PENFLEX

INTERLOCKED METAL HOSE

HOSE FUNDAMENTALS

Penflex interlocked metal hoses are made for a variety of specialized industrial applications and are available in a wide range of metals, styles and sizes. Interlocked hose is manufactured by helically winding preformed metal strip over a sizing mandrel and folding together the adjacent edges forming the interlocked convolutions. A packing material may be inserted into a preformed groove within the interlock to make the hose pressure tight or to minimize leakage. This packing forms a continuous gasket seal throughout the entire length of the hose. Flexibility is achieved through the sliding action which is provided by the slip-space within each interlocked convolution. The limits of axial elongation or compression are established when the convolutions are all fully opened or are all fully closed. Similarly, the minimum bend radius is achieved when the convolutions on the outside of the bend are fully opened, and those on the inside of the bend are fully closed. Considerable force is required to exceed these limitations. However, if the hose is forced beyond these limits, it will be permanently deformed. Certain styles of non-pressure hose are designed to minimize metal to metal contact within the interlocked convolutions, and are therefore very flexible. Conversely, pressure hose is considerably less flexible since the forces necessary to compress the packing material produce a greater resistance to the sliding action.

GUIDE TO INTERLOCKED HOSE SPECIFICATION TABLES

Nominal Diameter – This column lists the nominal diameters of the hose expressed in inches.

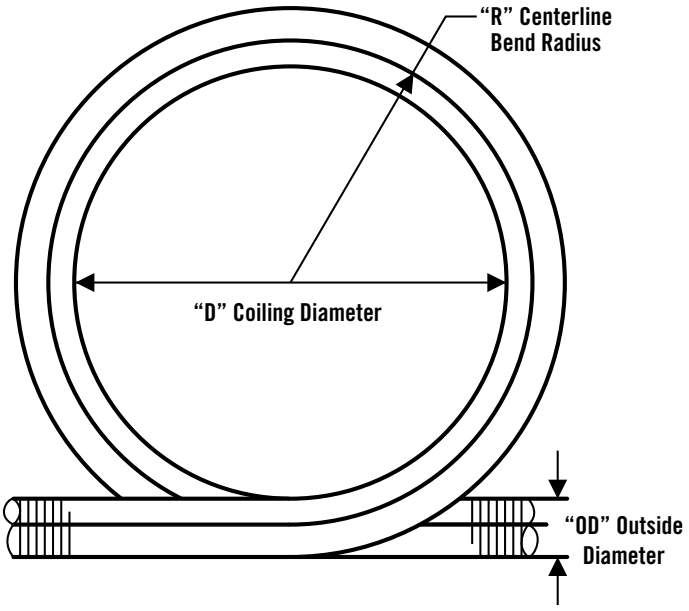
Strip Metal Thickness – This column indicates the thickness of the strip metal from which the hose is manufactured.

Weight – This column specifies the approximate weight per foot of hose and is given in pounds per foot.

Burst and Working Pressures – This data is applicable only to M-100 pressure hose. Review the M-100 pressure hose specification section for definitions of these terms.

Bend Radius – Identified as Minimum Centerline Bend Radius (for M-100 pressure hose) and Minimum Coiling Diameter (for all non-pressure hoses), this column specifies the bending limitations of the particular hose. The following drawing and formulas define these terms

R – Centerline Bend Radius
D – Coiling Diameter
OD – Outside Diameter of Hose
R = D+OD/2
D = 2R–OD



M–100 PRESSURE HOSE

DESCRIPTION

Penflex M-100 pressure hose is a high quality, heavy duty, fully interlocked metal hose designed to withstand the abuses of many industrial applications. The inclusion of a quality packing into a specially formed groove during manufacturing serves as a continuous gasket to make the hose pressure tight. Such media as air and non-searching fluids can be conveyed by M-100 hose at moderate pressures and temperatures. For technical data refer to the appropriate specification tables.

END FITTINGS

The high temperatures encountered in welding pipe and flanges to M-100 hose destroys the packing within the convolutions adjacent to the weld area. Penflex “Titepak” and “Packed & Welded” fittings were developed to seal this damaged section by providing a box and gland arrangement for the application of corrective packing after the fitting has been welded onto the hose. These fittings are available as rigid or floating flanges and as beveled, and NPT threaded pipe ends.

