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The value of smart

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Abbreviations Key

BndL = # of items per pallet	D/ACR = Pipe diameter for HVACR pipes	Fb,z = Breaking load vertically
BndS = # of items per bundle (bands of products)	D/CTS = Diameter of copper tube	For Rail = What size/type of rail the product fits
BT = Bolt size	D/IPS = Diameter of iron pipe	IPS = Iron pipe size
CTS = Copper tube size	EMT = Electrical Metallic Tubing	SS = Stainless steel
	Fa,z = Maximum allowed load	



About us

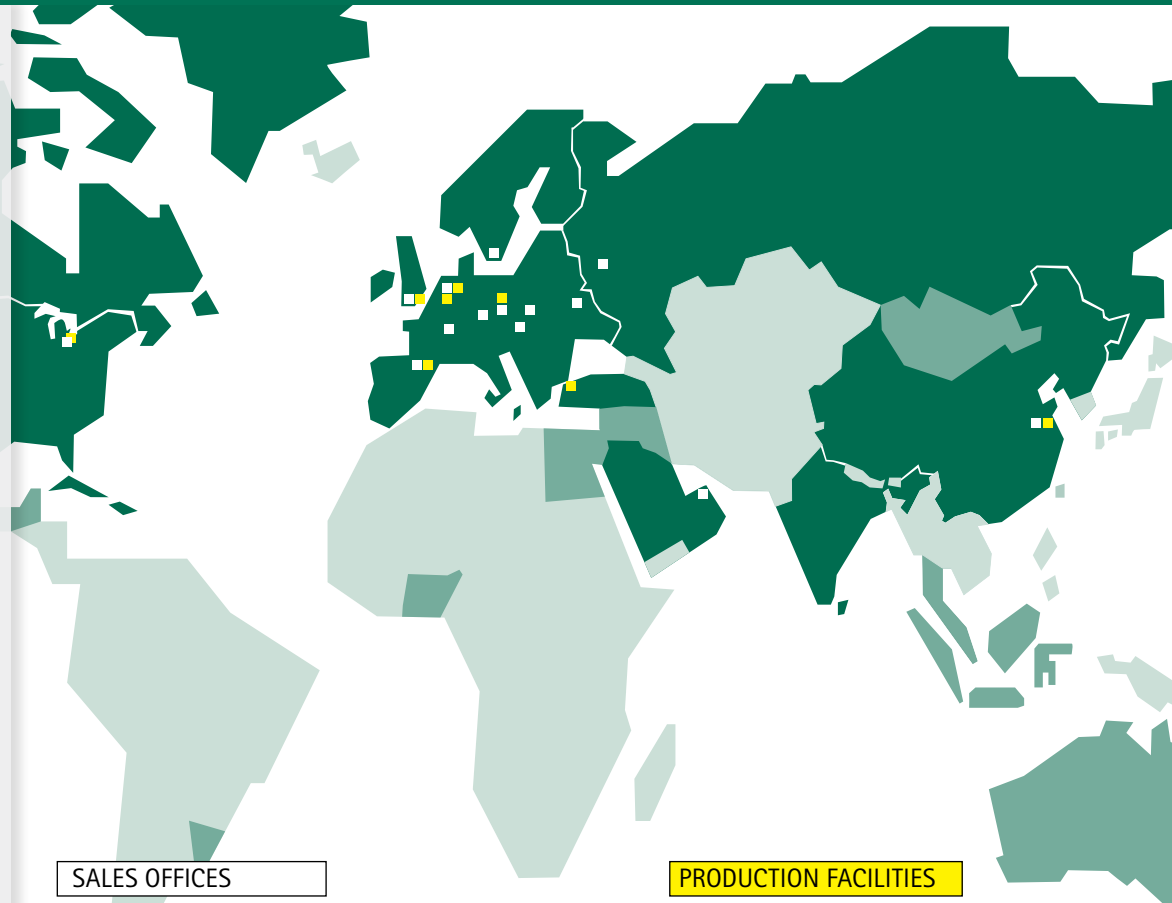
75 years ago, due to a shortage of quality materials, Dutch plumber, Jan van Walraven, was forced to make his own pipe fittings in order to continue to support his family.

Realizing his pipe fittings worked better and more efficiently than the original fittings he once used, he founded his own company in order to share his ideas and products in hopes of helping to better serve the needs of the working man.

As the family company grew over the years, the next generation, in the footsteps of its founding father, proceeded to develop workable, practical solutions and products for a wide range of HVAC and plumbing related issues.

With a pioneering spirit, sales offices were opened across Europe with much success. With great ingenuity, the company focused on new markets beyond its European borders. Due to its rich history of manufacturing and production, the Detroit area was chosen. Like Henry Ford, Jan van Walraven could visualize concepts and put physical form to innovative ideas which was a perfect match for the North American market.

At Walraven, we connect with our customers and the market. We know how important it is for even the smallest part to do its job properly. Plus, we offer our expertise which provides smart solutions that add value to any project.



SALES OFFICES

Mijdrecht (NL)
J. van Walraven Holding B.V.
Headquarters

Banbury (UK)
Walraven Ltd.
United Kingdom, Ireland

Barcelona
Isofix Walraven Iberia S.L.
Portugal, Spain
Headquarters for this area

Bayreuth (DE)
Walraven GmbH
Austria, Germany, Italy, South East Europe, Switzerland

Budapest (HU)
Walraven Kft.
Hungary, Romania

Dubai (AE)
Hira Walraven
United Arab Emirates, Saudi Arabia, Bahrain, Kuwait, Qatar, Oman, India

Grenoble (FR)
Walraven France Eurl
France

Kraków (PL)
Walraven Sp. z o.o.
Poland, Lithuania, Latvia, Estonia

Kyiv (UA)
Walraven Ltd.
Ukraine

Malmö (SE)
Walraven Nordic AB
Sweden, Denmark, Norway, Finland, Iceland

Mladá Boleslav (CZ)
Walraven s.r.o.
Czech Republic, Slovak Republic

Moscow (RU)
Walraven LLC
Russia

Shanghai (CN)
Walraven Shanghai, Ltd.
China

Tienen (BE)
Walraven BVBA
Belgium, Luxembourg

Walled Lake/Detroit (US)
Walraven, Inc.
United States of America, Canada

PRODUCTION FACILITIES

Banbury (UK)
Walraven Ltd.

Barcelona (ES)
Isofix S.L.

Changshu (CN)
Walraven Metal Products (Changshu) Co. Ltd.

Cista (CZ)
Suchánek & Walraven s.r.o.

Gramsbergen (NL)
Loko Gramsbergen B.V.

Horka (CZ)
Suchánek & Walraven s.r.o.

Horka (CZ)
SWO Tooling s.r.o.

Silivri – Istanbul (TR)
Jefleks Plastik Kauçuk

Walled Lake/Detroit (US)
Walraven, Inc.
United States of America, Canada

- Sales Offices
Walraven B.V.
Netherlands, Scandinavia, Finland
- Walraven International
Other countries

- Production Facilities
Jan van Walraven B.V.

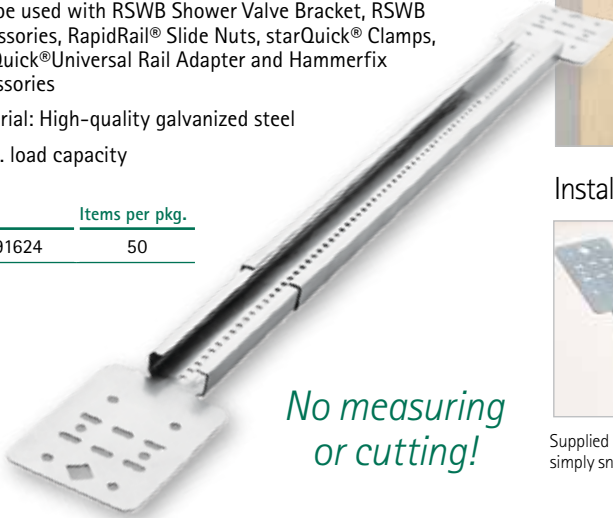
- Markets served by:
- Walraven Companies
 - Agents

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In-Wall product line featuring the Rapid Sliding Wall Bracket (RSWB)

- Can be used with either metal or wood studs
- In-wall bracket for mounting plumbing, pipes, electrical pipes, electrical boxes and conduit between studs in wall
- Expands from 16 to 24 inches - no measuring or cutting!
- Can be used with RSWB Shower Valve Bracket, RSWB Accessories, RapidRail® Slide Nuts, starQuick® Clamps, starQuick® Universal Rail Adapter and Hammerfix accessories
- Material: High-quality galvanized steel
- 50 lb. load capacity

Item #	Items per pkg.
59491624	50



No measuring or cutting!



Installs in 3 easy steps:



Supplied in connected halves, simply snap the bracket apart.



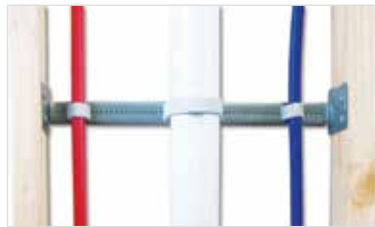
Bracket can be extended to fit between studs that are 16" to 24" apart.



Bend the bracket ends to mount on wood or metal studs.



Shown: Rapid Sliding Wall Bracket-RSWB, RapidRail® slide nut, and a starQuick® clamp.



