

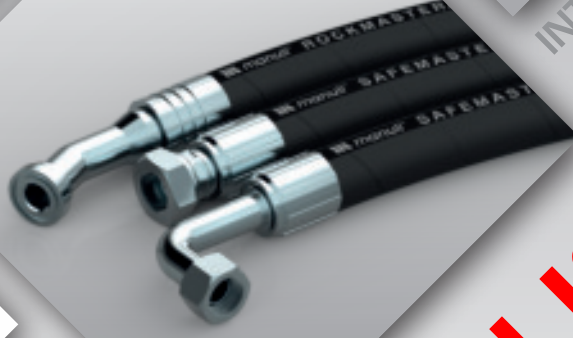
QUALITY

INTELLIGENT DESIGN

EXCELLENCE

PARTNERSHIP

INTEGRATED SOLUTIONS



RAILWAY APPLICATIONS PRODUCTS

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HYDRAULICS

Why Manuli?

Manuli Hydraulics is focused on achieving excellence in the design, manufacture and supply of fluid conveyance solutions, components and associated equipment for high pressure hydraulics, refrigeration, industrial and oil and marine applications.

Quality and sustainable development are the driving forces of all Manuli Hydraulics' activities, with an aim to guarantee worldwide availability of technical and commercial support for its products and services.

Rugged solutions

Modern hydraulic system specific solutions to



An integrated approach

Modern applications require robust fluid connector solutions with guaranteed long lasting performance. To that end, Manuli Hydraulics offers a complete range of hoses, fittings and assembly equipment which are designed to work seamlessly together. This harmonised approach allows us to guarantee the quality and performance of hose assemblies in a way that our competitors cannot match.

From design to manufacture and assembly, our commitment to this unified philosophy makes us the global leader in providing integrated solutions for fluid connector applications.

Solutions for the toughest applications

Systems are required to deal with ever more challenging applications, environments and conditions. The Manuli Extreme range has been specifically designed to provide the most robust solutions for the toughest hydraulic applications.



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Manuli Hoses for Railway Applications

In 2013 the European standard for fire safety on railway rolling stock, EN 45545, was issued which requires almost everything weighing more than 100 grams on an item of rolling stock to undergo fire safety testing. This has affected suppliers and manufacturers, including upholsterers, cable suppliers and, of course, hydraulic hose manufacturers.

Manuli has developed a dedicated range of hoses designed to meet the requirements of this standard, using materials that limit fire development and produce low levels of smoke and toxic fumes in the event of a fire. Compliance with the standard is broken down into 3 Hazard Levels (HL1, HL2 & HL3) and tests are conducted for both internal and external use.

The Manuli Railway Applications range consists of 3 specific hose families, **SafeMaster/2SN**, **SafeMaster/2SC** and **RockMaster/4SP**, each of which has been independently tested and qualified to the following Hazard Levels.

SafeMaster/2SN (DN 6 - 38)

- R22 (Internal): HL3
- R23 (External): HL3

SafeMaster/2SC (DN 6 - 25)

- R22 (Internal): HL1
- R23 (External): HL2

RockMaster/4SP (DN 6 - 51)

- R22 (Internal): HL1
- R23 (External): HL2



and has since become mandatory in Europe. These harmonised fire safety requirements undergo stringent fire safety testing. This has had a major effects on a wide range of operators manufacturers.

Requirement for:	Test Method & Reference	Test Measurement (Units)	Required	Thresholds		
				HL1	HL2	HL3
Inside uses (R22)	EN ISO 4589-2	Oxygen content (%)	Min.	28	28	32
	EN ISO 5659-2 (25kW/m ²)	Smoke density (Ds max. dimensionless)	Max.	600	300	150
	NF X70-100-1 & -2 (600°C)	Smoke toxicity (CITnlp dimensionless)	Max.	1.2	0.9	0.75
Outside Uses (R23)	EN ISO 4589-2	Oxygen content (%)	Min.	28	28	32
	EN ISO 5659-2 (25kW/m ²)	Smoke density (Ds max. dimensionless)	Max.	-	600	300
	NF X70-100-1 & -2 (600°C)	Smoke toxicity (CITnlp dimensionless)	Max.	-	1.8	1.5

EN 45545-2 test requirements and classifications



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Complementary Products

As the world leader in supplying integrated hydraulic connector solutions it is only to be expected that Manuli Hydraulics has a wealth of products designed to support and compliment their Railway Applications hose range.

