	Flange Width	Orientation to Header Steel	Kit Number
316	ZRAT / ZRA1	Close	Standard	Rotates	30300
			Wide		30301
		Adjustable	Standard		30287**
			Wide		30288**
	ZRA2	Close	Standard		30921
			Wide		30922
		Adjustable	Standard		30195**
			Wide		30196**
	ZRS2 / ZRS3	Close	Standard		30840
			Wide		30841
		Adjustable	Standard		30814**
			Wide		30815**

** Reference table below for various lengths.

SINGLE AND DUAL END TRUCK DRAWINGS AND PARTS LIST



(Dwg. MHP1549)



(Dwg. MHP1555)

Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
8	Capscrew	1 or 2	72623				
10	Capscrew	2	70968	---			70926
11	Locknut	1 or 2	75587				
16	Locknut	2	75582				
28	Clevis, Female	1	Order Item 38				
33	Gimbal	1					
38	Bridge Sub-assembly	1	30282	30175	30596		
43	Capscrew and Nut Assembly	1	99118				
44	Mounting Screw	1	30174				
45	Tie Bar	1	30173		30832		
58	Chair Washer	1	91105				
68	Capscrew	1	72644				
140	Bracket	1	30267				

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

SINGLE AND DUAL END TRUCK KIT PARTS LISTS

Single End Truck Kit

Item No.	Bridge Type	Runway Type	Capacity		Kit Number
			lbs	kg	
317	ZRAT	ZRAT	500	227	31059
	ZRAT or ZRA1	ZRA1			31059
	ZRAT				30283
	ZRA1	ZRS2 or ZRS3	500	227	30822
	ZRA2	ZRA1			30295
	ZRA1	ZRA2	1000	454	30909
	ZRA2	ZRA2	1000	454	30176
	ZRS2 or ZRS3	ZRS2 or ZRS3			30824
		30597			

Dual End Truck Kit - Aluminum Trolley

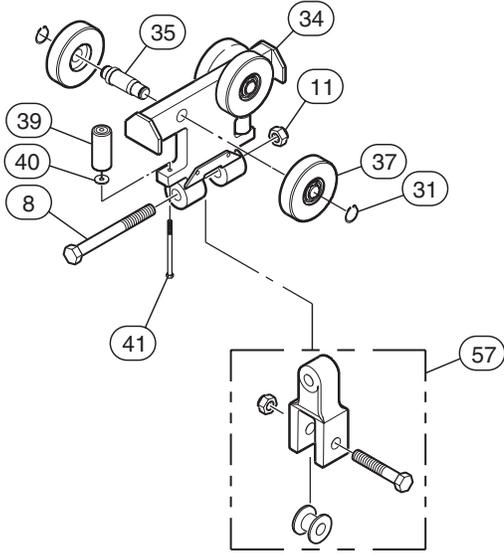
Item No.	Bridge Type	Runway Type	Capacity		Kit Number
			lbs	kg	
318	ZRAT/ZRA1	ZRAT	1000	454	31060
	ZRA1	ZRA1			30286
		ZRS2 or ZRS3			30826
	ZRA2	ZRA2	2000	907	30177
	ZRS2 or ZRS3	ZRS2 or ZRS3			30828
					30599
	ZRA1	ZRA2	2000	907	30911
	ZRA2	ZRA1	1000	454	30272
	ZRA1	Curved ZRA1			30296
	ZRA1	Curved ZRS2/3	2000	907	30833
	ZRA2	Curved ZRA1	1000	454	30297
	ZRA2	Curved ZRS2/3	2000	907	30835
	ZRS2/3	Curved ZRS2/3			30837

Dual Kit - Steel Trolley

Item No.	Bridge Type	Runway Type	Capacity		Kit Number
			lbs	kg	
319	ZRA1	Curved ZRS2/3	2000	907	30834
	ZRA2	Curved ZRS2/3			30836
	ZRS2/3	Curved ZRS2/3			30838

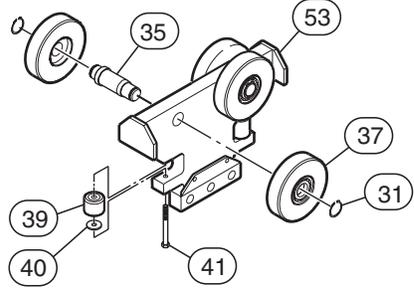
TROLLEY PARTS DRAWINGS

Item 27



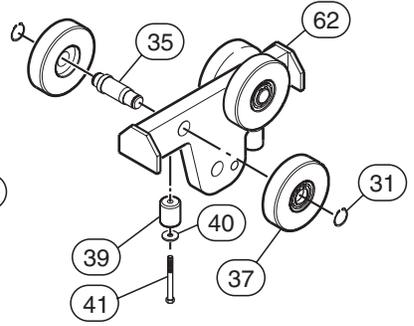
(Dwg. MHP2094)

Item 52



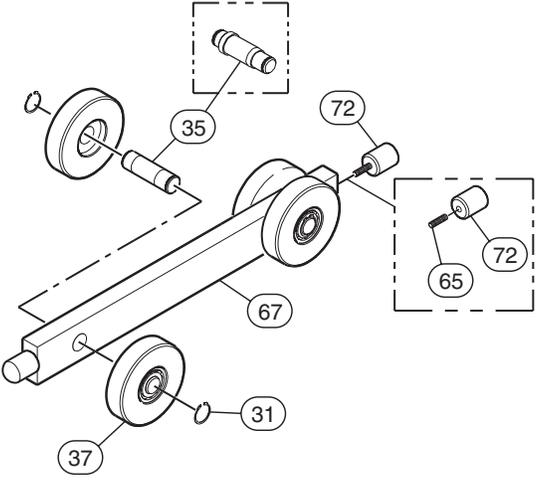
(Dwg. MHP2096)

Item 61



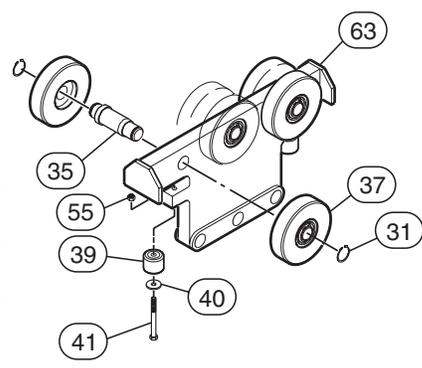
(Dwg. MHP2076)

Item 70



(Dwg. MHP2097)

Item 79



(Dwg. MHP2127)

TROLLEY PARTS LISTS

ZRAT & ZRA1 Aluminum Trolley 500 lb (227 kg) Capacity
(Dwg. MHP2094)

Item No.	Description of Part	Qty. Total	Part Number			
			ZRAT	ZRA1	ZRAT/ ZRA1	
27	Trolley Assembly	1	31057	30281	30304	30313
8	Capscrew	1				72623
11	Locknut	1	---	---		75587
30	Trolley	1			---	30281
31	Retainer Ring	4	99085			
34	Trolley Body*	1	30280			
35	Axle	2	30203			
37	Wheel Assembly**	4	31007	30208		---
39	Guide Roller	2	30223			
40	Washer	2	74504			
41	Capscrew	2	70484	70416		
57	Hook Bracket Assembly	1		---		30903

ZRA1 and ZRAT Aluminum Trolley 500 lb (227 kg) Capacity
(Dwg. MHP2096)

Item No.	Description of Part	Qty. Total	Part Number	
			ZRAT	ZRA1
52	Trolley Assembly	1	31056	30279
31	Retainer Ring	4	99085	
35	Axle	2	30203	
37	Wheel Assembly**	4	31007	30208
39	Guide Roller	2	30223	
40	Washer	2	74504	
41	Capscrew	2	70484	
53	Trolley Body	1	30278	

ZRA1 Universal Trolley Aluminum 500 lb (227 kg) Capacity
(Dwg. MHP2076)

Item No.	Description of Part	Qty. Total	Part Number
			ZRA1
61	Trolley Assembly	1	30204
31	Retainer Ring	4	99085
35	Axle	2	30203
37	Wheel Assembly**	4	30208
39	Guide Roller	2	30223
40	Washer	2	74504
41	Capscrew	2	70476
62	Trolley Body	1	30201

ZRA1, ZRA2, ZRS2 and ZRS3 Bumper Trolley - Single
(Dwg. MHP2097)

Item No	Description of Part	Qty. Total	Part Number			
			ZRA1	ZRA2	ZRS2	ZRS3
70	Trolley Assembly	1	30307-***	30148-***		
31	Retainer Ring		99085	93939		
35	Axle	2	30203	93934		
37	Wheel Assembly**	4	30208	30056		
65	Set Screw	2	---	71492		
67	Trolley Body	1	30311	30149		
72	Bumper	2	99097	93809		
***	Trolley	12	30307-12	30148-12		
		24	30307-24	30148-24		
		36	30307-36	30148-36		
		48	N/A	30148-48		

ZRA2 and ZRS2 Reaction Trolley 1000 lb (454 kg) Capacity
(Dwg. MHP2127)

Item No.	Description of Part	Qty. Total	Part Number	
			ZRA2	ZRS2
79	Trolley Assembly	1	30016	30511
31	Retainer Ring	4	93939	
35	Axle	3	93934	
37	Wheel Assembly**	6	30056	
39	Guide Roller	2	93935	93936
41	Capscrew	2	70484	
55	Locknut	2	75581	
63	Trolley Body	1	30014	

ZRA2, ZRS2 and ZRS3 Load Trolley 1000 lb (454 kg) Capacity
(Dwg. MHP2127)

Item No.	Description of Part	Qty. Total	Part Number		
			ZRA2	ZRS2	ZRS3
79	Trolley Assembly	1	30015	30510	
31	Retainer Ring	4	93939		
35	Axle	2	93934		
37	Wheel Assembly**	4	30056		
39	Guide Roller	2	93935	93936	
40	Washer	4	74504		
41	Capscrew	2	70484		
55	Locknut	2	75581		
63	Trolley Body	1	30014		

* Trolley Assembly 30313 uses the Trolley Assembly 30281 and adds a Hook Bracket Assembly.