Shown: Rapid Sliding Wall Bracket-RSWB and starQuick® clamps (3).



Shown: Rapid Sliding Wall Bracket-RSWB and Silent Nuts (2).



RSWB 1/2" PEX 90° Bend

- The 90° PEX bend prevents unwanted drastic bend radius that could cause the PEX tubing to kink.
- Versatile - can be installed several different ways

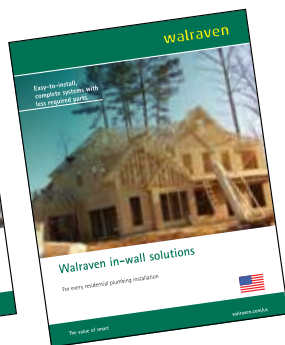
Item #	Kits per box
59490978	50



Mounted directly on wood stud



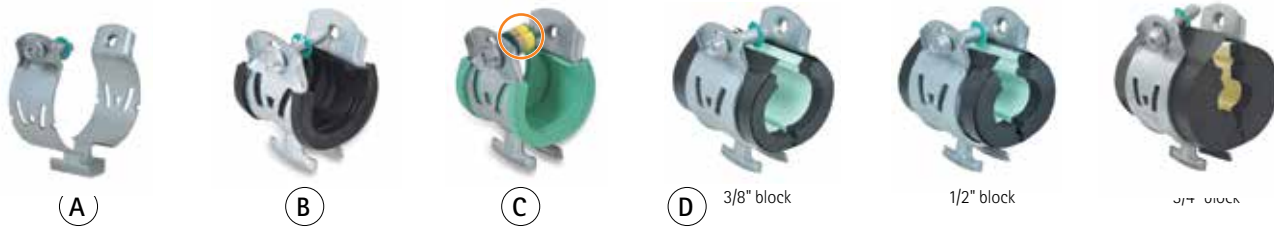
Free-floating mount with PEX pipe



The New Products Are Here!

Be sure to check out our new product line featured in our Residential and Commercial In-Wall Solutions brochures!

Strut and Cushion Clamps - the W Series line



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The W Series family of strut clamps are the latest, revolutionary way to mount pipes to strut. One-size clamp can fit multiple pipe diameters, reducing the types of clamps needed to complete a project. Each clamp is easily installed with one hand. The patented one-piece design (no loose parts) along with its overall durability allows installers to prefabricate a job, saving time and labor costs. The surface of each clamp is treated with high-grade Zn-Mg based coating which withstands a salt spray corrosion test of at least 600 hours. Boxed for easy handling. Simply stated, the W Series strut clamps are an easier, safer and affordable solution for any installation project.

A. W1000 Strut Clamp

- For use with steel pipes and EMT conduit
- Can be installed 4 different ways: on strut, on threaded rod or directly on wall or ceiling



Item #	D / IPS (inches)	D / EMT (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
2015021	1/2	1/2	18-21	200	50
2015027	3/4	3/4	23-27	200	50
2015033	1	1	29-33	220	25
2015042	1-1/4	1-1/4	38-42	220	25
2015048	1-1/2	1-1/2	44-48	400	25
2015060	2	2	56-60	400	25

2055020	1-1/2	1-1/4	40-43	400	25
2055022	-	1-1/2	47-49	400	25
2055023	-	-	50-52	400	25
2055024	2	-	53-54	400	25
2055025	-	-	56-58	400	25
2055026	-	2	60-63	400	25

B. W2000 Cushion Clamp

- For use with metal pipes
- Age-resistant EPDM lining insulates against noise and vibration and protects against galvanic corrosion



Item #	D / CTS (inches)	D / ACR (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
2025004	1/4	3/8	-	9-10	-	50
2025006	3/8	1/2	-	11-13	200	50
2025008	1/2	5/8	1/4	14-16	200	50
2025010	5/8	3/4	3/8	17-19	220	50
2025012	3/4	7/8	1/2	20-22	220	50
2025014	1	1-1/8	3/4	25-29	400	50
2025016	1-1/4	1-3/8	1	32-35	400	50
2025018	-	1-1/2	-	37-40	400	50
2025020	1-1/2	1-5/8	1-1/4	40-43	400	25
2025022	-	-	1-1/2	48-50	400	25
2025024	2	2-1/8	-	54-56	400	25
2025026	-	-	2	60-63	400	25

C. W5000 Cushion Clamp

- For use with plastic pipes
- Spacers allow for pipe expansion and contraction
- Removable spacers - suitable for sliding or anchoring applications
- Age-resistant EPDM green lining insulates against noise and vibration and prevents plasticiser migration



Item #	D / CTS (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
2055007	3/8	-	12-13	200	50
2055008	-	1/4	14-15	200	50
2055009	1/2	-	15-16	200	50
2055010	-	3/8	17-18	220	50
2055012	5/8-3/4	1/2	19-22	220	50
2055013	-	-	24-25	400	50
2055014	1	3/4	26-29	400	50
2055016	1-1/4	1	32-35	400	50

D. W6000 Insulated Clamp

with integrated thermal insulation block

- For use with pipes that need to be insulated - thermal isolated steel, copper, stainless steel or plastic pipe
- Available with 3/8", 1/2" or 3/4" integrated thermal insulation block
- Outer PVC jacket with overlapping adhesive tab acts as a vapor barrier

Item #	D / CTS (inches)	D / ACR (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
3/8" insulation block					
2061006	-	1/4	-	36	25
2061010	1/4	3/8	9-10	36	25
2061013	3/8	1/2	11-13	68	25
2061016	1/2	5/8	14-16	68	25
2061019	5/8	3/4	17-19	91	25
2061022	3/4	7/8	20-22	91	25
2061029	1	1-1/8	25-29	159	25
2061035	1-1/4	1-3/8	32-35	159	25
2061041	1-1/2	1-5/8	40-43	227	25

1/2" insulation block

2062006	-	1/4	-	36	25
2062010	1/4	3/8	9-10	36	25
2062013	3/8	1/2	11-13	68	25
2062016	1/2	5/8	14-16	68	25
2062019	5/8	3/4	17-19	91	25
2062022	3/4	7/8	20-22	91	25
2062029	1	1-1/8	25-29	159	25
2062035	1-1/4	1-3/8	32-35	159	25
2062041	1-1/2	1-5/8	40-43	227	25

3/4" insulation block

2063010	1/4	3/8	9-10	36	25
2063013	3/8	1/2	11-13	68	25
2063016	1/2	5/8	14-16	68	25
2063019	5/8	3/4	17-19	91	25
2063022	3/4	7/8	20-22	91	25
2063029	1	1-1/8	25-29	159	25
2063035	1-1/4	1-3/8	32-35	159	25

Clamps - for metal and plastic pipe

Clamps can be mounted to threaded rod using RapidStrut® Hammerfix, BIS Hanger Bolt and BIS Stud Bolt



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A. BISMAT® Flash*

- For use with all metal pipes
- Plenum rated - tested to ASTM E-84
- Zinc plated

Item #	D / CTS (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
CR3379018	1/2	3/8	15-18	180	50
CR3379023	3/4	1/2	20-22	180	50
CR3379028	1	3/4	25-28	180	50
CR3379035	1-1/4	1	32-35	180	50
CR3379043	1-1/2	1-1/4	40-43	180	50
CR3379051	-	1-1/2	48-51	180	50
CR3379056	2	-	53-56	180	50
CR3379063	-	2	57-63	180	50

CR3409091	-	3	83-91	210	25
CR3409105	4	-	100-105	210	25
CR3409114	-	4	108-114	210	25

B. BIS Aero Clamp

- For use with spiral ducts, metal and plastic venting
- Age resistant lining insulates against noise and vibration

Item #	D (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
CR4135063	-	63	157	25
CR4115080	3	80	157	25
CR4115100	4	100	157	25
CR4135112	-	112	157	20
CR4115125	5	125	157	20
CR4115150	6	150	162	20
CR4115160	-	160	162	20
CR4115200	8	200	162	20
CR4115250	10	250	162	20
CR4115300	12	300	162	20
CR4115315	-	315	162	20

C. BIS 4000 Plastic Pipe Clamp - metric

- For use with metric sized plastic pipes
- Allows for expansion and contraction of pipe
- Removable spacer washers makes clamp suitable for sliding or anchoring
- Zinc plated

Item #	D (mm)	DM (mm)	Fa,z (lbs)	Items per pkg.
TS4443032	32	25	200	50
TS4443040	40	32	200	50
TS4443050	50	40	200	50
TS4443063	63	57	200	50
TS4443075	75	70	200	50
TS4443090	90	80	200	50
TS4443110	110	100	500	25
TS4443125	125	125	500	25
TS4443160	160	150	500	25
TS4443200	200	200	500	25

D. BISMAT® 2000 Clamp*

- For use with all metal pipes
- Two screw clamp with age resistant lining
- Plenum rated - tested to ASTM E-84

Item #	D / CTS (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
CR3409070	2-1/2	-	64-70	210	50
CR3409080	3	2-1/2	73-80	210	50

E. BISMAT® Heavy Duty Clamp - HD1501*

- For use on all metal pipes
- Two-part clamp with sound-insulating lining
- Surface protected by the BIS UltraProtect® 1000 system - making it suitable for indoor and outdoor applications
- Use with adapter and height adjuster for a clevis hanger-type mounting
- Plenum rated - tested to ASTM E-84
- NOTE: Adapter must be used to mount: 1/2" adapter, item #VA6474321 or 3/8" adapter, item #VA6474221. Please specify when ordering