SPECIFICATIONS

M-100 pressure hose is produced in type 304 stainless steel. I.D. sizes range from 3/4” through 28”. In addition to the column headings defined in the “Guide To Interlocked Hose Specification Tables,” the following terms are included in the specifications tables for M-100 pressure hose.

Nominal Burst Pressure is the PSIG pressure at which the hose can be expected to rupture. This rating is predicated upon the hose being installed straight and motionless, and subjected to internal hydrostatic pressure at 70°F.

Maximum Working Pressure is the PSIG pressure at 70°F to which the hose should be subjected while operating under moderate bending, motion and flow conditions. This rating represents the application of a 3 to 1 safety factor against the nominal burst pressure. If more severe operating conditions are anticipated, the use of a 4 to 1 or a 5 to 1 safety factor is recommended.

Elevated operating temperatures require the application of a temperature adjustment factor to the maximum working pressure at 70°F. Refer to the “Temperature Adjustment Factor Table” in the “Technical Information” section of the main products catalog posted on our website: http://www.penflex.com/penflexcatalog.

APPLICATIONS

M-100 pressure hose is an ideally suited hose for metal expansion joints, boiler relief valve sealing, pulverized coal cyclone feeders, boiler draft systems and BOF lance hose assemblies. Additionally, M-100 pressure hose can be used in applications involving diesel exhaust, tank car unloading, barge unloading, fuel oil transfer, oven exhaust, suction lines and air intake lines.

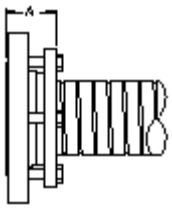
M–100 PRESSURE HOSE

Size	Nominal OD	Maximum Working Pressure PSIG	Nominal Burst Pressure PSIG	Minimum Centerline Bend Radius	Strip Thickness	Weight Per Foot
½	0.65	500	1500	6	0.015	0.4
¾	0.93	495	1212	7	0.015	0.45
1	1.18	365	912	10	0.015	0.5
1 ½	1.69	240	600	14	0.015	0.8
2	2.19	190	540	19	0.018	1.2
2 ½	2.69	140	420	22	0.018	1.5
3	3.35	120	360	27	0.018	1.7
4	4.36	175	525	36	0.035	4.6
5	5.35	200	600	46	0.050	5.6
6	6.48	165	495	48	0.050	6.7
8	8.46	150	450	64	0.050	13.7
10	10.60	120	360	90	0.060	20.2
12	12.70	115	345	114	0.070	24.1
14	14.70	100	300	132	0.070	31.3
16	16.70	97	260	150	0.070	35.7
18	18.70	77	230	169	0.070	40.0
20	20.70	70	210	196	0.070	44.4
22	22.70	64	192	204	0.070	48.7
24	24.70	56	169	224	0.070	53.1
26	26.70	53	159	240	0.070	57.5
28	28.70	50	150	260	0.070	61.8

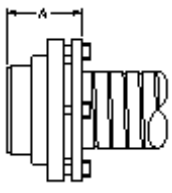
M–100 FITTINGS

Penflex manufactures M-100 hose assemblies with the following fittings. All M-100 assemblies are factory produced.

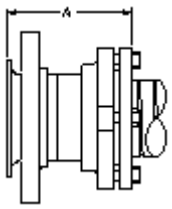
Titepak Rigid Flange TRF



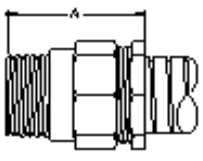
Titepak Weld End TWM



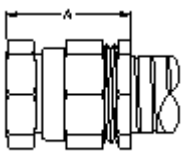
Titepak Floating Flange TFF



Male NPT End HM



Female NPT End HF



CONVEYOR HOSE

STANDARD CONVEYOR HOSE CROSS SECTION

SMOOTH BORE CONVEYOR HOSE CROSS SECTION

DESCRIPTION

Penflex manufactures two distinct types of interlocked conveyer hoses designed especially for transfer of dry bulk materials. Standard Conveyor Hose is a serviceable, unlined, medium weight hose featuring a fully packed interlocked construction.