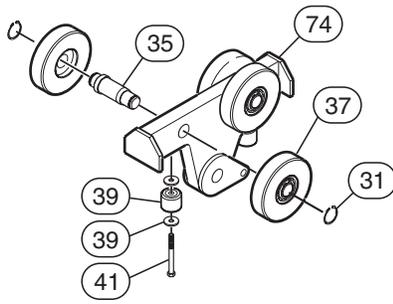
** Wheel Assembly comes with pressed in bearing, not sold separately.

*** Specifies lengths of trolley assembly.

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

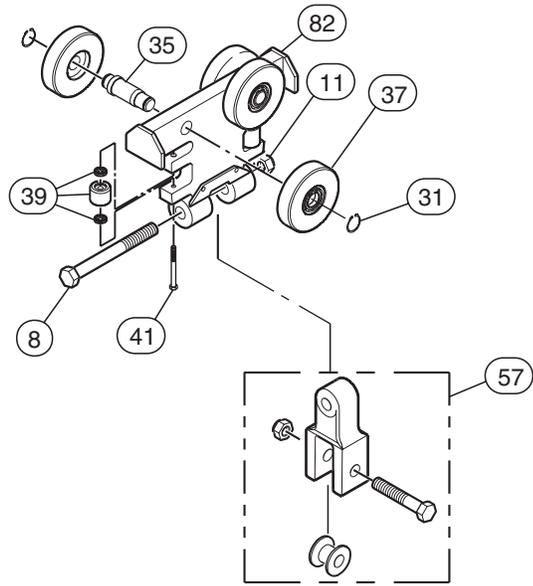
TROLLEY PARTS DRAWINGS - CONTINUED

Item 80



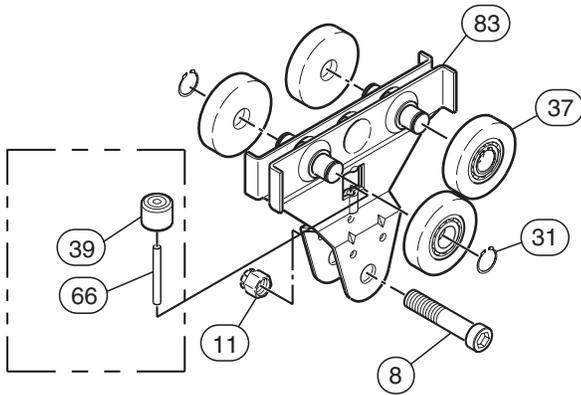
(Dwg. MHP2128)

Item 81



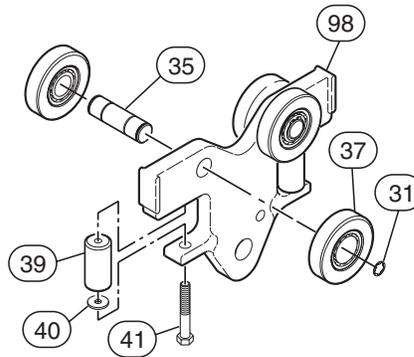
(Dwg. MHP2130)

Item 94



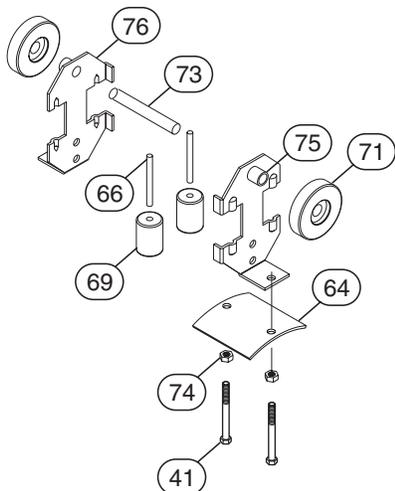
(Dwg. MHP2102)

Item 95



(Dwg. MHP2129)

Item 99



(Dwg. MHP1550)

TROLLEY PARTS LISTS - CONTINUED

ZRA2 Trolley 1000 lb (454 kg) Capacity
(Dwg. MHP2128)

Item No.	Description of Part	Qty. Total	Part Number		
			ZRA2	ZRS2	ZRS3
80	Trolley Assembly	1	30011	30512	
31	Retainer Ring	4	93939		
35	Axle	2	93934		
37	Wheel Assembly**	4	30056		
39	Guide Roller	2	93935	93936	
41	Capscrew	2	70484		
56	Trolley Body	1	30010		

ZRA2, ZRS2 and ZRS3 Trolley 1000 lb (454 kg) Capacity
(Dwg. MHP2130)

Item No.	Description of Part	Qty. Total	Part Number		
			ZRA2	ZRS2	ZRS3
81	Trolley Assembly	1	30172	30923	
8	Capscrew	1	---	72623	
11	Locknut	1		75587	
31	Retainer Ring	4	93939		
35	Axle	2	93934		
37	Wheel Assembly**	4	30056		
39	Guide Roller	2	93935		
41	Capscrew	2	70484		
82	Trolley Body	1	30171		

ZRA2, ZRS2 and ZRS3 Trolley 1000 lb (454 kg) Capacity
(Dwg. MHP2130)

Item No.	Description of Part	Qty. Total	Part Number			
			ZRA2, ZRS2 and ZRS3			
81	Trolley Assembly	1	30821	30842	30314	30315
8	Capscrew	1	---	72623		---
11	Locknut	1		75587		
30	Trolley	1		30172	30842	
31	Retainer Ring	4	93939			
35	Axle	2	93934			
37	Wheel Assembly**	4	30056			
39	Guide Roller	2	93936			
41	Capscrew	2	70416			
57	Hook Bracket Assembly	1	---		30903	
82	Trolley Body	1	30171		---	

ZRA1 500 lb (227 kg) Capacity and ZRA2 1000 lb (454 kg) Capacity
Universal Trolley (Dwg. MHP2102)

Item No.	Description of Part	Qty. Total	Part Number		
			ZRA1	ZRA2	
94	Trolley Assembly	1	30259	30126	30131
8	Capscrew	1	72013	---	72608
11	Locknut	1	75583		75585
31	Retainer Ring	4	99085	93939	
37	Wheel Assembly**	4	30208	30056	
39	Guide Roller	1	30262	93935	
66	Pin	1	77057	77062	
83	Trolley Body	1	30602	30125	

ZRS2, ZRS3 and ZRSS 1000 lb (454 kg) Capacity
Universal Trolley
(Dwg. MHP2102)

Item No.	Description of Part	Qty. Total	Part Number		
			ZRS2 and ZRS3	ZRSS	
94	Trolley Assembly	1	30561	30565	30565S
8	Capscrew	1	---	72608	
11	Locknut	1		75585	
31	Retainer Ring	4	93939		
37	Wheel Assembly**	4	30056		
39	Guide Roller	1	30262	93935	
66	Pin	1	77062		
83	Trolley Body	1	30125		

ZRAT Universal Trolley 250 lb (113 kg) Capacity
(Dwg. MHP2129)

Item No.	Description of Part	Qty. Total	Part Number
			ZRA1A
95	Trolley Assembly	1	31005
31	Retainer Ring	4	99085
35	Axle	2	30203
37	Wheel Assembly**	4	31007
39	Guide Roller	2	30223
40	Washer	2	74504
41	Capscrew	2	70484
98	Trolley Body	1	31006