Item #	D / CTS (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
33178029	1	3/4	25	350	25
33178035	1-1/4	1	32	350	25
33178045	1-1/2	1-1/4	40	350	25
33178051	-	1-1/2	50	350	25
33178059	2	-	-	350	25
33178064	-	2	63	350	25
33178078	-	2-1/2	74	525	25
33178092	-	3	90	525	25
33178116	-	4	110	525	25
33178133	-	-	125	525	15
33178169	-	6	160	875	15
33178204	-	-	200	875	15
33178227	-	8	-	875	2
33178250	-	-	250	875	2
33178275	-	10	-	2,100	2
33178325	-	12	315	2,100	2

F. BISMAT® 5000 Clamp

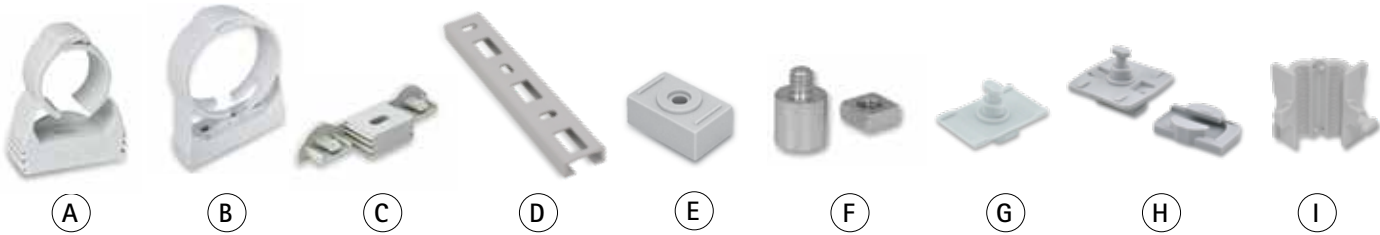
- For use with plastic pipes - allows for expansion and contraction
- Removable spacer washers makes clamp suitable for sliding or anchoring
- Plenum rated - tested to ASTM E-84

Item #	D / CTS (inches)	D / IPS (inches)	D (mm)	Fa,z (lbs)	Items per pkg.
CR3489018	1/2	3/8	16	180	50
CR3489023	3/4	1/2	20	180	50
CR3489028	1	3/4	25	180	50
CR3489035	1-1/4	1	32	180	50
CR3489043	1-1/2	1-1/4	40	180	50
CR3489053	-	1-1/2	50	180	50
CR3489056	2	-	54-56	180	50
CR3489058	-	2	58-61	180	50
CR3489067	2-1/2	-	63	300	50
CR3489075	3	2-1/2	75	300	50
CR3489090	-	3	90	300	25
CR3489110	-	4	110	300	25
CR3489125	-	-	125	300	25
CR3489160	-	-	160	300	10

*The maximum allowed load (Fa,z) is calculated using specific statistical methods related to the breaking load, taking into account a deflection of 0.060" (1.5mm) or 2% of the maximum nominal clamp diameter. The test results are certified and monitored by an independent test institute.

Nylon Clamps and Accessories - starQuick® line

Plenum and UV rated



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A. starQuick® Clamp

- For use with all pipe materials
- Can be used for both indoor and outdoor installations
- This one piece, self-closing clamp is self-locking: the clamp securely closes when pipe is pushed into it
- Due to a patented profile, it is possible to tack several clamps to each other (up to 1-1/4" CP)
- Resistant to UV, aging, oil and gasoline



Item #	Type	D / CTS (inches)	D / IPS (inches)	D (mm)	Items per pkg.
0854010	SQ-10	1/4	-	10-12	100
0854012	SQ-12	3/8	1/4	12-14	100
0854015	SQ-15	1/2	-	14-16	100
0854018	SQ-17	5/8	3/8	16-20	100
0854022	SQ-20	3/4	1/2	20-23	50
0854028	SQ-25	-	3/4	24-28	50
0854031	SQ-28	1	-	28-32	50
0854035	SQ-32	1-1/4	1	32-35	50
0854038	SQ-36	-	-	35-40	25
0854042	SQ-40	1-1/2	1-1/4	40-44	25
0854050	SQ-47	-	-	44-50	25
0854054	SQ-51	2	1-1/2	48-55	15
0854063	SQ-59	-	2	59-65	15

B. starQuick® Clamp - Large

- For use with all pipe materials
- Can be used for both indoor and outdoor installations
- This one piece, self-closing clamp securely closes when pipe is pushed into it
- Clamp can be mounted to wall, ceiling or floor by use of two bolts (outer slots) or by using a standard Walraven slide nut (middle hole) and screwing the clamp on a threaded rod
- Resistant to UV, aging, oil and gasoline

Item #	D/IPS (inches)	D (mm)	Fa.z (lbs)	Items per pkg.
08541075	2-1/2	71-76	200	50
08541090	3	88-93	200	40
08541110	4	109-115	200	25

C. starQuick® Duo Bracket

- For use with all pipe materials
- Used to easily mount two pipes using starQuick® clamps

Item #	Fb.z (lbs)	Items per pkg.
0854000	134	100

D. starQuick® Fixing Rail (PVC)

- Used for anchoring multiple pipes with starQuick® clamps without nuts
- starQuick® clamps can be attached to this fixing rail by means of the starQuick® rail adapter (item #0854313)

Item #	Length (inches)	Items per pkg.
0854316	6	50
0854325	39	25

E. starQuick® Distance Block

- Used for mounting a clamp when there is distance to the structure
- For larger distances, distance blocks can be clicked together
- Suitable for SQ-10 to SQ-36 starQuick® clamp sizes

Item #	Items per pkg.
0854510	25

F. starQuick® Threaded Rod Adapter with Nut

- Used to easily mount starQuick® clamps to 3/8" threaded rod
- Suitable for SQ-10 to SQ-59 starQuick® clamp sizes
- Material: Stainless Steel

Item #	Items per pkg.
0854001	50

G. starQuick® Rail Adapter

- Used to easily mount starQuick® clamps up to 1-1/4" CTS in size
- Also used to attach a starQuick® clamp (without nut) onto a starQuick® fixing rail

Item #	Items per pkg.
0854313	20

H. starQuick® Universal Strut Adapter

- Used to easily mount starQuick® clamps to RapidRail® or strut rail
- Used to add pipework quickly and simply to an existing installation
- Suitable for SQ-10 to SQ-51 starQuick® clamp sizes
- Suitable for WM15 RapidRail® and 1-5/8" strut

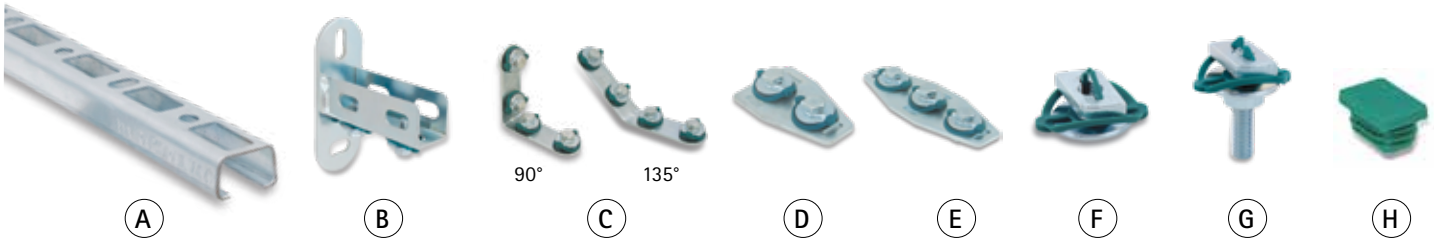
Item #	For Rail	Items per pkg.
0854332	WM15+ Strut	50

I. starQuick® Threaded Rod Adapter

- For use when mounting a starQuick® clamp to a threaded rod
- Used to add pipework quickly and simply to an existing installation
- Suitable for SQ-10 to SQ-32 starQuick® clamp sizes

Item #	Items per pkg.
0854359	25

Medium Duty Strut and Accessories - RapidRail®



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A. RapidRail®

- C-profile which features continuous perforation
- The distance between rail end and first hole is always equal
- Continuous graduated centimeter scale on one side
- Unique perforation on rail WM15 allows for hanging on both sides
- Material: Steel 1.0242, pre-galvanized
- Yield stress 34,809 pounds/square inch

Item #	Length (inches)	# of items per bundle	# of items per pallet
65059502	10	20	-
65059505	20	10	-
65059510	39	10	-
6505015	78	10	240

For information about the maximum allowed load (Fa,z) please refer to the loading tables.