Zinc-Nickel and Stainless Steel Fittings

In order to maximise efficiency and minimise downtime Manuli offer both zinc-nickel coated and stainless steel fittings. These highly corrosion-resistant fittings allow for extended mission profiles and significant cost savings over the life of the hose assembly.

Flat Face Quick Couplings

In an industry where rolling stock is coupled and uncoupled frequently, the use of quick couplings is a normal part of everyday life. The Q.Safe Flat Face range from Manuli are not only the industry gold-standard for hydraulic performance, but they are also have a zinc-nickel coating as standard with stainless steel versions also available.

GoldenCrimp/420 Crimping Machine

With a crimping force of 420 tonnes the GoldenCrimp/420 offers a maximum crimping diameter of up to 3", whilst its robust design and split architecture make it ideal for transport and operation on-site.

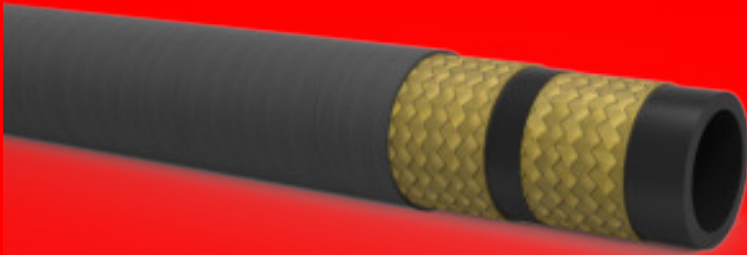
External Fire Sleeves

Designed to further enhance the fire retardant properties of hose assemblies, the Manuli FSL sleeve is a blend glass fibre and fire resistant silicon. Easily identifiable due to its bright orange exterior, the FSL provides a maximum service temperature of 260°C (500°F).



SAFEMASTER/2SN

RAILWAY - EN 45545-2



TECHNICAL DATA

PART REF.	HOSE SIZE			R.O.D		O.D		MAX. W.P		BURST		MIN. BEND		WEIGHT		FITTINGS	
	DN	dash	inch	mm	inch	mm	inch	bar	psi	bar	psi	mm	inch	g/m	lb/ft	Std 1	Std 2
H01165006*	6	-4	1/4"	12.7	0.50	14.7	0.58	400	5800	1750	25380	50	1.97	356	0.24	MF+M03400-04	OPF-04
H01165008*	8	-5	5/16"	14.3	0.56	16.3	0.64	350	5070	1480	21460	60	2.36	394	0.26	MF+M03400-05	OPF-05
H01165010*	10	-6	3/8"	16.7	0.66	18.7	0.74	350	5070	1400	20300	70	2.76	520	0.35	MF+M03400-06	OPF-06
H01165012*	12	-8	1/2"	19.8	0.78	21.8	0.86	350	5070	1400	20300	89	3.50	651	0.44	MF+M03450-08	OPF-08
H01165016*	16	-10	5/8"	23.0	0.91	25.0	0.98	250	3620	1020	14790	100	3.94	713	0.48	MF+M03400-10	OPF-10
H01165019*	19	-12	3/4"	27.0	1.06	29.0	1.14	215	3110	900	13050	130	5.12	910	0.61	MF+M03400-12	OPF-12
H01165025*	25	-16	1"	34.8	1.37	36.8	1.45	175	2530	670	9710	160	6.30	1256	0.84	MF+M03400-16	OPF-16
H01165031*	31	-20	1 1/4"	44.3	1.74	47.0	1.85	140	2030	600	8700	419	16.50	1898	1.28	MF+M03400-20	OPK-20
H01165038*	38	-24	1 1/2"	50.7	2.00	53.4	2.10	100	1450	500	7250	500	19.69	2227	1.50	MF+M03400-24	OPK-24

KEY FEATURES

- Good abrasion resistance
- High ozone and weather resistance
- Cover has flame retardant properties
- Cover has low density smoke when burning (EN 45545-2)
- Over-standard working pressures