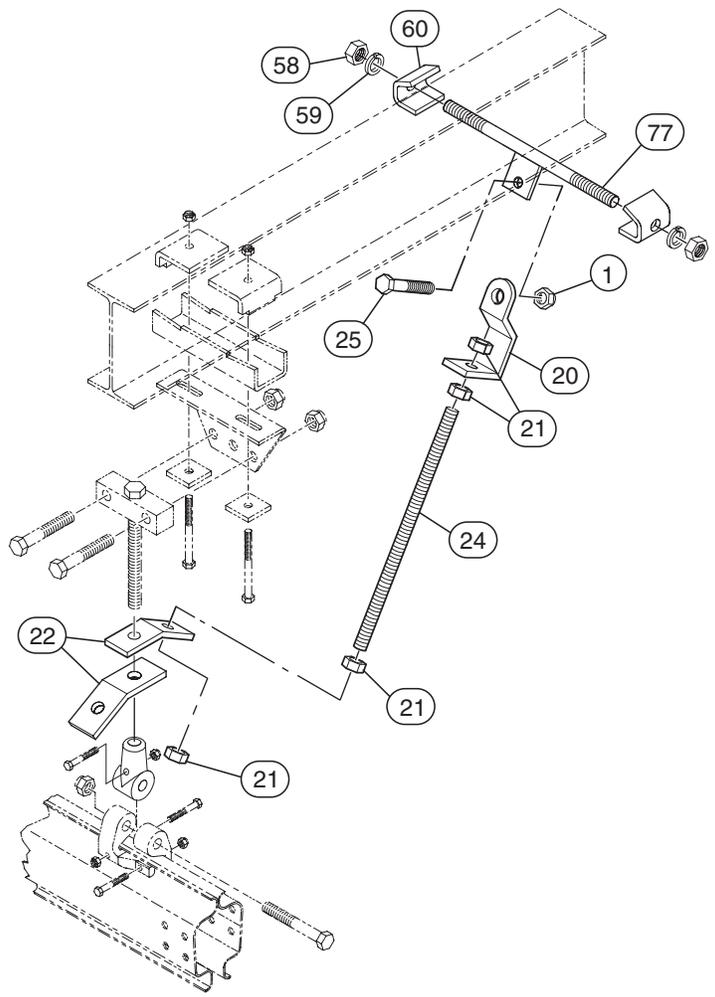
ZRA1, ZRA2, ZRS2 and ZRS3 Festoon Trolley - Single
(Dwg. MHP1550)

Item No	Description of Part	Qty. Total	Part Number			
			ZRA1	ZRA2	ZRS2	ZRS3
99	Trolley Assembly	1	30579	30581		
41	Capscrew	2	70498			
64	Clamp Plate	1	30578			
66	Pin	2	77057			
69	Guide Roller	2	30582			
71	Wheel Assembly**	2	9960T11			
73	Pin	1	77010	77011		
74	Locknut	2	75503			
75	Spacer	2	---	30585		
76	Body	2	Order item 99			

** Wheel Assembly comes with pressed in bearing, not sold separately.

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

ADJUSTABLE CROSS BRACE KIT PARTS DRAWING



(Dwg. MHP1650)

ADJUSTABLE CROSS BRACE KIT PARTS LIST

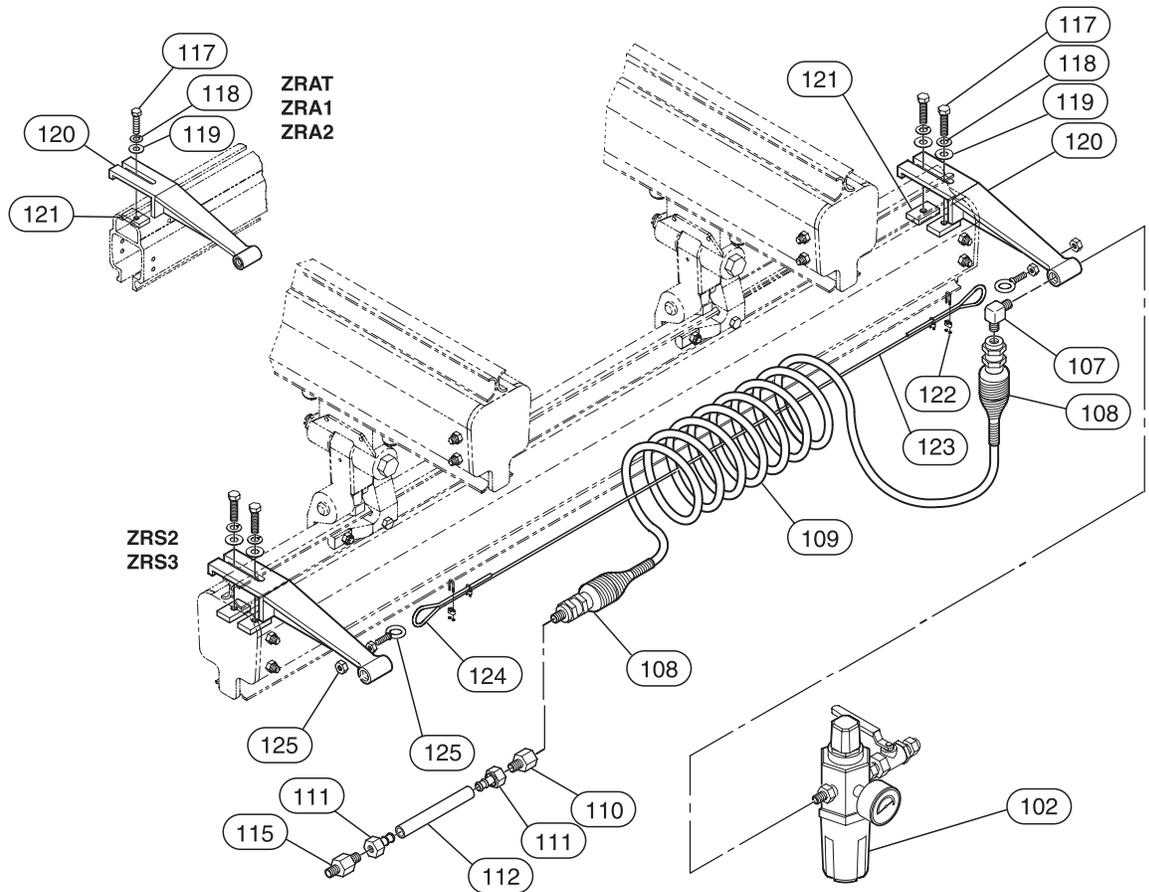
Item No.	Description of Part	Qty. Total	Part Number
1	Locknut	1	75512
20	Hanger Bracket	1	30099
21	Jam Nut	4	75558
22	Bracing Connector	2	30097
24	Threaded Rod 1/2-13 x 32.12 in.	1	30522-3200
	Threaded Rod 1/2-13 x 40.25 in.		30522-4000
	Threaded Rod 1/2-13 x 48.31 in.		30522-4800
	Threaded Rod 1/2-13 x 64.43 in.		30522-6400
	Threaded Rod 1/2-13 x 80.56 in.		30522-8000
	Threaded Rod 1/2-13 x 96.68 in.		30522-9600
25	Capscrew	1	72021
26	Clamp Mount	1	30158
29	Beam Clamp	2	30159
36	Lockwasher	2	74521
58	Nut	2	Order Item 77
59	Lockwasher		
60	Clamp		
77	Beam Clamp Assembly	1	30098
407	Locknut	1	75585

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

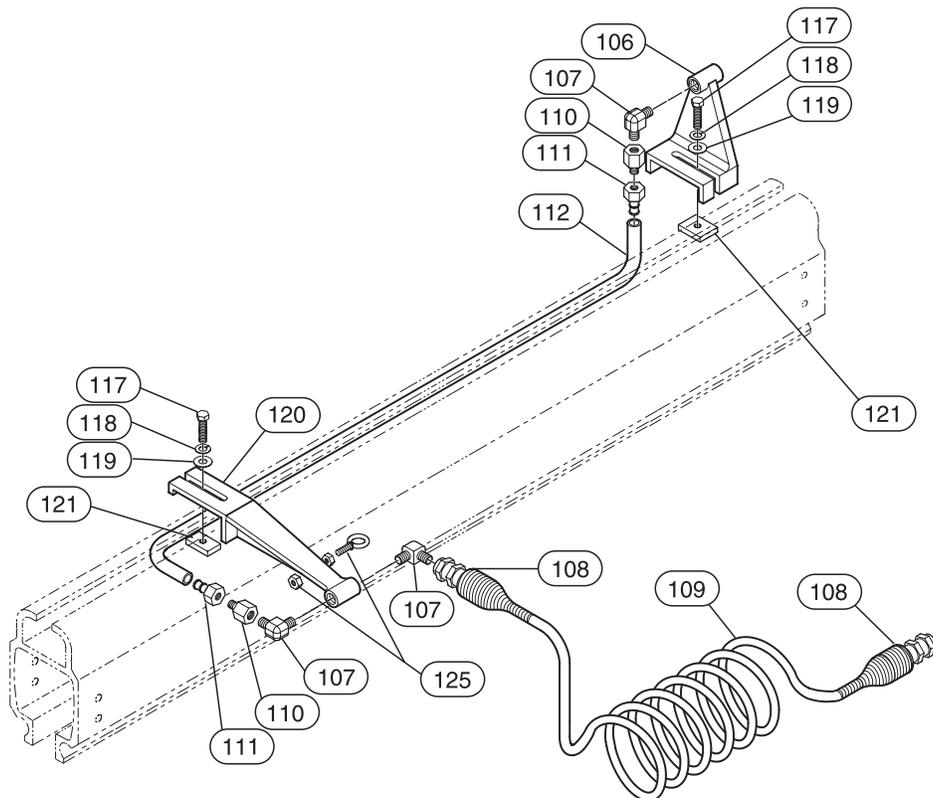
Item No.	Description of Part	Size or Length		Part Number				
		in.	mm	ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
506	Cross Brace Rod Kit	24	610	30081-24				
		30	762	30081-30				
		36	914	30081-36				
		48	1219	30081-48				
		60	1524	30081-60				
		72	1829	30081-72				

* Contact Factory if a different length is needed.