B. RapidRail® Wall Plate

- For floor or wall mounting
- CO2 welded for durability
- Rail can be mounted with slot downwards or sideways
- Slots are at 90° to each other to simplify installation
- Pre-assembled with RapidRail® Slide Nut(s) for quick installation
- Zinc plated

Item #	For rail	Items per pkg.
6613200	WM15	25

C. RapidRail® Connector

- Used for making rail fabrications
- Connector with pre-assembled RapidRail® slide nut
- Retains assembly in place before final tightening
- Zinc plated

Connector angle	Item #	For rail	Fa,z (lbs.)	Fa,x (lbs.)	Items per pkg.
90°	6584001	WM15	351	250	25
135°	6584051	WM15	350	250	25

D. RapidRail® T Connector

- Connector with pre-assembled RapidRail® slide nut
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening
- Zinc plated

Item #	For rail	Fa,x (lbs.)	Items per pkg.
6584090	WM15	77	25

E. RapidRail® X Connector

- Connector with pre-assembled RapidRail® slide nut for making rail fabrications
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening
- Zinc plated

Item #	For rail	Fa,x (lbs.)	Items per pkg.
6584091	WM15	77	25

F. RapidRail® Slide Nut

- For attaching threaded rod to RapidRail®
- Replaces tee-nut and washer with a single piece
- Ready-to-use, pre-assembled for quick installation
- Slide nut with washer and RapidRail® spring
- Retains assembly in place before final tightening
- Plenum rated - tested to ASTM-84
- Zinc plated

Item #	For rail	For rod (inches)	Fa,z (lbs.)	Fa,x (lbs.)	Items per pkg.
RR6513109	WM15	3/8"	625	135	50

G. RapidRail® Hammerfix

- For attaching to RapidRail®
- No need to measure and cut rod
- Ready-to-use, pre-assembled for quick installation
- Slide nut with threaded rod, washer and RapidRail® spring
- Replaces tee-nut, washer and threaded rod with one piece assembly
- Plenum rated - tested to ASTM-84
- Threaded rod size: 3/8"
- Zinc plated

Item #	Threaded rod length (inches)	For rail	Items per pkg.
RR6523902	1-1/2	WM15	25
RR6523908	3	WM15	25
RR6523910	4	WM15	25
RR6523916	6	WM15	25

H. BIS End Rail Cap

- Use for clean finishing of rail end, covers all burrs
- Easily to insert and will not fall out
- Made of PE (polyethylene)

Item #	For use with (inches)	Items per pkg.
6566000	WM15 (1.18 x 0.78) rail	50

Standard Strut and Accessories - RapidStrut®



The value of smart

RapidStrut® products are protected by the BIS UltraProtect® 1000 system (BUP) which means they have a very high corrosion resistance. They effortlessly withstand a salt spray corrosion test of at least 1000 hours (in accordance with ISO 9227).

A. RapidStrut® Rail

- Used for quick and easy installation
- Unique hole pattern, allowing RapidStrut® accessories to be mounted on both sides of the rail
- Corrosion protection remains intact even after cutting
- Designed with continuous perforation
- Distance between rail end and first hole is always equal
- Continuous graduated centimeter scale on one side
- Suitable for indoor and outdoor applications

Item #	Length (feet)	# of items per bundle
65058352	10	10

B. RapidStrut® Wall Plate

- For floor or wall mounting
- U-profile C02 welded on wall plate

Item #	For rail	Items per pkg.
66683400	Strut	10

C. RapidStrut® Hammerfix

- Slide nut with threaded rod, washer and RapidStrut® spring
- Retains assembly in place before final tightening
- Replaces tee-nut, washer and threaded rod with one piece assembly
- No need to measure and cut rod
- Suitable for indoor and outdoor applications
- Fits 3/8" threaded rod

Item #	Threaded rod length (inches)	For rail	Surface finish	Fa,x (lbs)	Items per pkg.
SR6527005	1-1/2	Strut	Zinc plated	1,686	15
SR6527007	3	Strut	Zinc plated	1,686	10
SR6527011	4	Strut	Zinc plated	1,686	5
SR6527016	6	Strut	Zinc plated	1,686	5
SR6528005	1-1/2	Strut	BUP 1000	1,686	15
SR6528007	3	Strut	BUP 1000	1,686	10
SR6528011	4	Strut	BUP 1000	1,686	5
SR6528016	6	Strut	BUP 1000	1,686	5

D. RapidStrut® Slide Nut - G2

- Replaces tee-nut and washer with a single piece
- Slide nut with washer and RapidStrut® spring
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening

Item #	Threaded rod width (inches)	For rail	Surface finish	Fa,x (lbs)	Items per pkg.
SR66517107	1/4	Strut	Zinc plated	1,191	20
SR66517109	3/8	Strut	Zinc plated	1,348	20
SR66517113	1/2	Strut	Zinc plated	2,248	20
SR66518109	3/8	Strut	BUP 1000	1,348	20
SR66518113	1/2	Strut	BUP 1000	2,248	20

E. RapidStrut® Rail Connector - 90°

- Connector with pre-assembled RapidStrut® slide nut(s)
- Used for RapidStrut rail fabrication
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening

Item #	For rail	Items per pkg.
665885205	Strut	20

F. RapidStrut® Rail Connector - 135°

- Connector with pre-assembled RapidStrut® slide nut(s)
- Used for RapidStrut rail fabrication
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening

Item #	For rail	Items per pkg.
665885235	Strut	20

G. RapidStrut® T Connector

- Connector with pre-assembled RapidStrut® slide nut(s)
- Used to make fabrication with strut rail
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening

Item #	For rail	Items per pkg.
665885213	Strut	20

H. RapidStrut® X Connector

- Connector with pre-assembled RapidStrut® slide nut(s)
- Used to make fabrication with strut rail
- Ready-to-use, pre-assembled for quick installation
- Retains assembly in place before final tightening

Item #	For rail	Items per pkg.
665885223	Strut	15

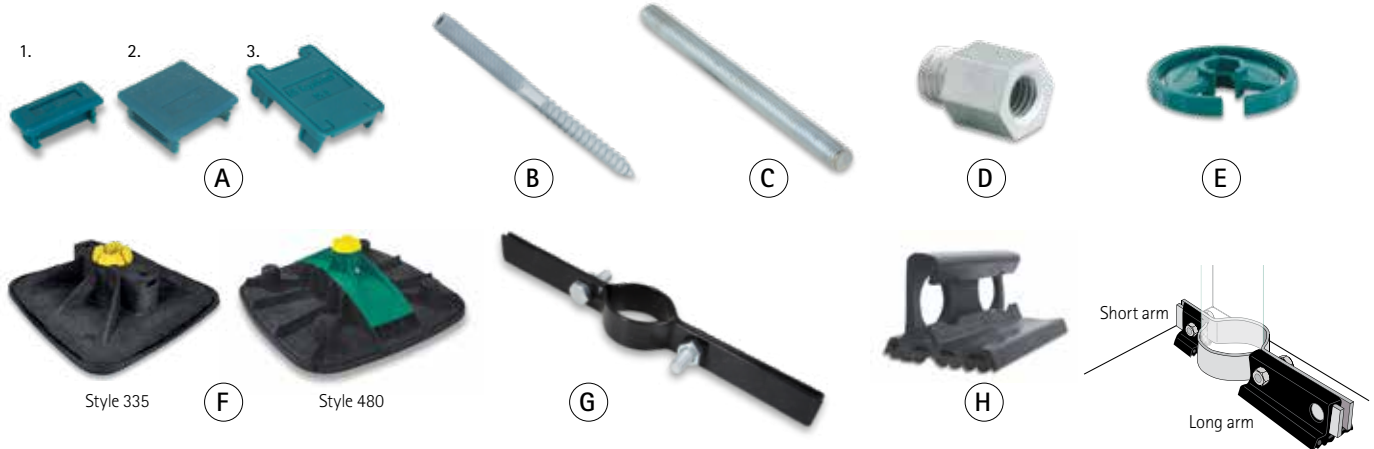
I. BIS Beam Clamp

- For a solid installation to steel assembly without welding or drilling
- Zinc plated



Item #	For rod (inches)	Fa,z (lbs)	Items per pkg.
6003910	3/8	562	10
6003912	1/2	786	25

Miscellaneous Products



The value of smart

A. BIS Strut End Cap

- Install for a clean finish of rail end, covers all burrs
- Easily inserted - will not fall out

Photo #	Item #	For strut (inches)	Items per pkg.
1.	6566021	1-5/8 x 13/16	50
2.	6566041	1-5/8 x 1-5/8	50
3.	6566051	DS 5 only	40

B. BIS Hanger Bolt

- T25 recess for quick installation with screw gun
- Hex collar for fine adjustment with wrench

Item #	Length (inches)	Size (inches)	Recess	Items per pkg.
VA6283908	3	3/8	T25	50
VA6283912	5	3/8	T25	50
VA6283920	8	3/8	T25	50
VA6283925	10	3/8	T25	10

C. BIS Stud Bolt

- No more measuring, cutting or thread chasing
- Fully zinc plated, including ends

Item #	Length (inches)	Size (inches)	Items per pkg.
ML6323904	1-1/2	3/8	50
ML6323910	4	3/8	50
ML6323920	8	3/8	50

D. BIS Threaded Adapter

- Designed to adapt thread sizes for greater versatility

Item #	Material	Items per pkg.
VA6473209	Steel-zinc plated	25
VA6473309	Steel-zinc plated	25
VA6477209	Stainless Steel	25
VA6477309	Stainless Steel	25

E. BIS Nut Spinner

- Designed for 3/8" and 1/2" nuts
- Quickly thread nuts up and down threaded rod
- Open end allows access to nut anywhere along rod
- Made of green PA (polyamide)

Item #	Items per pkg.
0699211	50

F. BIS Yeti® Support System

- Designed for strut 1-5/8" x 1-5/8" + DS 5 (1-5/8" x 2")
- Features a non-slip, anti-vibration mat
- Resistant to UV and chemical influences

Item #	Item style	Application environment	Items per pkg.
67685201	335	Flat roofs	1
67685001	480	Flat and low pitched roofs	1

G. Riser Clamp - Metric

- Recommended for supporting and for stabilizing vertical pipe runs of both plastic and metal pipe