APPLICATIONS & FLUIDS

- Hydraulics: medium-high pressure lines in severe environmental conditions, specific installations with tough abrasion conditions, railway hydraulic applications
- Mineral oils, vegetable and rape seed oils and synthetic ester based oils, glycols and polyglycols, oils in aqueous emulsion, water

CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

100 °C, 212 °F

MAX. OPERATING TEMPERATURE

100 °C, 212 °F

TUBE

Oil resistant synthetic rubber

REINFORCEMENT

Two high tensile steel wire braids

COVER

Synthetic rubber with high ozone, weather and heat resistance with flame retardant properties

APPLICABLE SPECS

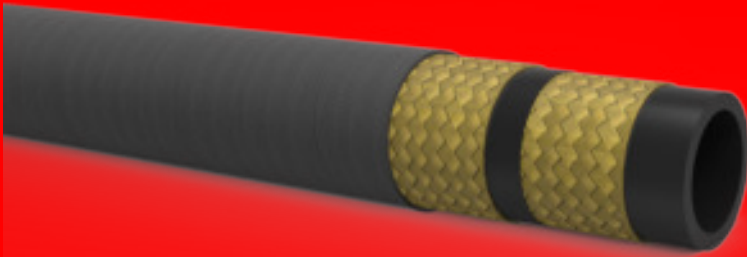
Exceeds EN 853 2SN; SAE 100 R2AT; ISO 1436 2SN/R2AT

TYPE APPROVALS

EN 45545-2; R22 (Internal): HL3; R23 (External): HL3

SAFEMASTER/2SC

RAILWAY - EN 45545-2



TECHNICAL DATA

PART REF.	HOSE SIZE			R.O.D		O.D		MAX. W.P		BURST		MIN. BEND		WEIGHT		FITTINGS	
	DN	dash	inch	mm	inch	mm	inch	bar	psi	bar	psi	mm	inch	g/m	lb/ft	Std 1	Std 2
H01162006*	6	-4	1/4"	11.3	0.44	13.1	0.52	400	5800	1850	26830	45	1.77	290	0.19	MF+M03300-04	OPF-04
H01162008*	8	-5	5/16"	12.9	0.51	14.7	0.58	350	5070	1700	24650	55	2.17	322	0.22	MF+M03300-05	OPF-05
H01162010*	10	-6	3/8"	15.0	0.59	16.8	0.66	330	4780	1500	21750	65	2.56	388	0.26	MF+M03300-06	OPF-06
H01162012*	12	-8	1/2"	18.5	0.73	20.3	0.80	275	3980	1220	17690	80	3.15	496	0.33	MF+M03300-08	OPF-08
H01162016*	16	-10	5/8"	21.8	0.86	23.6	0.93	250	3620	1050	15220	90	3.54	615	0.41	MF+M03400-10	OPF-10
H01162019*	19	-12	3/4"	25.6	1.01	27.6	1.09	245	3550	980	14210	120	4.72	788	0.53	MF+M03400-12	OPF-12
H01162025*	25	-16	1"	33.0	1.30	35.2	1.39	210	3040	840	12180	150	5.91	1188	0.80	MF+M03400-16	OPF-16

KEY FEATURES

- Compactness and flexibility
- Good abrasion resistance
- High ozone and weather resistance
- Cover has flame retardant properties
- Cover has low density smoke when burning (EN 45545-2)
- Over-standard working pressures

APPLICATIONS & FLUIDS

- Hydraulics: medium-high pressure lines in severe environmental conditions, specific installations with tough abrasion conditions, railway hydraulic applications
- Mineral oils, vegetable and rape seed oils and synthetic ester based oils, glycols and polyglycols, oils in aqueous emulsion, water

CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

100 °C, 212 °F

MAX. OPERATING TEMPERATURE

100 °C, 212 °F

TUBE

Oil resistant synthetic rubber

REINFORCEMENT

Two high tensile steel wire braids

COVER

Synthetic rubber with high ozone, weather and heat resistance with flame retardant properties