Smooth Bore Conveyor Hose features rugged interlocking construction plus an integral metal strip lining. This lining provides Smooth Bore conveyor hose with a smooth bore that minimizes impaction and reduces turbulence for free flowing transmission of materials. Smooth Bore conveyor hose can also be produced with the inclusion of packing in the interlocks to reduce air loss and for low pressure requirements.

END FITTINGS

A wide range of end fittings is available for Penflex conveyor hoses. These end fittings can be plain, threaded or grooved nipples, pipe ends, plate flanges, either rigid or floating, and quick disconnect couplings. Attachment can be made by welding, brazing or by high strength adhesives.

SPECIFICATIONS

Standard conveyor hose is produced in stainless steel in a range of sizes from 3” to 20” inside diameters. Smooth Bore conveyor hose is produced in a size range from 1 1/2” to 20” inside diameters. Because Smooth Bore conveyor hose is manufactured using two separate pieces of metal strip, the completed hose can be composed of two different types of material. TLSS is an all stainless steel construction for maximum corrosion and abrasion resistance. Smooth Bore conveyor hose is a uni-directional flow hose; make sure that the inlet and outlet end connections are specified. The tables on the following page give complete technical information about Penflex conveyor hoses.

APPLICATIONS

Penflex conveyor hoses are excellent for applications involving the pneumatic transmission of flake or pelletized plastics, grain, coal dust, slag and other dry granular or abrasive materials. It can be used for the loading or unloading of ships, barges, containers, silos, elevators, highway and rail cars. Standard conveyor hose can also be used for air intake for diesel superchargers, exhausting gases from ovens and furnaces, and boiler draft system expansion joints.

STANDARD CONVEYOR HOSE

Nominal ID	Nominal OD	Minimum Coil Diameter	Wt/Ft SS
3	3.25	30	2.3
4	4.25	40	3.1
5	5.25	48	3.8
6	6.25	58	4.8
8	8.25	67	6.0
10	10.25	96	7.52
12	12.25	114	9.0
14	14.25	133	11.0
16	16.25	152	12.0
18	18.25	170	14.5
20	20.25	190	17.0

SMOOTH BORE CONVEYOR HOSE

Nominal ID	Light Weight TLSS .015 Armour "/.015" Liner		Standard Weight TLSS .018" Armour/.015" Liner		Heavy Weight TLSS .024" Armour/.015" Liner	
	Minimum Coiling Diameter	Wt/Ft	Minimum Coiling Diameter	Wt/Ft	Minimum Coiling Diameter	Wt/Ft
1 ½	18	1.4	20	1.6		
2	19	1.9	21	2.2		
2 ½	22	2.3	24	2.6		
3	24	2.8	26	3.1	29	3.8
4	32	3.6	35	4.1	39	5.0
5	47	4.5	50	5.1	57	6.1
6	52	5.4	56	6.1	63	7.3
8			91	8.1	98	9.4
10					111	11.0
12					132	13.0
14					154	15.5
16					176	17.5
18					198	20.5
20					220	23.0

Standard Smooth Bore Conveyor Hose is supplied unpacked. If there is a pressure requirement consult the table below. This data is also applicable to Standard Conveyor Hose.

Packing Material	Max. Temperature	Max. Pressure	Vacuum
Cotton	300 F	15 PSIG	15 in. Mercury, Max.
Silicone	500 F	20 PSIG	20 in. Mercury, Max.

INTERLOCKED EXHAUST HOSE

INTERLOCKED EXHAUST HOSE CROSS SECTION

DESCRIPTION

Penflex exhaust hoses are produced in a wide range of ID sizes, metals and weights. This range is available to provide the right hose for the application at the most economical cost. Interlocked exhaust hose utilizes a fully interlocked construction for strength and durability while allowing the hose to have excellent flexing characteristics. The normal configuration of exhaust hose is unpacked and fully extended. In order to minimize leakage, however, exhaust hose can be supplied packed upon request.

END FITTINGS

Standard pipe couplings, nipples and fixed or floating flanges can be attached to exhaust hose. Any special type of fitting can be adapted to fit this hose. Attachment can be by welding, brazing or with adhesives. Additionally, hose clamps and automotive muffler clamps can be used.