AIR SUPPLY PARTS DRAWINGS



(Dwg. MHP1535)



(Dwg. MHP1536)

AIR SUPPLY PARTS LIST

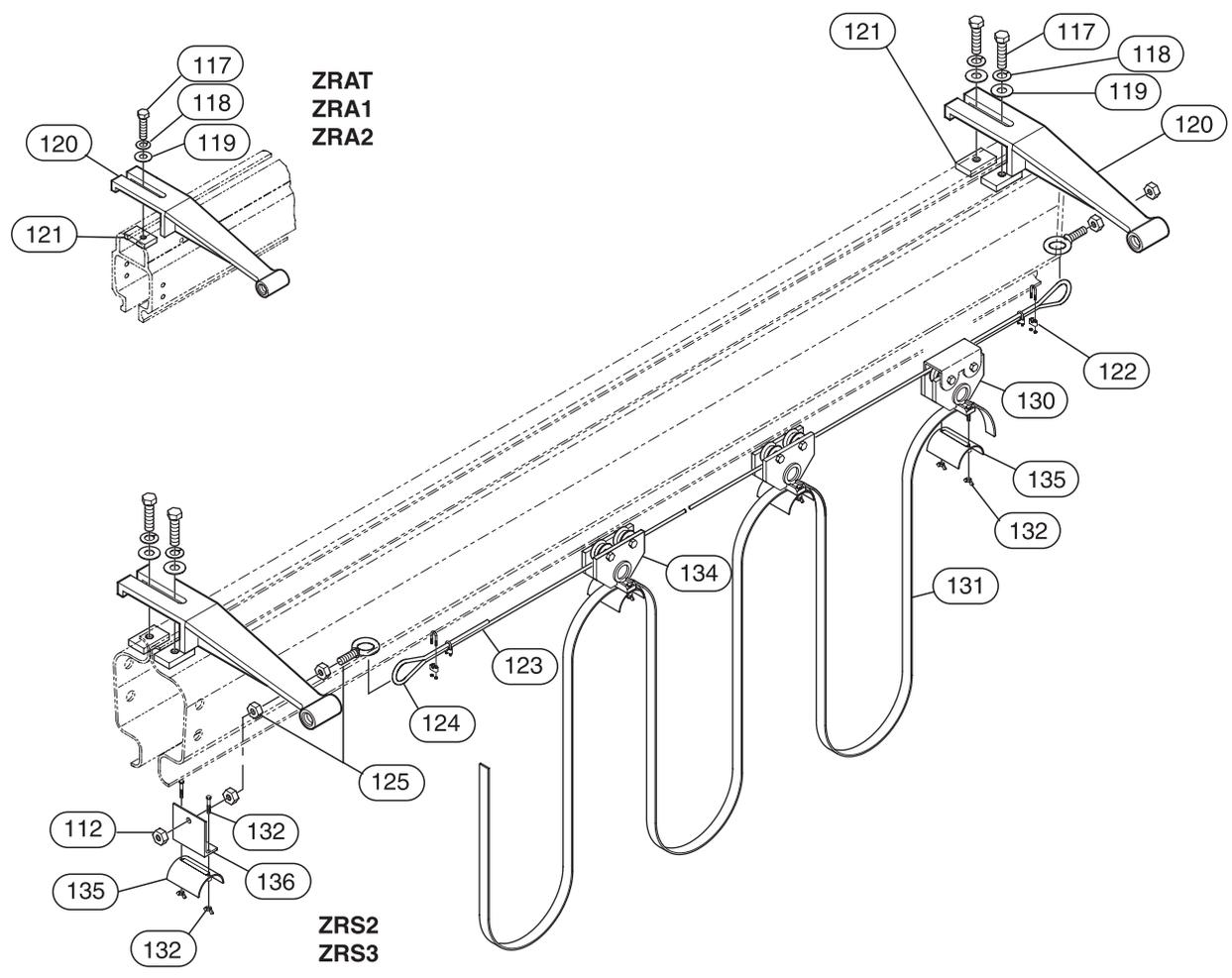
Item No.	Description of Part	Qty. Total	Part Number	
			3/8 in.	1/2 in.
101	Air Supply Kit*	1	90000	90001
102	Filter/Regulator/Gauge Kit	1	01941	01972
106	Bracket	1	30116-375	30116-500
107	Fitting, 90° Elbow	1	10354	01961
108	Fitting, Swivel	2	01957	01956
109	Precoil Hose	Specify Length	01910	01912
110	Fitting, Adapter	1 or 2	10765	10568
111	Fitting, Hose End	2	10560	10561
112	Adapter Hose	Specify Length	10555-B	10556-B
115	Fitting, Adapter	1	10566	10567
117	Capscrew	2 or 4	71480	
118	Lockwasher	2 or 4	74507	
119	Washer	2	74540	
120	Bracket	2	30114-375	30114-500
121	Plate	2 or 4	30038	
122	Clamp Assembly	4	10230	
123	Cable	Specify Length	10105	
124	Thimble	2	10210	
125	Eyebolt & Nut Assembly	2	01918	

* Each kit includes brackets, tagline assembly and coiled hose assembly.

NOTE: When placing an order for metric on all capscrews and locknuts place the letter “M” after a part number; example: part number 75587 would be 75587M.

Item No.	Description of Part	Size or Length		Part Number	
		ft	m	3/8 in.	1/2 in.
503	Air Supply Package - Rail System	50	15.2	90000-1	90001-1
		75	22.8	90000-2	90001-2
		100	30.5	90000-3	90001-3
504	Air Supply Package - Bridges	5 to 8	1.5 to 2.4	90020-1	90021-1
		9 to 11	2.7 to 3.4	90020-2	90021-2
		12 to 14	3.7 to 4.3	90020-3	90021-3
		15 to 18	4.6 to 5.5	90020-4	90021-4
		19 to 24	5.8 to 7.3	90020-5	90021-5
505	Adapter Hose Assy Air Supply Package	N/A	N/A	30075-036	30076-036
				30075-054	30076-054
				30075-072	30076-072
507	Z-Rail and I-Beam Systems	50	15.2	90040-1	90041-1
		75	22.8	90040-2	90041-2
		100	30.5	90040-3	90041-3

ELECTRIFICATION DRAWING



(Dwg. MHP1538)

ELECTRIFICATION PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
400	Electrification Festooning Kits	1	Refer to Chart Below				
112	Adapter Hose	Specify Length	10555-B (3/8 in.) or 10556-B (1/2 in.)				
117	Capscrew	2 or 4	71480				
118	Lockwasher	2 or 4	74507				
119	Flat Washer	2 or 4	74540				
120	Bracket	2	30114-375				
121	Plate	2 or 4	30038				
122	Clamp Assembly	4	10230				
123	Cable	1	10105				
124	Thimble	2	10210				
125	Eyebolt and Nut Assembly	1	01918				
130	Towing Trolley	1	99040				
131	Electrical Cable	Specify Length	Refer to chart				
132	Wing Nut Assembly	As Req'd	Order Item 96				
132	Capscrew	2	Order Item 96				
134	Cable Trolley (20 ft (6.1 m) Boom)	4	99041				
135	Flat Cable Clip	As Req'd	99042				
136	Anchor Bracket	1	99043				

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

Electrification Festooning Kit

Boom Length		Part Number
ft	m	
12	3.66	90090-1
25	7.62	90090-2
50	15.24	90090-3
75	22.86	90090-4
100	30.48	90090-5
125	38.10	90090-6
150	45.72	90090-7

Each kit includes: Festoon lamp, sliders, flat cable, and junction box.