APPLICABLE SPECS

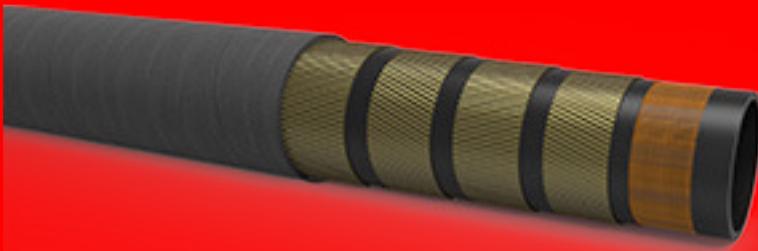
Exceeds EN 857 2SC; SAE 100R16; ISO 11237 2SC/R16

TYPE APPROVALS

EN 45545-2; R22 (Internal): HL1; R23 (External): HL2

ROCKMASTER/4SP

ABRASION, WEATHER & HEAT RESISTANCE



TECHNICAL DATA

PART REF.	HOSE SIZE			R.O.D		O.D		MAX. W.P		BURST		MIN. BEND		WEIGHT		FITTINGS	
	DN	dash	inch	mm	inch	mm	inch	bar	psi	bar	psi	mm	inch	g/m	lb/ft	Std 1	Std 2
H10008006	6	-4	1/4"	14.7	0.58	17.6	0.69	485	7,030	2,400	34,800	125	4.92	590	0.40	MF+M00910-04	
H10008010	10	-6	3/8"	17.6	0.69	21.0	0.83	450	6,520	2,000	29,000	125	4.92	740	0.50	MF+M00910-06	
H10008012	12	-8	1/2"	20.3	0.80	24.2	0.95	420	6,090	1,750	25,380	175	6.89	880	0.59	MF+M00910-08	
H10008016	16	-10	5/8"	23.7	0.93	27.6	1.09	380	5,510	1,600	23,200	200	7.87	1,080	0.73	MF+M00910-10	
H10008019	19	-12	3/4"	28.2	1.11	31.7	1.25	380	5,510	1,600	23,200	240	9.45	1,450	0.97	MF+M00920-12	SP+M05400-12
H10008025	25	-16	1"	35.0	1.38	39.0	1.54	320	4,640	1,400	20,300	340	13.39	1,880	1.26	MF+M00930-16	SP+M05400-16
H10008032	31	-20	1.1/4"	46.1	1.81	49.7	1.96	210	3,040	1,250	18,120	460	18.11	2,990	2.01	MF+M00920-20	SP+M05500-20
H10008038	38	-24	1.1/2"	52.4	2.06	56.1	2.21	185	2,680	1,000	14,500	560	22.05	3,500	2.35	MF+M00910-24	SP+M05500-24
H10008051	51	-32	2"	65.4	2.57	69.0	2.72	175	2,530	1,000	14,500	660	25.98	5,010	3.37	MF+M00910-32	SP+M05400-32

KEY FEATURES

- Validated for high fatigue resistance
- Superior abrasion resistance
- High ozone and weather resistance
- Flame resistance to a wide range of specs.
- Antistatic and antitoxic cover
- Upgraded temperature resistance
- BIO biological and mineral oils compatibility

APPLICATIONS & FLUIDS

- Hydraulics: very high pressure power lines in severe environmental conditions, specific installations with tough abrasion conditions, marine applications, underground and open pit mining
- Mineral oils, vegetable oils and synthetic ester based oils (up to 100°C/212°F), glycols and polyglycols, mineral oils in aqueous emulsion, water

CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

121 °C, 250 °F

MAX. OPERATING TEMPERATURE

125 °C, 257 °F

TUBE

Oil resistant synthetic rubber

REINFORCEMENT

Four high tensile steel spirals

COVER

Synthetic rubber with high ozone, weather and heat resistance

APPLICABLE SPECS

Exceeds EN 856 4SP; ISO 3862 4SP; DN 16 & 19: thin cover style, exceeds EN 856 4SP and ISO 3862 4SP

TYPE APPROVALS

ABS; DNV-GL; DNV-GL (MED); BV; FRAS; CU-TR; MA; MSHA; RINA; B; LR; NK; DB (EN 45545-2); R22 (Internal); HL1; R23 (External); HL2



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