SPECIFICATIONS

Penflex exhaust hoses are produced in 304 stainless steel as standard. Other alloys may be available upon special request. The strip thickness and thus the hose weight can be selected to match the application depending upon the degree of rough handling and the abrasive conditions of the service. Penflex makes three different weights of exhaust hose as indicated in the following tables.

Series	Weight Designation	Strip Thickness
IE30	Light	.010" to .012"
IE40	Mid-Weight	.015"
IE50	Standard	018" to .020"

The size range of exhaust hose is from 1/2” to 8” inside diameter. For sizes larger than 8”ID, use the standard conveyor hose (up to 20”ID).

APPLICATIONS

Some typical uses of exhaust hose are: engine exhaust and vacuum and collection service, conveying, ventilating lines, and protective casing for cable and tubing.

IE30 Interlocked Exhaust Hose

Strip Thickness 0.010/0.012”

Part Number	Inside Nominal Diameter (in)	Outside Nominal Diameter (in)	Minimum Cooling Diameter (in)	Wt/Ft (lbs)
IE30-S-008	1/2	0.61	6	0.23
IE30-S-012	3/4	0.834	7	0.32
IE30-S-016	1	1.11	9	0.41
IE30-S-020	1 1/4	1.385	11	0.44
IE30-S-024	1 1/2	1.61	13	0.54
IE30-S-028	1 3/4	1.86	15	0.63
IE30-S-032	2	2.11	17	0.72
IE30-S-036	2 1/4	2.36	19	0.80
IE30-S-038	2 3/8	2.540	20	0.85
IE30-S-040	2 1/2	2.61	21	0.89
IE30-S-044	2 3/4	2.86	23	0.96
IE30-S-046	2 7/8	3.083	25	1.00
IE30-S-048	3	3.11	26	1.06
IE30-S-056	3 1/2	3.61	30	1.24
IE30-S-064	4	4.200	34	1.41
IE30-S-080	5	5.215	42	1.76
IE30-S-088	5 1/2	5.700	46	1.94
IE30-S-096	6	6.11	50	2.11
IE30-S-112	7	7.11	58	2.46
IE30-S-128	8	8.11	66	2.80

NOTES

1. Tabulated weights apply to stainless steel.

2. Intermediate sizes, alloys and flexibility characteristics are all subject to quotation from the factory.

3. Dimensional Tolerance is +/- .020”

IE40 Interlocked Exhaust Hose

Strip Thickness 0.015”

Part Number	Inside Nominal Diameter (in)	Outside Nominal Diameter (in)	Minimum Cooling Diameter (in)	Wt/Ft (lbs)
IE40-S-020	1 1/4	1.415	8.4	0.58
IE40-S-024	1 1/2	1.670	9.4	0.76
IE40-S-026	1 5/8	1.788	10.7	0.81
IE40-S-030	1 7/8	2.039	12.2	0.98
IE40-S-032	2	2.163	13.1	1.01
IE40-S-036	2 1/4	2.431	14.6	1.15
IE40-S-040	2 1/2	2.669	18.7	1.25
IE40-S-044	2 3/4	2.913	20.2	1.42
IE40-S-048	3	3.151	20.4	1.50
IE40-S-052	3 1/4	3.426	20.9	1.63
IE40-S-056	3 1/2	3.664	23.5	1.79

IE50 Interlocked Exhaust Hose

Strip Thickness 0.018/0.020”

Part Number	Inside Nominal Diameter (in)	Outside Nominal Diameter (in)	Minimum Cooling Diameter (in)	Wt/Ft (lbs)
IE50-S-016	1	1.22	17	0.70
IE50-S-024	1 1/2	1.66	17	0.86
IE50-S-028	1 3/4	1.91	19	1.00
IE50-S-032	2	2.20	22	1.13
IE50-S-036	2 1/4	2.495	25	1.27
IE50-S-040	2 1/2	2.66	27	1.40
IE50-S-044	2 3/4	2.91	29	1.54
IE50-S-048	3	3.16	32	1.67
IE50-S-056	3 1/2	3.66	38	1.95
IE50-S-064	4	4.230	43	2.22
IE50-S-080	5	5.16	53	2.76
IE50-S-096	6	6.16	63	3.30
IE50-S-112	7	7.16	74	3.85
IE50-S-128	8	8.16	84	4.39