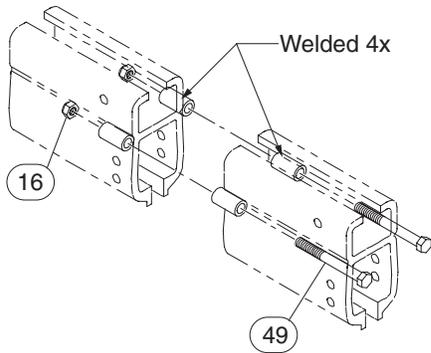
Optional Flat Electrification Cable*

Item No.	Part No.	No. of Conductors	Conductor Size-AWG	AMP rating NEC 310 16
131	99050	8/C	16	15
	99051	12/C	16	15
	99052	4/C	14	17
	99053	8/C	14	17
	99054	12/C	14	17
	99055	4/C	12	30
	99056	7/C	12	30
	99057	4/C	10	40

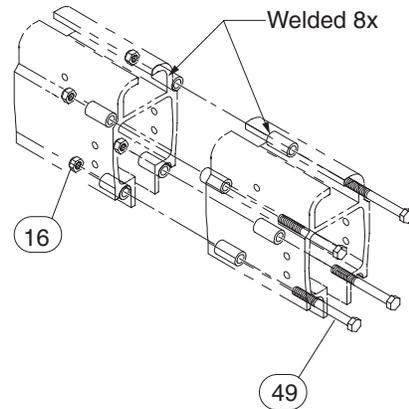
*PVC Jacket flat cable is available in the configuration shown. To determine the correct cable length, add 10 ft (3 m), plus 10% of system

SPLICE LUGS PARTS DRAWING AND PARTS LIST

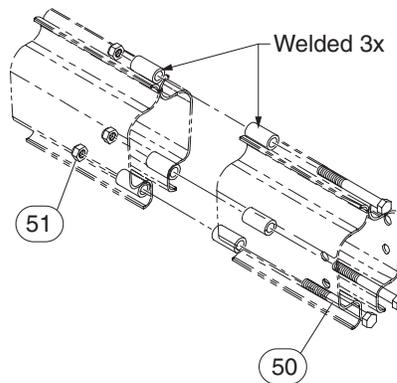
ZRA1 Rail



ZRA2 Rail



**ZRS2 and
ZRS3 Rail**



(Dwg. MHP1562)

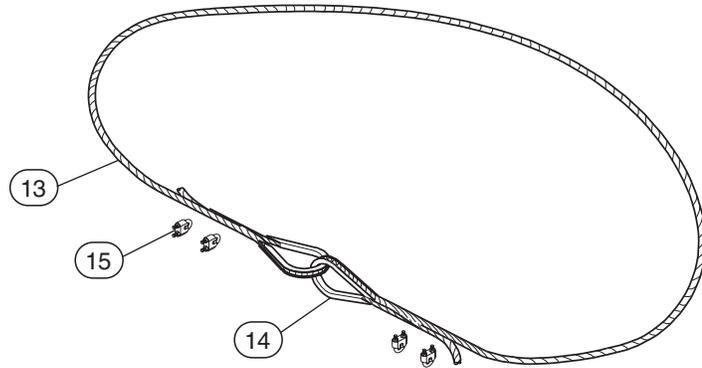
Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2/3	ZRSS
16	Capscrew	2 or 4	75582				
49	Locknut	2 or 4	70972	70926		-	
50	Capscrew	3	-			71910	71914
51	Locknut	3	-			75532	75600
140	Suspension Bracket	1	30267	-			

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

Splice Kits

Item No.	Rail Model	Qty. Total	Part Number
339	ZRAT	1	31020
	ZRA1		30231
	ZRA2		30057
	ZRS2 and ZRS3		30515
	ZRSS		30317

SAFETY CABLE PARTS DRAWING AND PARTS LIST



Note: Wire rope clamp to be not more than two inches from end.

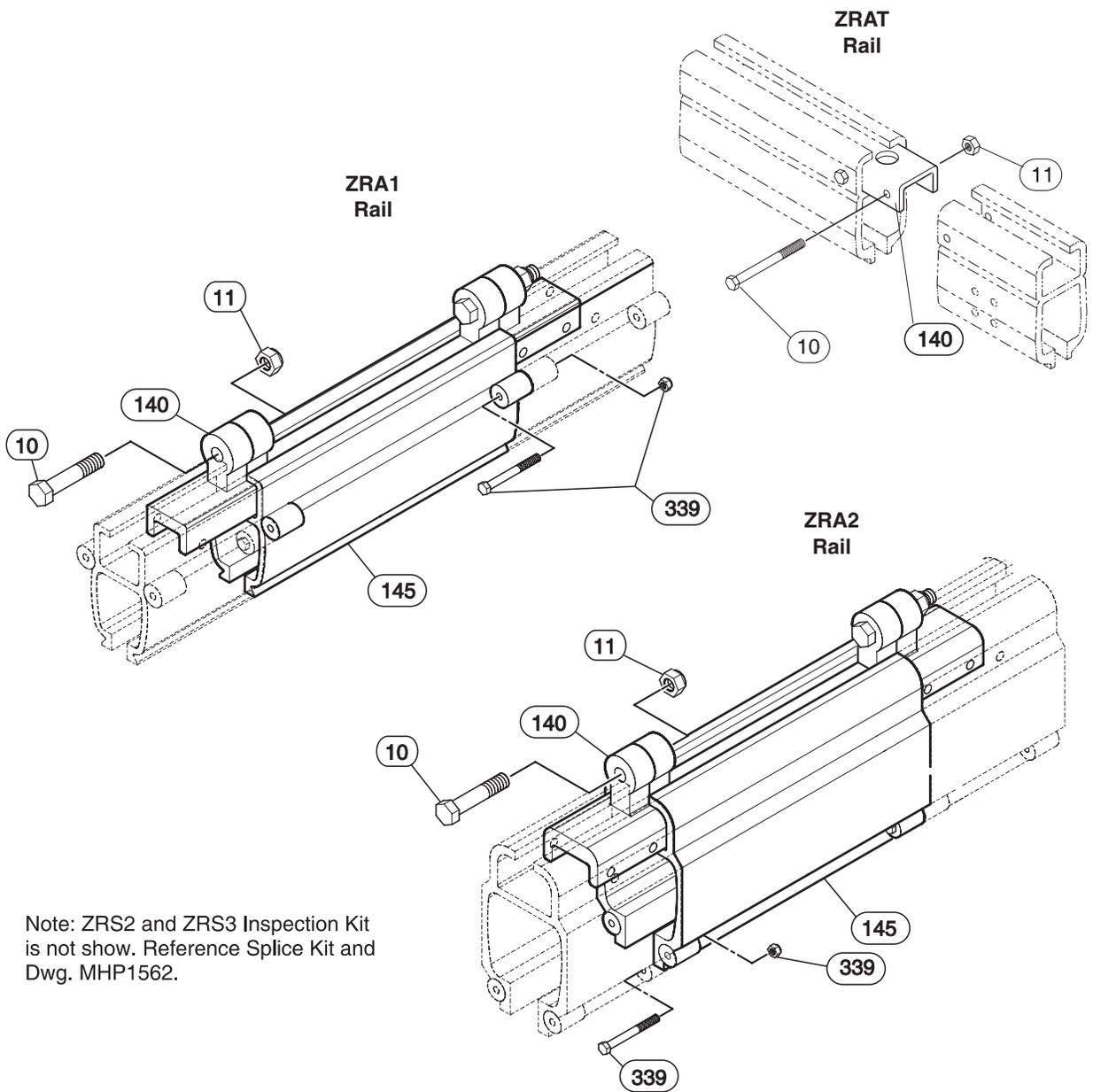
(Dwg. MHP1999)

Item No.	Description of Part	Qty. Total	Part Number
342	Safety Cable Kit (incl's items 13 through 15)	1	30907-XX
13	Wire Rope (bulk)	As Req'd.	10099
14	Thimble	2	10212
15	Wire Rope Clamp	4	10235

XX = Wire rope length (feet).