Item #	D (mm)	Fa,z (lbs)	Items per pkg.
B4976025	25	250	10
B4976032	32	250	10
B4976040	40	250	10
B4976050	50	250	10
B4976063	63	375	10
B4976075	75	500	10
B4976090	90	500	10
B4976110	110	800	10
B4976125	125	1,050	10
B4976160	160	1,450	10
B4976200	200	2,300	10
B4976250	250	2,500	10

H. BIS Whisper Pads -Strut Rubber Profile

- For use with most riser clamps up to 8" in size
- Used to insulate riser clamps to minimize vibration and noise transfer
- Reduces corrosion by isolating the clamp from the floor
- Available in multiple sizes for the perfect fit

Item #	Item size (inches)	Fits riser clamps sizes (inches)	Items per pkg.
B4999001	4 - long arm	1/2-4	100
B4999002	4 - long arm	4-8	100
B4999003	2 - short arm	1/2-4	100
B4999004	2 - short arm	5-8	100

Pipe Reinforcement

- Self-gripping and continuous support for plastic pipes to prevent unsatisfactory curvature or bending
- Allows for longer distance between supports
- Controls direction of pipe expansion - Maintains alignment of pipe, and prohibits "snaking"
- Reinforcement fits inside insulation
- Maintains "plenum rating"
- Lightweight and economical, also 10 foot lengths are easy to handle which speeds installation of plastic pipes
- Can be cut with hand tools
- Material: Steel - 20 gauge
- Pre-galvanized



Item #	D/CTS (inches)	D/IPS (inches)	Length (feet)	Recommended hanger spacing	Items per bundle
PSU050	1/2	-	10	5 ft.	5
PSU075	3/4	1/2	10	5 ft.	5
PSU100	1	3/4	10	6 ft.	5
PSU125	1-1/4	1	10	7 ft.	5
PSU150	1-1/2	1-1/4	10	8 ft.	5
PSU200	2	-	10	8 ft.	5
PSU300	3	-	10	8 ft.	5

Larger sizes made to order. Contact your local sales office.

Metric sizes

Item #	D (mm)	D/IPS (inches)	Length (meters)	Recommended hanger spacing	Items per bundle
PRM020	20	3/8	3	5 ft.	5
PRM025	25	-	3	6 ft.	5
PRM032	32	-	3	7 ft.	5
PRM040	40	-	3	8 ft.	5
PRM050	50	1-1/2	3	8 ft.	5
PRM063	63	2	3	8 ft.	5
PRM075	75	2-1/2	3	8 ft.	5
PRM090	90	3	3	8 ft.	5
PRM110	110	4	3	8 ft.	5
PRM125	125	4	3	8 ft.	5
PRM160	160	-	3	8 ft.	5
PRM200	200	-	3	8 ft.	5

Larger sizes available. Please contact your local sales office.



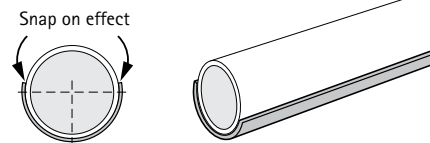
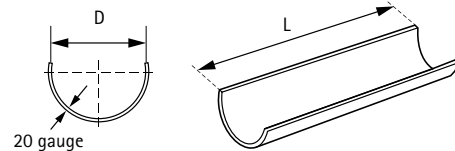
Pipe Reinforcement in use with BISMAT® 5000 Clamps



Use normal hanging methods



Insulate over plastic pipe and pipe reinforcement



Installation example:



Snap plastic pipe or tubing into Pipe Reinforcement



Pre-mount BISMAT® 5000 clamps on strut or rail



Place reinforced pipe into clamp



Patented quick-closing feature allows for one-handed installation



Tighten clamp to complete installation

Explanation of Maximum Recommended Load

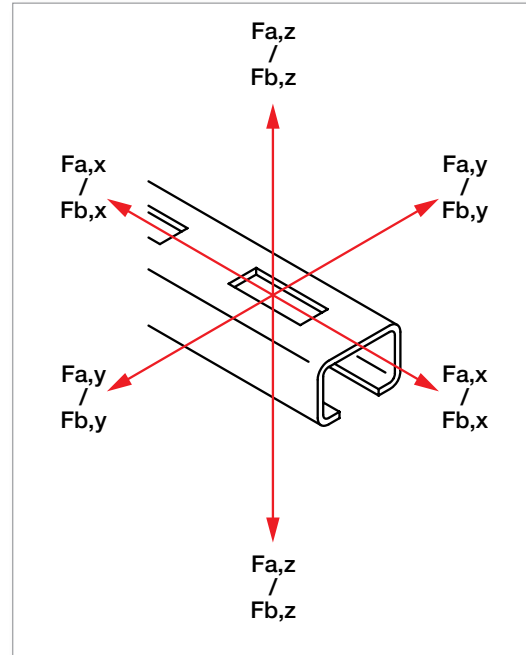
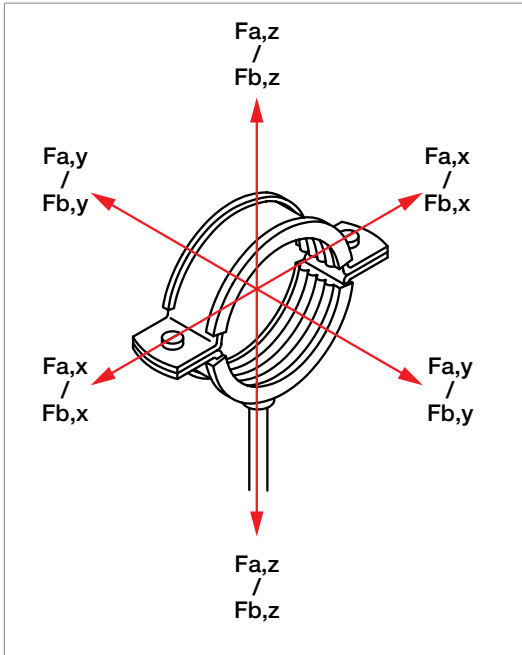
Maximum allowed load:

For most of our products, a maximum allowed load is mentioned in the article tables. Stated values are determined by a Walraven developed method.

Force direction (F) x, y and z (at 68° F)

Fa = maximum allowed load

Fb = breaking load



Use Of Loading Tables

Calculation Method

The published safe working loads are based on tests with perforated (slotted) rail. For non perforated rail the safe working loads can be taken as 20% higher. Loads are calculated taking into consideration a maximum deflection (f) of length $1/200 \times L$ and a maximum bending stress of 160 N/mm². (figure A)

1 N (Newton) = 0.22 lbs.

2.2 lbs. = 8.89 N (Newton)

Installing rails to walls or ceilings

The strength of the anchoring of the rail has not been taken into consideration. The installer must verify that the bolts and wall plugs used are suitable for the maximum permitted loading of the rail. (figure B)

Methods of loading

Where loads are suspended beneath rails, the load must not exceed the relevant safe load of the slide nut. To increase rigidity of the installation we recommend the use of a U-formed washer. (figure C)

Reading the rail loading tables

The stated values are only valid for the fixing rail. The maximum safe load of all other construction parts have to be verified. The stated maximum safe load is calculated for a static load at free bending support. (figure D)

Where the segment is marked with a hyphen, the stated length cannot be safely loaded.

Special conditions

For special conditions not stated in the loading tables, please contact us.

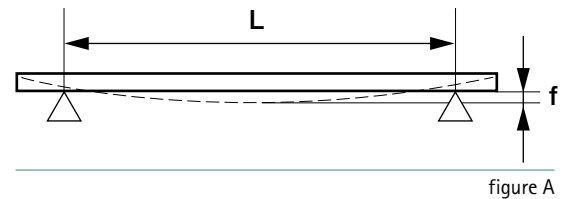


figure A

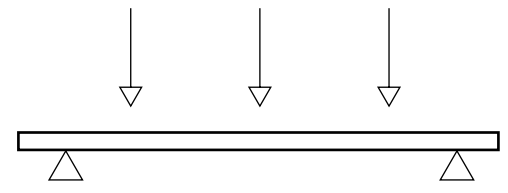


figure B

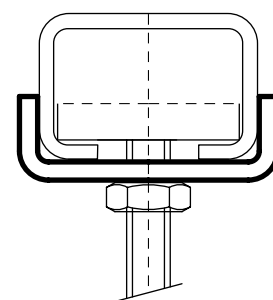


figure C

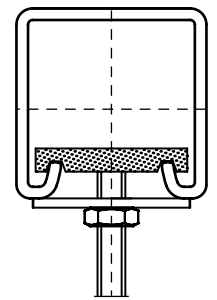
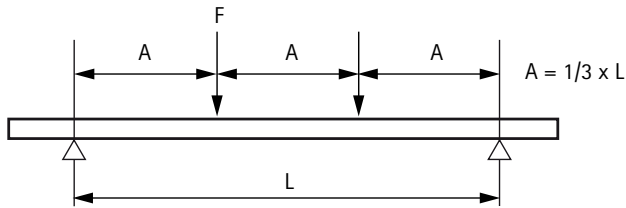


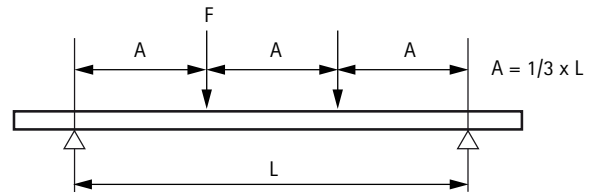
figure D

RapidRail® and RapidStrut® Mounting Rail Load Tables

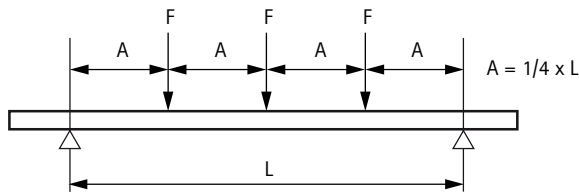
For load information on rail longer than 6 ft., please contact your local sales representative.