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

INSPECTION GATE ASSEMBLY DRAWING AND PARTS LIST



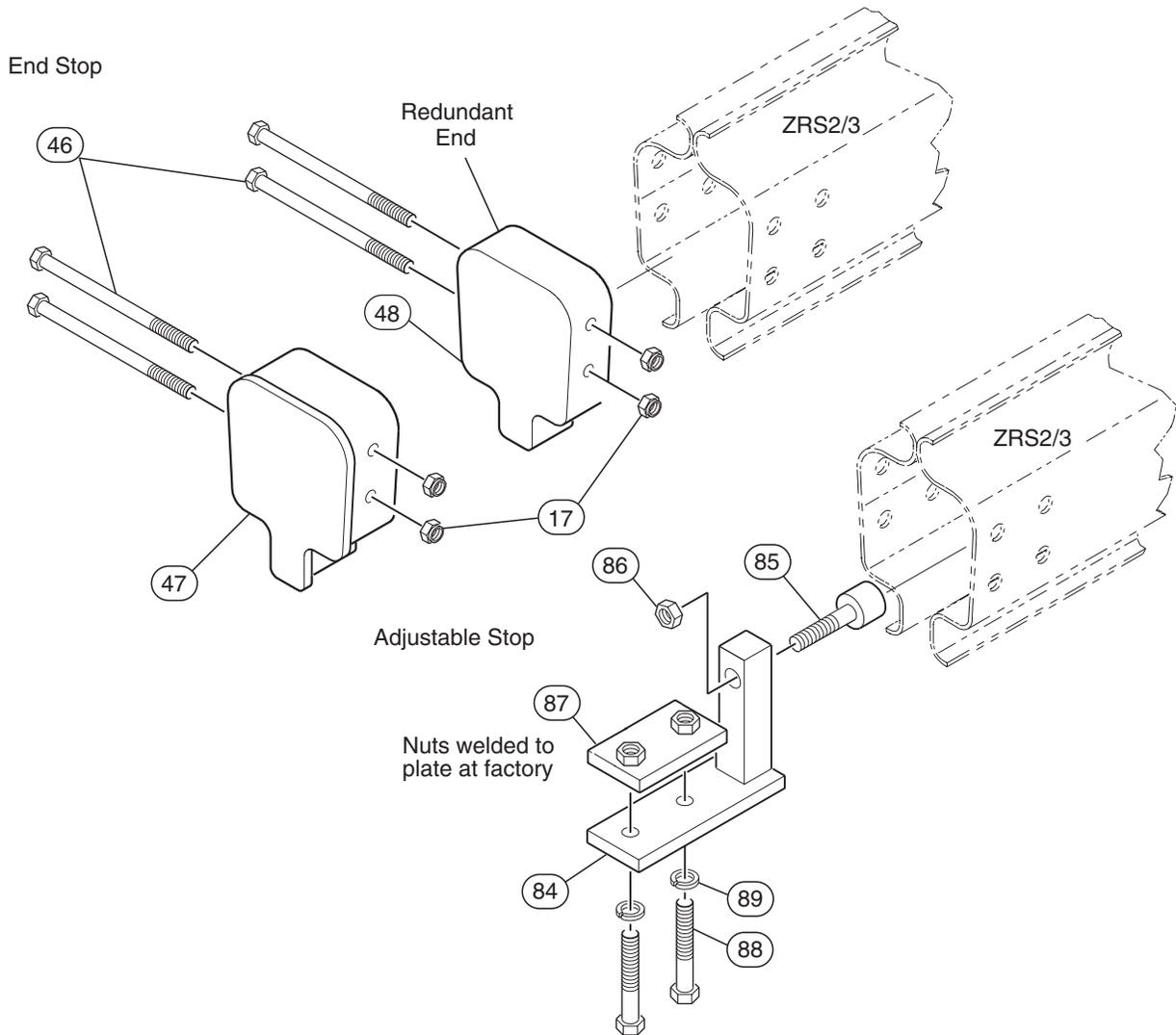
Note: ZRS2 and ZRS3 Inspection Kit is not shown. Reference Splice Kit and Dwg. MHP1562.

(Dwg. MHP2284)

Item No.	Description of Part	Qty. Total	Part Number				
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3
340	Inspection Gate Assembly	1	31034	30998	30995	30889	30892
10	Capscrew	4	70972	72652		---	
11	Locknut	4	75582	75587		---	
50	Capscrew	4	---	70964	71481	71910	
51	Locknut	4	---	75582	75583	75532	
140	Bridge Suspension Bracket	2 (4)	30267	30996	30994	---	
145	Gate End	1	31035	30997	30993	30891	30894
339	Splice Bolt Kit Assembly	2	---	30231	30057	---	

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75582 would be 75582M.

END AND ADJUSTABLE STOP PARTS DRAWING AND LIST

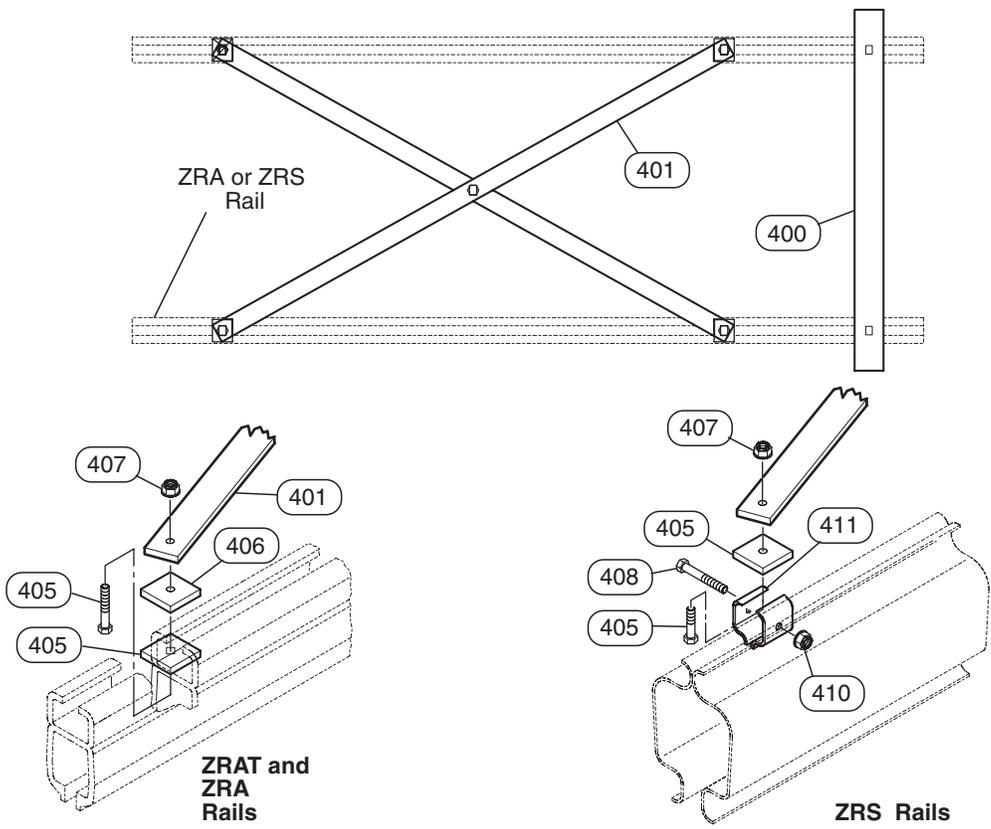


(Dwg. MHP1554)

Item No.	Description of Part	Qty. Total	Part Number					
			ZRAT	ZRA1	ZRA2	ZRS2	ZRS3	ZRSS
17	Locknut	2	75582	75583				75593
46	Capscrew	2	70972	71479	71472	71481		71502
47	End Stop	1	31019	30274	30182	30803	30807	30803
48	Redundant End Stop	1	31023	30276	30184	30805	30809	30805
84	Bar Weldment	1	30734		30735			---
85	Hex Shoulder Bumper	1	30744					
86	Locknut	1	75582					
87	Nut	1	30736		30737			
88	Capscrew	2	72002		72022			
89	Lockwasher	2	74513					
510	End Stop Kit	1	31022	30275	30183	30804	30808	
512	Redundant End Stop Kit	1	31024	30277	30185	30806	30810	30806S
514	Adjustable Stop Kit	1	30738		30733			---

NOTE: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

DUAL BRIDGE TIE BAR DRAWING



(Dwg. MHP2225)

DUAL BRIDGE TIE BAR PARTS LIST

Item No.	Description of Part	Span Between Bridges	Qty. Total	Part Number									
				ZRAT	ZRA1	ZRA2	ZRA2T	ZRS2	ZRS3	ZRS2T	ZRS3T		
400	Dual Bridge Tie Bar Assembly	18.00	2 or 3	30221-1800	30101-1800	30791-1800	30535-1800	30638-1800					
		24.00		30221-2400	30101-2400	30791-2400	30535-2400	30638-2400					
		28.50		30221-2850	30101-2850	30791-2850	30535-2850	30638-2850					
		36.00		30221-3600	30101-3600	30791-3600	30535-3600	30638-3600					
401	Dual Bridge Cross Brace Kit for Bridge Lengths up to 16 feet	See Note 3	---	30718	30719	N/A	30720	N/A					
		18.00		30718-1800	30719-1800	30787-1800	30720-1800	30637-1800					
		24.00		30718-2400	30719-2400	30787-2400	30720-2400	30637-2400					
		28.50		30718-2850	30719-2850	30787-2850	30720-2850	30637-2850					
		36.00		30718-3600	30719-3600	30787-3600	30720-3600	30637-3600					
	Dual Bridge Cross Brace Kit for Bridge Lengths greater than 16 feet	See Note 3	---	30771	30770	N/A	30772	N/A					
		18.00		30771-1800	30770-1800	30788-1800	30772-1800	30795-1800					
		24.00		30771-2400	30770-2400	30788-2400	30772-2400	30795-2400					
		28.50		30771-2850	30770-2850	30788-2850	30772-2850	30795-2850					
		36.00		30771-3600	30770-3600	30788-3600	30772-3600	30795-3600					
		30717											
		402		Cross Brace Bar	---	2 or 4							
403	Tie Bar/Spacer Bar (Weldment for ZRS2/3 Applications)	18.00	2 or 3	42499-1800		30789-1800	30779-1800	30796-1800					
		24.00		42499-2400		30789-2400	30779-2400	30796-2400					
		28.50		42499-2850		30789-2850	30779-2850	30796-2850					
		36.00		42499-3600		30789-3600	30779-3600	30796-3600					
405	Suspension Plate Assembly	---	1	30218	30109	30218		---					
406	Toe Clamp Plate		4	30094									
407	Locknut		See ()	75585 (5)									
408	Capscrew		See ()	72010 (5)		72010 (1)							
409	Capscrew		4	---	71479								
410	Locknut		4	---	75583								
411	Side Plate		8	---	30502								

* Item 400 is included in item 401 Kit.