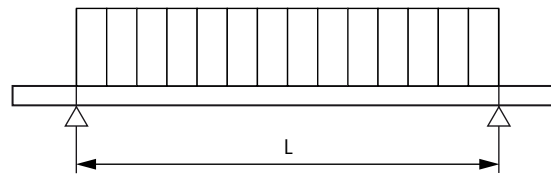
Single centered load between 2 supports (lbs)		
Length	RapidRail®	RapidStrut®
	WM15	DS 5
0' 10"	276	1,981
1' 0"	230	1,650
1' 2"	197	1,415
1' 4"	173	1,238
1' 6"	154	1,100
1' 8"	138	990
1' 10"	117	825
2' 0"	100	707
2' 6"	78	619
3' 0"	62	550
3' 6"	44	495
4' 0"	34	413
4' 6"	27	354
5' 0"	22	309
6' 0"	15	275



Equal load on 2 points between 2 supports (lbs)		
Length	RapidRail®	RapidStrut®
	WM15	DS 5
0' 10"	207	1,486
1' 0"	173	1,238
1' 2"	148	1,061
1' 4"	130	928
1' 6"	115	825
1' 8"	104	742
1' 10"	94	619
2' 0"	79	530
2' 6"	51	464
3' 0"	35	412
3' 6"	26	371
4' 0"	20	309
4' 6"	16	265
5' 0"	13	207
6' 0"	9	163



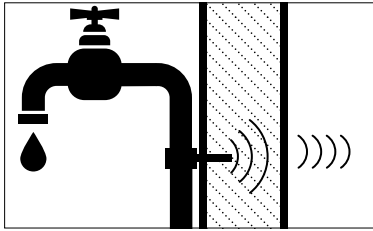
Equal load on 3 points between 2 supports (lbs)		
Length	RapidRail®	RapidStrut®
	WM15	DS 5
0' 10"	138	990
1' 0"	115	825
1' 2"	99	707
1' 4"	86	619
1' 6"	77	550
1' 8"	69	495
1' 10"	63	412
2' 0"	57	354
2' 6"	36	310
3' 0"	25	275
3' 6"	19	248
4' 0"	14	206
4' 6"	11	177
5' 0"	9	148
6' 0"	6	117



Uniformly distributed load between 2 supports (lbs)		
Length	RapidRail®	RapidStrut®
	WM15	DS 5
0' 10"	553	3,961
1' 0"	461	3,301
1' 2"	395	2,830
1' 4"	346	2,476
1' 6"	307	2,201
1' 8"	276	1,981
1' 10"	251	1,650
2' 0"	216	1,415
2' 6"	138	1,238
3' 0"	96	1,100
3' 6"	70	990
4' 0"	54	825
4' 6"	43	707
5' 0"	34	564
6' 0"	24	446

Noise Insulation in Pipe Work Systems

Sources of noise



Sources of noise

Pipe work systems installed for fluid supply, heating and sanitary purposes, as well as ductwork systems for air conditioning, can act as conductors of acoustic vibrations. These vibrations arise from the flow of the medium in the system, the method of system connection and pumps, fans, valves, etc.

Statutory regulations

If a system conducting the acoustic vibrations mentioned above is directly fixed to walls or ceilings the noise level can increase because the building structure acts as an amplifier. Building regulations state a maximum permissible transmitted noise level from pipe work systems (see DIN 4109). Currently this residual value is 35 dB (A) future regulation is expected to reduce this level.

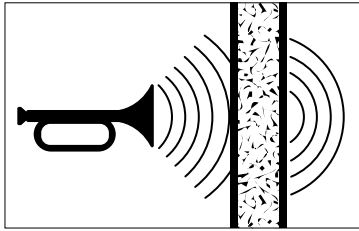
Noise insulation by pipe clamps

To reduce the transmission of acoustic vibrations in pipe work to the building structure, a layer of acoustic vibration absorbing material must be placed between the pipe work and all support fixing points. It is essential that the support fixing point into the building structure is never directly in contact with the pipe work. The smallest direct contact will act as a sound carrying bridge. Therefore, the acoustic vibration absorbing material needs to be specifically designed for each pipe clamp support.

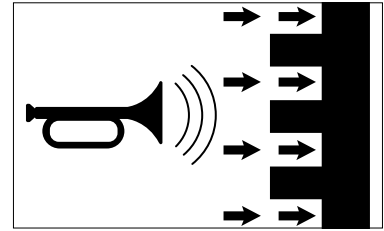
Maximizing noise insulation

The acoustic vibration absorbing materials used in our products are rubber profiles. Since rubber is elastic the transmission of acoustic vibrations is considerably reduced. The shape of the rubber profile is specifically designed

Noise insulation



Noise absorption



for each clamp to eliminate contact between pipe and clamp. We have also paid considerable attention to the cross section of the rubber profile by introducing grooves which maximize absorption of acoustic vibrations.

Quality of the rubber lining

The rubber lining must be durable and capable of retaining its elastic qualities to adequately absorb acoustic vibrations over a prolonged period. In consultation with rubber technology experts we have established performance standards to optimize aging resistance. The rubber profiles which we use are regularly tested against these performance standards independent specialist testing institutes.

Test certification

The reduction in noise transmission by use of our rubber lined pipe clamps tested by independent institutes on the basis of the requirements of DIN 4109. The test method employed is that described in DIN 52 218 for measurement of noise transmission reduction of rubber linings. Original test certificates are available upon request.

Please note: The recorded RESIDUAL VALUE of noise transmission is that achieved by the DIN 52 218 test and measurement method at 3 bar.

Rubber temperature performance

EPDM rubber (both black and green) has been designed for an operating temperature range of minus 58° F up to plus 200° F, continuous. For a peak situation it can be plus 250° F. For steam pipes a special silicon rubber profile (red) is available, allowing for an operating temperature of 390° F, continuous and 420° F peak.

Material Properties of Plastics

ABS – Acrylonitrile-Butadiene-Styrene

Temperature-resistance: Permanently up to 316°F, briefly up to 365° F and to about minus 40° F*.

Resistant to: Formic acid, citric acid, lactic acid.

Conditionally resistant to: Hydrochloric acid, sulphuric acid.

Not resistant to: Acetone, gasoline, benzene, solvents for paints and lacquers, butyric acid, chlorine, acetic acid, nitric acid.

PA – PolyAmide (Nylon)

Temperature-resistance: Permanently up to about 194° F, briefly up to about 266° F and to about minus 40° F*.

Resistant to: Gasoline, benzene, diesel oil, acetone, solvents for paints and lacquers, oils and greases. Low tendency to stress cracking.

Not resistant to: Bleach, most acids, chlorine.

PA-GV – Polyamide, fiberglass reinforced

Temperature-resistance: Permanently up to about 212-230° F, briefly up to 320° F and to about minus 40° F*.

Resistant to: Gasoline, benzene, diesel oil, acetone, solvents for paints and lacquers, oils and greases. Low tendency to stress cracking.

Not resistant to: Bleach, most acids, chlorine.

PE – PolyEthylene

Temperature-resistance: Hard types permanently up to about 194° F, briefly up to about 221° F soft types permanently up to about 176° F, briefly up to about 212° F and to about minus 40° F*.

Resistant to: Alkalis and inorganic acids.

Conditionally resistant to: Acetone, organic acids, gasoline, benzene, diesel oil, most oils.

Not resistant to: Chlorine, hydrocarbons, oxidizing acids.

POM – PolyOxyMethylene (polyacetal, polyformaldehyde)

Temperature-resistance: Permanently up to about 212° F, briefly up to about 266° F and to minus 40° F*.

Resistant to: Acetone, ether, gasoline, weak acetic acid, benzene, heating oil, oils and greases, toluene.

Not resistant to: Methylene chloride, trichloroethylene, hydrochloric acid, nitric acid, sulphuric acid.

PP – PolyPropylene

Temperature-resistance: Permanently about 194° F, briefly up to about 230° F and to about minus 22° F*.

Resistance to chemicals generally as for polyethylene.

PS – PolyStyrene

Temperature-resistance: Because of its relatively high sensitivity to the effects of chemicals, its use is not recommended at temperatures above normal room temperature, about 77° F. Resistance to cold: to about minus 40° F*.

Resistant to: Alkalis, most acids, alcohol.

Conditionally resistant to: Oils and greases.

Not resistant to: Butyric acid, concentrated nitric acid, concentrated acetic acid, acetone, ether, gasoline and benzene, solvents for paints and lacquers, chlorine, diesel fuel.

PVC (hard) – PolyVinylChloride (hard)

Temperature-resistance: Permanently up to about 149° F, briefly up to about 167° F and to about minus 22° F*.

Resistant to: Weak acids, alkalis, oils and greases, gasoline.

Not resistant to: Strong acids, benzene, acetone, iodine, toluene, trichloroethylene.