** Item 401 includes item 400 and 405 through 410.

NOTE 1: Dual Bridge Cross Brace Kits should be used on any bridge spans over 10 ft (3.05 m).

NOTE 2: When placing an order for metric on all capscrews and locknuts place the letter "M" after a part number; example: part number 75587 would be 75587M.

NOTE 3: If bridge span is not indicated, then kit will not include tie bar assembly. Bridge tie bars are required on dual bridges that have articulating endtrucks.

INSTALLATION CHECKLIST

Ingersoll-Rand Installation Checklist for the I-Beam suspended Overhead Rail System

BEFORE LIFTING ANY LOAD VERIFY INSTALLATION!

AT EACH STEP IN THE TESTING PROCESS CHECK THE ITEMS BELOW.

This form may be copied and used as a permanent record.

- Is support structure for the I-Beams capable of supporting five times the combined weight of the I-Beams, the Overhead Rail System and anticipated loads?
- Are I-Beams capable of suspending five times the combined weight of the system and anticipated loads?
- Are I-Beam clamps securely anchored to the beams?
- Are I-Beam clamp wedges aligned correctly and securely fastened down?
- Are the bolts in the hanger assemblies tight and securely fastened down?
- Are all safety cables installed and fastened correctly?
- Are threaded rods straight?
- Do end trucks sit straight in the rail channels?
- Do the festooning trolleys and the airhose or electrical arrangement, along the runway and bridge, move freely without binding or interference?
- Are the runways and bridge straight and level to specifications?
- Do truck and trolley wheels roll freely?
- Does hoist or positioner move freely throughout the complete range of movement without binding or interference?
- Are fasteners on rail splices correctly torqued, and are they aligned and straight?
- Is hoist or positioner secure, and is the connector holding correctly?
- Is any part, sub-assembly or main assembly of the hoist or positioner damaged, broken, bent, or twisted?
- Does any part show signs of undue stress or loading?
- Are end stops installed?
- Are all fasteners secure and correctly torqued?

Notes: _____

If you have any questions regarding the items on the checklist or are experiencing problems or difficulty in any testing process, please copy and fax this checklist to Ingersoll-Rand at 248-293-5800 for consultation.

**When all items on the Installation Checklist have been verified
proceed with "TESTING THE INSTALLATION."**

TESTING THE INSTALLATION

WARNING

- Never lift a test load while standing under or in close proximity to the lifting device, bridge rail or connected assemblies.

CAUTION

- During the testing procedure clear all personnel from the area.
 - If any problems occur during the testing process, immediately lower the load. Remove the tension from the lifting devices, then correct the problems.
 - Limit access to the system to the personnel who have read this manual and are authorized in the installation, operation, maintenance and/or repair of the system.
1. Before testing processes are initiated clear all unauthorized personnel from the installation site.
 2. All personnel in the testing area should wear appropriate safety equipment while testing procedures are in progress.
 3. Use the inspection checklist provided to prevent overlooking a potential hazard.

Step 1

Check to see that bridge, hoist and/or positioner move freely throughout the entire intended work space without binding or interference.

Step 2

Lift a test load *while standing clear of the system*. This load should be 1/4 the maximum load. Notice any problems that may occur while lifting this load. Repeat Step 1. At each testing step, correct any problems that may occur while testing the system, and retest if necessary before continuing to the next step. If you encounter a problem you do not know how to correct, call your nearest **Ingersoll-Rand** office or distributor.

Step 3

Repeat Steps 1 and 2, lifting the maximum rated load. Correct any problems that may occur while lifting this load, and retest if necessary before putting the system into service. If you encounter a problem you do not know how to correct, call your nearest **Ingersoll-Rand** office or distributor.

After successfully lifting and maintaining the maximum load rate and completing the testing procedure, the system is ready to operate.

GENERAL INSPECTION

The **Ingersoll-Rand** Overhead Rail System requires a visual inspection before each shift, and a thorough inspection at least every six months. The Inspection Record form on page 50 can be copied and maintained in your files for future reference. If problems are found ensure corrective procedures are completed prior to continuing rail system operation.

1. Keep proper records of the date, time and personnel responsible for each inspection.
2. Visually examine the system for wear or abrasion due to movement or motion.
3. Check to see if any parts show signs of excessive wear or damage.
4. Check rail system adjustment. Verify alignment and level to specifications.
5. Inspect all load bearing devices including clamps, swivels, brackets, bolts and nutplates for wear or fatigue due to system use.
6. Check all end stops or rail attachments for damage in the areas around capscrews.
7. Inspect all runway and bridge assemblies for ridges caused by wear. If ridges are apparent, the rail section must be replaced.
8. Inspect all truck and trolley assemblies for worn guide wheels and bearings.
9. Inspect all threaded items and replace those with damaged threads.
10. Check to see if any minor parts show signs of wear, overloading or undue stress.
11. Inspect all disassembled parts to determine their fitness for continued use.
12. Check hoist or positioner and the bracket that secures it to the trolley. Follow manufacturers' manuals and inspection procedures for these devices.
13. Do not reuse locknuts.

If you have any questions or experience problems or difficulty in the inspection process, please copy and fax your completed Inspection Record (page 50) to Ingersoll-Rand at 248-293-5800 for consultation.

LUBRICATION

The **Ingersoll-Rand** Rail System has been designed to require minimal lubrication. The runways and bridges require no lubrication; although some attachments do require lubrication.

Whenever a Rail System is disassembled for overhaul or replacement of parts, lubricate as follows:

1. Lubricate the hook and hook latch pivot points on lifting device. Hook and latch should swivel/pivot freely.
2. Lubricate eye bolts, end truck pivots and guide roller pins.

3. Use **Ingersoll-Rand LUBRI-LINK-GREEN®** or a SAE 50 to 90 EP oil.

Trolley and Trucks

Trolley wheels have anti-friction bearings which are lubricated for life and only require replacement under extreme conditions. If these wheels must be replaced, they can be ordered separately.

TROUBLESHOOTING

This section provides the basic troubleshooting information. Specific causes to problems are best identified by through inspections performed by personnel instructed in safety, operation and maintenance of this equipment. The chart below provides a brief guide to common rail symptoms, probable causes and remedies.

Symptom	Cause	Remedy
Change in rolling effort or erratic operation.	Dirt or obstruction in rail.	Clean all parts and inspect for wear.
	Damaged or bent rail.	Inspect all parts and replace those damaged. Determine cause of damage prior to operation.
	Misaligned bridge or runway.	Check for loose or broken fasteners. Tighten if loose or replace if broken. Check alignment.
	Worn or damaged trolley wheels and/or guide rollers.	Inspect wheels and rollers. Replace damaged parts.
	Spliced sections misaligned.	Ensure inside running surfaces at the splice are flush and aligned.
Unusual noises.	Broken guide roller and/or wheel.	Inspect and replace damaged parts.
	Dirt or obstruction in rail.	Clean all parts and inspect for wear.
Load creeping.	Runway or bridge not level.	Level components to specifications.
	Runway or bridge overloaded.	Reduce load to within rated capacity.
Hoist, positioner or handling device malfunctioning.	Leaking or damaged air hose, fittings or electrical cable.	Check and repair leaks. Tighten fittings if loose. Replace electrical cable. Refer to hoist, positioner or handling device service manual for additional repair instructions.

MAINTENANCE

The minimum maintenance required for a rail system requires inspection of suspension hardware and all bolted connections.

CAUTION

- Any operating problems such as a change in rolling effort or unusual noises must be identified and corrected immediately.

Retighten all bolt connections (suspension hardware, trolleys attaching hardware, etc.) two weeks after installation and again after two months of operation.

The maintenance schedule below is provided to minimize problems and identify component wear. This chart should be used based on system use and/or local requirements for safe operation. This schedule does not contain daily inspections that may be required by local regulations.

If there are problems with the rail system (worn or damaged components) and replacement is required, refer to appropriate parts list to order replacements. Some components can only be ordered as complete assemblies. If parts are worn or damaged, the complete assembly must be replaced, not just the worn parts.

Trolley wheels have anti-friction bearings which are lubricated for life and only require replacement parts under extreme conditions. If these wheels must be replaced, they can be ordered separately - there is no need to replace the entire assembly.

WARNING

- Never perform maintenance on the system while it supports a load.

CAUTION

- During maintenance, tag system: **“CAUTION - DO NOT OPERATE - EQUIPMENT UNDER REPAIR”**.
- Do not attempt to repair system parts. Replace part or consult an authorized Ingersoll-Rand service center.
- Do not re-use locknuts, install new locknuts.
- Only allow personnel trained in operation and maintenance of the system to perform service.

NOTICE

- Visually inspect system before each shift for wear or damage.
- Advise supervisor or maintenance personnel, according to company policy or procedure, of any needed maintenance. Replace all damaged system components. Record all inspection, cleaning, maintenance and repair.
- After performing maintenance, test system to its rated capacity before returning to service.