* The minus values apply only for parts in the quiescent condition with no severe impact stress.

Surface Treatment Information

Salt-spray test

To compare the protection duration of various surface treatments, a salt-spray test is carried out according to ISO 9227. In this test products are placed in a closed cabinet and sprayed with a salt solution. The products will start to corrode. The point at which "white" and then "red" rust appears is noted. This test does not give a perfect protection duration (this depends on the surroundings in which the product is applied), but does offer a comparative view of the various surface treatments.

RESULTS OF SALT-SPRAY TEST	Thickness protection layer (μm)	Hours until 5% red rust*
BIS UltraProtect® 1000 system	- **	1,000
Surface treatment		
Zinc plating, blue passivation	8 - 10	72
Pre-galvanized	25	150
Hot-dip galvanizing	50 - 80	300 - 600
Delta-Tone 9000	10 - 12	480
* Until the occurrence of maximum 5% red rust. ** Method and thickness protection layer differ per product.		

To improve the corrosion resistance of steel products, Walraven uses a multitude of methods. Below is an overview.

BIS UltraProtect® 1000 system

The BIS UltraProtect 1000 system is the ideal and most durable solution for securing or supporting mechanical installations, solar systems and many other types of installations.



The products in the BIS UltraProtect 1000 system effortlessly withstand a salt spray corrosion test of at least 1000 hours* (in accordance with ISO 9227). The salt spray test shows that the corrosion resistance of BIS UltraProtect 1000 products is considerably higher than that of, for example, hot-dip galvanized products (approximately 300-600 hours).

Although the system utilizes a relatively thin protective coating, the corrosion resistance is high. Not only does the BIS UltraProtect 1000 system offer a smooth and fine finish, the products are also visually appealing. An additional benefit of the relatively thin protective coating is that threaded products are also well protected against corrosion. The BIS UltraProtect 1000 products, including threaded items such as bolts, nuts and threaded rods, have superior corrosion resistance.**

Zinc plating

The products to be treated are cleaned, degreased and pickled. The protective coating is then applied in an electrolytic process. The thickness of the layer of zinc is between 1 and 20 μm (0,001 – 0,020 mm) and is determined by the current intensity and the duration of the galvanizing process. After the galvanizing process the products are passivated to extend the protection period.

Pre-galvanized

Also known as Sendzimir galvanization. Pre-galvanizing is a continuous thermal galvanizing process. The strip steel is guided through a bath containing liquid zinc after having been cleaned, degreased and pickled. Later the steel is cut to the required width. The sides of this cut material are not galvanized. This is also the case with any holes that may be drilled in the pre-galvanized material.

The sides of material thinner than 0.059" are protected somewhat by the zinc layer on the top and bottom by the electrolytic process of 'pulling together'.

This method is excellently suited for products with a screw thread, which are to be used indoors or in a non-corrosive environment.

Hot-Dip galvanizing

Also known as 'thermal galvanizing', 'full bath galvanizing' or 'centrifugal galvanizing'. The products to be treated are cleaned, degreased and pickled and subsequently put into an immersion bath of liquid zinc. The immersion bath has a temperature of 1022°F. In this process an alloy of zinc/iron develops on the surface and is then covered by a layer of pure zinc.

The thickness of the zinc layer varies between 50 and 150 μm (0.0019" – 0.0059"). In consequence the process is less suitable for products with threaded holes or rods. Hot-dip galvanized products are suitable for inside as well as outside use and also for damp and light-corrosive environments.

Delta-Tone 9000

Delta-Tone 9000 consists of zinc and aluminum particles that are held together by an inorganic binder. This offers an effective protection against corrosion even with a limited thickness of the coating. Delta-Tone 9000 is applied in an immersion/centrifugal or spray process and then dried at a temperature of 392°F. With this method an even layer is formed over the whole product with a thickness of 10 – 12 μm . Subsequently Delta-Tone 9000 forms a connection with the metal underneath.

In contrast to electrolytic and thermal galvanizing, with Delta-Tone 9000 there is no danger of hydrogen embrittlement in materials with an increased carbon content, such as spring steel.

To improve the corrosion resistance, the process can be repeated which increases the thickness each time by 10 – 12 μm . Products protected by Delta-Tone 9000 are suitable for outside use as well as moderate corrosive environments.

Stainless steel 316 (1.4401)

Stainless steel 316 is one of the best corrosion resistant types of stainless steel. It offers a superior corrosion resistance compared to many other types of stainless steel in many corrosive environments.

The protective layer is damaged by treatments such as punching, drilling and welding. That is why, after the last treatment, all stainless steel products receive an extra treatment which pickles and passivates to restore the protective layer.

Products from stainless steel 316 can be applied in aggressive situations such as a sea climate and industry.

* Until the occurrence of maximum 5% red rust. ** The warranty conditions can be found on our website www.bis-ultraprotect.com

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#		E		S
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2000 Clamp, BISMAT®.....	5	Explanation of Maximum Recommended Load.....	11	Rooftop Support Systems, Yeti®.....
335 BIS Yeti® Support System.....	9	F		RSWB, 90° PEX Bend, 1/2".....
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A		HD1501, Heavy Duty Clamp, BISMAT®.....	5	Spiral Duct Clamp, BIS Aero Clamp.....
Adapter, Threaded, zinc plated.....	9	Heavy Duty Clamp, HD1501, BISMAT®.....	5	SS Threaded Rod Adapter, starQuick®.....
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BIS End Rail Cap.....	7	Noise Insulation in Pipe Work Systems.....	13	starQuick® Universal Rail Adapter.....
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BIS Yeti® 335 and 480 Support Systems.....	9	Plastic Pipe Clamps.....	4-6	Stud Bolt.....
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Clamp, Heavy Duty, BISMAT® HD1501.....	5	RapidRail® Connector, X.....	7	W2000 Cushion Clamp, W Series.....
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Clamp for plastic pipes.....	4-6	RapidRail® Rail Connectors.....	7	W6000 Insulated Clamp, W Series.....
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DELIVERY AND TERMS

1. PRICES

Prices are those stated on the order. Prices shown on Walraven's price list or elsewhere are for information only and do not constitute quotations or offers to sell. Walraven's prices are subject to change without notice at any time. Price increases will not be applied to products covered by an order acknowledgment stipulating a shipment date within 15 days after the effective date of the increase. Prices do not include taxes.

2. ACCEPTANCE OF ORDERS

All orders are subject to final approval and acceptance by Walraven. Walraven has the right to accept orders in whole or in part. Shipment of less than an entire order shall be deemed acceptance of that portion of the order actually shipped. Any different or additional terms and conditions proposed by Purchaser in its purchase order, or otherwise not specifically approved in writing by Walraven, are rejected by Walraven. Walraven accepts no responsibility and Purchaser cannot hold Walraven responsible for errors or misunderstandings, whether or not due to Walraven's negligence, in complying with orders or instructions given to Walraven by telephone or orders or instructions given to a third party for transmittal to Walraven. Delivery to Walraven of Purchaser's acceptance of Walraven's quotation according to its terms, Walraven's actions in reliance on Purchaser's oral acceptance of a written or oral quotation, or Purchaser's receipt of Products, will constitute acceptance and a binding order.

3. CANCELLATION

Customer may not cancel the order unless agreed to by Walraven in writing.

4. DELIVERY AND PACKAGING

Walraven shall package product in accordance with its own standard practices. All items will be shipped in standard box quantities only. A minimum order quantity of \$150 is in effect on all orders. Orders below \$150 shall be subject to a \$25 handling charge.

5. FREIGHT

All sales are F.O.B. point of origin unless otherwise agreed to in writing in advance of the shipment date. Delivery dates are estimates only. Walraven is not responsible to prepay transportation or insurance costs. Whether or not Walraven prepays shipping charges, risk of loss passes to Purchaser upon tender of product to a carrier.

6. TITLE

Title and right to possession of any Product remains with Walraven until all payments are made in full. Purchaser agrees to do all acts necessary to protect such right and title. Risk of loss however shall pass to Purchaser at the time of delivery to the carrier. Purchaser shall make claims for loss or damage to goods while in transit against the carrier.

7. PAYMENT TERMS

Final payment is due and payable 30 days from date of invoice, unless otherwise specified. Any amount not timely paid by Purchaser shall bear interest at the maximum rate permitted by U.S. law.

If at any time reasonable grounds for insecurity arise with respect to Purchaser's performance of its payment or other obligations, Walraven may demand immediate payment in full or a documentary letter of credit approved by a U.S. bank acceptable to Walraven. All amounts owed by Purchaser shall be accelerated and payable immediately if Purchaser fails to make any payment on time as required. Walraven may allocate payments from Purchaser among outstanding invoices at its own discretion. Walraven may change payment terms on seven (7) days written notice.

8. RETURNS

Permission to return any products must be obtained in writing from Walraven in advance. Products must be in standard full cartons in first-class salable condition. All returns are subject to Walraven inspection and acceptance. Proof of purchase is required for all returns. Return transportation must be prepaid, and freight expenses will be the responsibility of the Purchaser. Purchaser is responsible for a minimum restocking charge of 25% of the list price of the returned products.

9. PRODUCTS

Walraven may modify or discontinue any product or line of products at any time without liability except to refund any amounts already paid for any such products that have been ordered but not yet delivered. Unless otherwise agreed in writing, all product dimensions are approximate. Consequently, Purchaser shall take into account reasonable product tolerances.