Component	Inspect For	Maintenance Procedure	Interval	
			6 months	12 months
Complete rail system	General condition (roll resistance, rough operation).	Clean and realign system components.	X	
Rail system suspension	Loose mountings, wear or damage.	Tighten or replace mountings.		X
	Loose bolted connections.	Tighten bolts.		X
Runway rails and bridge rails	Loose bolted clamp connections.	Tighten clamp bolts.		X
	Loose bolted rail clamping connections.	Tighten connections.		X
	Suspension wear.	Replace worn components.		X
	Loose connections.	Tighten connections.		X
Rail system splices and end stops	Loose bolted connections.	Tighten splice and end stop bolts.		X
	Improper joint alignment.	Realign joints.		X

CLEANING

It is important to schedule a periodic cleaning of the Overhead Rail System and its parts.

Frequency of cleaning cycles will depend on the use of the system, the personnel operating the system, and the environment the system is installed in. Protecting the system and its surfaces from abuse, wear, decay, or other harm, will improve its appearance and service life.

In very harsh environments moisture and contaminants can quickly destroy the integrity of the system. Although the system is made mostly of precision 6005 class T-5 strength corrosion resistant aluminum and high impact flair resistant nylon, moisture, humidity, and chemicals in time take their toll. The maintenance and preservation of the bridges, rails and suspension devices are just as necessary as the maintenance of any equipment whether it be electrical or mechanical.

Use the following procedures to clean the components of the Overhead Rail System.

1. Clean all hanger assemblies with LUBRI-LINK-GREEN® or spray-on WD40® and dry with compressed air.
2. Clean all trucks and trolleys using suitable cleaner. Dry using low-pressure, filtered, compressed air.
3. Remove accumulated dirt, sediment, and corrosion on the metal plates, bushings, rollers and pins.
4. Clean or replace air filter if used with the system.

WARNING

- **Solvents and certain cleaning solutions may be hazardous to your health. Beware of mixing cleaners or solvents and the vapors they produce. Use adequate ventilation. Wear protective clothing, goggles, gloves and other appropriate safety wear.**

GENERAL SYSTEM DISASSEMBLY

Never disassemble components or assemblies further than necessary to accomplish the needed repair. If excess force is used, a good part can be damaged during the course of disassembly. Do not use heat to free parts unless they are already worn or damaged beyond repair, and no additional damage will occur to other parts. As a general rule the channel that makes up the rail and bridge sections should be removed by disassembling the separate pieces at the spliced joints. In instances where the rail or bridge sections must be removed in complete assemblies, use a safety cable or chain to restrict the distance a section may fall when removed. Review all safety procedures listed in the preceding chapters to familiarize yourself with safety issues and precautions.

For your safety follow these steps and use due care and caution in the disassembly of the system.

CAUTION

- **Clean up all excess cleaning fluids or spills immediately after they occur.**

NOTICE

- **During routine cleaning always check for worn, damaged or broken parts needing replacement.**

Storage

Stainless Steel Rail System

Storage for the stainless steel rail system should be in clean and dry environment. This should not be stored with any other type of metals.

CAUTION

- **If stainless steel parts or rail are stored with other types of metal the properties of the stainless steel are subject to change and could compromise the integrity of the rail.**

Aluminum and Steel Rail System

Store in clean and dry environment to avoid corrosion.

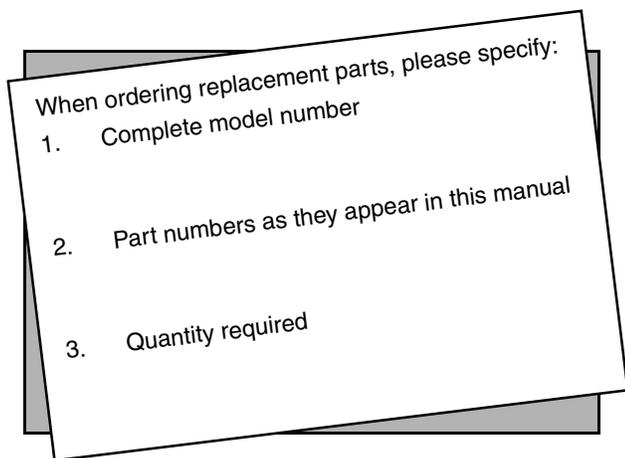
CAUTION

- **Never disassemble the system alone. Always have someone help you.**

1. Shut off and bleed down air supply.
2. Disconnect the air supply from the bridge air stanchion and runway air regulator.
3. Remove one end stop from the bridge section.
4. Remove the festooning, hoist, positioner or lifting device from the bridge section.
5. Remove an end stop from one end of each runway.
6. Remove the bridge section and festooning trolleys.
7. Remove safety cables from the runways.
8. Loosen mounting tabs on I-Beam clamp.
9. Remove rail section.
10. Repeat for opposite side.

PARTS ORDERING INFORMATION

Upon receipt of shipment, carefully compare contents to the bill of lading or express receipt. For future reference when ordering replacement parts, record model information and file with system documentation.



Disposal

When the life of the unit has expired, it is recommended that it be disassembled, degreased and parts separated as to materials so that they may be recycled.

The use of other than **Ingersoll-Rand** replacement parts may result in decreased performance, and may invalidate the warranty.

To order parts, contact your nearest **Ingersoll-Rand** Distributor, or fax or write:

Ingersoll-Rand

1872 Enterprise Drive
Rochester Hills, MI 48309
Phone: (248) 293-5700
Fax: (248) 293-5800
or

Ingersoll-Rand

Douai Operations
111, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08 00

LIMITED WARRANTY

Ingersoll-Rand Company (**I-R**) warrants to the original user its Rail System (Product) to be free of defects in material and workmanship for a period of one year from the date of purchase. **I-R** will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which **I-R** has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine **I-R** parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.

This shipment has been thoroughly checked, packed and inspected before leaving our plant, and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment en route is not due to any action or conduct of the manufacturer.

Visible Loss or Damage

If any goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

Concealed Loss or Damage

When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place during transit, notify the carrier's agent immediately.

Damage Claims

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the **Ingersoll-Rand** invoice, nor should payment of **Ingersoll-Rand** invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.

You may return products damaged in shipment to us for repair, which services will be for your account and will form your basis for claim against the carrier.

United States Office Locations

Technical Support

Ingersoll-Rand
1872 Enterprise Drive
Rochester Hills, MI 48309
Phone: (248) 293-5700
Fax: (248) 293-5800

For Order Entry, Order Status

**Ingersoll-Rand
Distribution Center**
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 672-0321
Fax: (615) 672-0801

Web Site:
www.irco.com

Regional Sales Offices

Chicago, IL
131 W. Diversey Avenue
Elmhurst, IL 60126-1102
Phone: (630) 530-3800
Fax: (630) 530-3891

Detroit, MI
1872 Enterprise Drive
Rochester Hills, MI 48309
Phone: (248) 293-5700
Fax: (248) 293-5800

Houston, TX
450 Gears Road
Suite 210
Houston, TX 77067-4516
Phone: (281) 872-6800
Fax: (281) 872-6807

Los Angeles, CA
13107 Lakeland Road
Santa Fe Springs, CA 90670
Phone: (562) 777-0808
Fax: (562) 777-0818

Philadelphia, PA
P.O. Box 425
900 E. 8th Avenue, Suite 103
King of Prussia, PA 19406
Phone: (610) 337-5930
Fax: (610) 337-5912

International Office Locations

Offices and distributors in principal cities throughout the world. Contact the nearest **Ingersoll-Rand** office for the name and address of the distributor in your country or write/fax to:

Canada
**National Sales Office
Regional Warehouse**
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 213-4500
Fax: (416) 213-4510
Order Desk
Fax: (416) 213-4506

Regional Sales Offices
Edmonton, Alberta
Phone: (780) 438-5039
Fax: (780) 430-4300

Montreal, Quebec
3501 St. Charles Blvd.
Suite 104
Kirkland, Quebec
H9H 4S3
Phone: (514) 695-9040
Fax: (514) 695-0963

British Columbia
1200 Cliveden Avenue
Delta, British Columbia
V3M 6G4
Phone: (604) 523-0803
Fax: (604) 523-0801

Latin America Operations
**Ingersoll-Rand
Production Equipment Group**
730 NW 107th Avenue
Suite 300, Miami, FL
33172-3107
Phone: (305) 559-0500
Fax: (305) 222-0864

**Europe, Middle East and
Africa**
**Ingersoll-Rand
Douai Operations**
111, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

Asia Pacific Operations
Ingersoll-Rand
42 Benoi Road
Jurong, Singapore
629903
Phone: 65-861-1555
Fax: 65-861-0317

Russia
Ingersoll-Rand
Kuznetsky Most 21/5
Entrance 3
Moscow 103895 Russia
Phone: 7-501-923-9134
Fax: 7-501-924-4625

Australia
Ingersoll-Rand Aust
1 Hartnett Drive
Seaford, Vic 3198
Australia
Phone: 61 3 95541642
Fax: 61 3 95541607