10. BRAND PROTECTION

Customer may not resell Product under any brand name other than the name under which they were purchased.

11. TAXES

All duties, sales, use, excise or similar taxes or charges applicable to the sale or use of any products shall be Purchaser's responsibility, and Purchaser shall indemnify Walraven against any liability there under.

12. WARRANTY

Walraven warrants that for a period of 12 months from the date of shipment, it will, at its option, refund the purchase price, repair or replace any product if it contains a defect in material or workmanship, provided that a claim, and proof thereof, along with a request of a return authorization number is made in writing to Walraven within 6 months after Purchaser's receipt thereof. ALL DEFECTS AND NON-CONFORMITIES WHICH ARE NOT SO SPECIFIED ARE WAIVED. If product is not returned within 30 days of a claim, the claim shall be deemed conclusively to have been abandoned. No other warranty, expressed or implied (including any warranty of merchantability or fitness for a particular purpose) shall exist in relation to the sale of any Walraven products. Walraven shall in no event be liable for any product which has been altered, repaired, or misused, nor for any claim related to special, direct, indirect, incidental, consequential or any other damages arising out of the sale, use or inability to use the products, for which Purchaser hereby agrees to indemnify Walraven. There are no express warranties other than those contained in the order. WALRAVEN DISCLAIMS ALL IMPLIED WARRANTIES (OTHER THAN GOOD TITLE) INCLUDING BUT NOT LIMITED TO THOSE OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, AND NON-INFRINGEMENT.

13. LIMITATIONS OF LIABILITY

Walraven excludes all liability except such liability that is directly attributable to the willful or gross negligence of Walraven's employees. Should Walraven be held liable, its liability shall in no event exceed the total purchase price under the order. WALRAVEN SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS OF BUSINESS OR PROFITS, DOWNTIME OR DELAY, LABOR, REPAIR OR MATERIAL COSTS OR ANY SIMILAR CONSEQUENTIAL LOSS OR DAMAGE INCURRED BY PURCHASER OR ANY THIRD PARTY. Product cannot be deemed defective if Walraven cannot duplicate the alleged failure.

14. FORCE MAJEURE

If Walraven is prevented from performing its obligations by Force Majeure, Walraven will have the right to suspend the performance of the agreement or to terminate the agreement in whole or in part, at Walraven's option, without judicial intervention and without Walraven being liable for any claims for damages or guarantees. Force Majeure includes any circumstance, foreseen and unforeseen, as a result of which performing the obligations of the order can no longer reasonably be expected by Purchaser, including but not limited to war, sabotage, rebellion, revolt, transportation disturbances, strikes, accidents, fire, explosion, technical failures and delayed delivery by suppliers.

15. AMICABLE RESOLUTION OF DISPUTES

No litigation may be commenced (other than for injunctive relief) by a party unless it first proposes a meeting of management personnel to resolve the dispute. For all disputes which cannot be amicably resolved, the parties shall attempt to resolve them by mediated negotiation with the assistance of a neutral person or arbitrator. Any disputes which cannot be resolved through negotiation or mediation shall, on written notice by either party, be submitted to final and binding arbitration by three arbitrators under the Rules of Commercial Arbitration of the American Arbitration Association ("AAA") in effect at the time, at the AAA regional office in Michigan. Arbitrators shall have no authority to award punitive or exemplary damages against either party or to amend or nullify this agreement. All final and interim orders and awards of

the arbitrator or arbitration panel shall be final and enforceable by any court of record having jurisdiction.

16. GOVERNING LAW

Walraven and Customer acknowledge that they are merchants in respect to the Products, they have had an opportunity to review the order, and the provisions of the order are reasonable when considered as a whole. These terms and conditions shall be governed, construed and enforced under the laws of the State of Michigan, including the Uniform Commercial Code in force at the time of the original date of order. The courts of Michigan shall have exclusive jurisdiction over the parties and the disputes arising under or related to these terms and conditions, unless such exclusivity is waived by Walraven.

17. INDEMNITY

Purchaser agrees to defend, indemnify, and hold harmless Walraven, its agents, employees, directors, officers, servants, and insurers, from and against any and all losses, claims, demands, liabilities or causes of action of every kind and character, whether in order or in tort, including claims of negligence, or strict liability (including any action brought by any employee, agent or customer of Purchaser for Purchaser's failure to comply with Walraven's published instructions and specifications concerning the operation, use or maintenance of Products) in favor of any person or party, for injury to or illness or death of any person or party, or for any property damage (including loss of income, profits, sales or "down time") arising out of or incident to the Products, except any loss, claim, demand or liability proven to be the result of the gross negligence of Walraven and not contributed to by the negligence of Purchaser, its agents, employees, officers or directors or other third parties. Walraven provides product information on all its products. It is Purchaser's responsibility to provide any customer, upon buying any Walraven product, with the appropriate product information.

18. INTEGRATION AND MODIFICATION

No modifications, limitations, waivers or discharge of the order or any of its terms shall bind Walraven unless in writing and signed by Walraven's authorized employee. No agent, employee, or representative of Walraven has the authority to bind Walraven to any affirmation, waiver, representation, or warranty concerning Product, not contained the order. Walraven may correct unilaterally any mathematical or typographical errors in the order.

TERMS AND CONDITIONS

1. WEBSITE DISCLAIMER

Any and all information, website content, catalogs, materials, documents, application/technical notes, products, specifications, advice and other services included on, made available or provided to you either directly or indirectly (collectively "Information") by Walraven Inc. ("Walraven") are provided on an "AS IS" and "AS AVAILABLE" basis. Walraven makes no representations or warranties of any kind, express or implied, as to the appropriateness, quality, accuracy, adequacy, sufficiency, reliability, usability, compliance and condition of the Information, especially for your application and usage even if you inform Walraven of your intended application and usage. All Information provided may be subject to change by Walraven without notice. You expressly agree that: your use or reliance of any Information is at your sole risk and liability, and Walraven does not warrant or represent that any Information made available to you complies with, is sufficient for, or is adequate for your usage, situation, product and/or product design. Walraven shall not be liable for any damages of any kind arising from the Information including, but not limited to, direct, indirect, incidental, punitive, and consequential damages. To the fullest extent permissible by applicable law and unless specified in writing by Walraven, Walraven disclaims all warranties, express or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose relating to the Information and its products.

2. LIMITED WARRANTY AND DISCLAIMER

Walraven warrants to the original purchaser of the Walraven product ("Product") that for a period of 12 months from the date of shipment, it will, at its option, refund the purchase price, repair or replace any Product that fails to substantially conform to Walraven's specifications published at www.walraven.com, provided that a claim, and proof thereof, along with a request of a return authorization number is made in writing to Walraven within 6 months after purchaser's receipt thereof. ALL DEFECTS AND NON-CONFORMITIES WHICH ARE NOT SO SPECIFIED ARE WAIVED. If Product is not returned within 30 days of a claim, the claim shall be deemed conclusively to have been abandoned. No other warranty, expressed or implied (including any warranty of merchantability or fitness for a particular purpose) shall exist in relation to the sale of any Product. Walraven shall in no event be liable for any Product which has been altered, repaired or misused, nor for any claim related to special, direct, indirect, incidental, consequential or any other damages arising out of the sale, use or inability to use the Product. Purchaser shall defend, indemnify and hold harmless Walraven and its directors, officers, shareholders, employees, independent contractors, affiliates, successors and assigns from and against any and all claims, demands, losses, actions, proceedings, damages, injuries, liabilities, costs and expenses (including attorneys' fees) relating to, associated with or arising from, including allegations of such, the Product (including without limitation the alteration, repair, maintenance, handling, ownership, sale, use or inability of use thereof) or any action or inaction of purchaser, its agents or employees. Walraven shall in no event be liable for any costs of removing or reinstalling the Product, which costs shall be borne by the purchaser. All shipping and other transportation costs related to shipping the defective Product to Walraven and shipping the repaired or replacement Product shall be borne by the purchaser. There are no express warranties other than those contained herein. WALRAVEN DISCLAIMS ALL IMPLIED WARRANTIES (OTHER THAN GOOD TITLE) INCLUDING BUT NOT LIMITED TO THOSE OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, AND NON-INFRINGEMENT.

3. LIMITATION OF LIABILITY

THE LIMITED WARRANTY GRANTED BY WALRAVEN FOR ITS PRODUCTS SHALL COMPRISE THE ORIGINAL PURCHASER'S SOLE AND EXCLUSIVE REMEDIES CONCERNING THE PRODUCTS, WHICH REMEDIES SHALL NOT BE APPLICABLE TO (i) ANY ASSIGNS, SUCCESSORS, SUBSEQUENT (DOWNSTREAM) PURCHASERS OF THE ORIGINAL PURCHASER OR (ii) ANY OTHER PERSON OR ENTITY OTHER THAN THEN THE ORIGINAL PURCHASER. EXCEPT FOR THE REMEDIES GRANTED BY WALRAVEN UNDER THE LIMITED WARRANTY, WALRAVEN SHALL NOT BE LIABLE FOR ANY AMOUNTS REPRESENTING DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES OF PURCHASER ARISING OUT OF OR RELATED TO WALRAVEN'S PRODUCTS, THEIR USE, OR MISUSE, INCLUDING COSTS OR DAMAGES ARISING OUT OF OR RELATED TO LOSS OF BUSINESS, LOSS, WORK STOPPAGES OR DELAYS, PRODUCT RECALLS OR PRODUCT LIABILITY.

