

# RAILWAY HOSES



SUPERIOR PERFORMANCE IN RAILWAY APPLICATIONS



 **manuli**<sup>®</sup>  
HYDRAULICS HP

## MANULI HOSES FOR RAILWAY APPLICATIONS

In 2013 the European standard for fire safety on railway rolling stock, EN 45545, was issued and has since become mandatory in Europe. These harmonised fire safety requirements require almost everything weighing more than 100 grams on an item of rolling stock to undergo stringent fire safety testing. This has had a major effects on a wide range of operators 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 4 specific hose families, **SafeMaster/2SN**, **SafeMaster/2SC**, **SafeMaster/2TE** 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

### **SafeMaster/2TE** (DN 5 - 31)

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

### **RockMaster/4SP** (DN 6 - 51)

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



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 <sup>2</sup> )	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 <sup>2</sup> )	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



## 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 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.

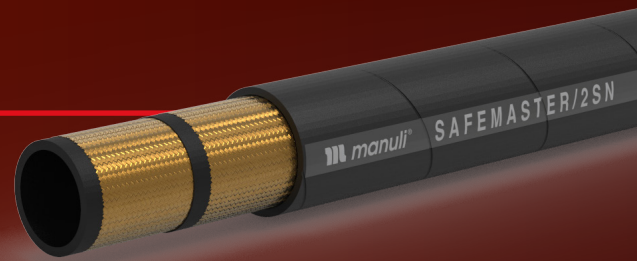
### EXTERNAL FIRE SLEEVES

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, low pressure compressed air up to 70°C max.

## CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

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 and flame retardant properties

## APPLICABLE SPECS

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

## TYPE APPROVALS

EN 45545-2; CU-TR; ISO 15540 (pending)

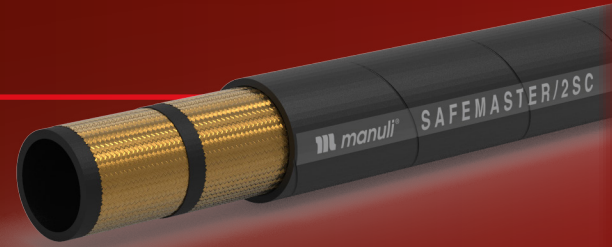
## REMARKS



- Hose cover must be pin-pricked for use with compressed air.

# 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, low pressure compressed air up to 70°C max.

## CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

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 and flame retardant properties

## APPLICABLE SPECS

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

## TYPE APPROVALS

EN 45545-2; CU-TR; ISO 15540 (pending)

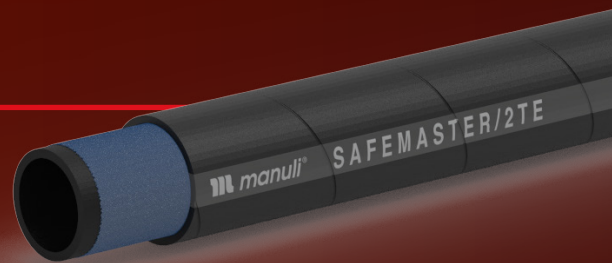
## REMARKS



- Hose cover must be pin-pricked for use with compressed air.

# SAFEMASTER/2TE

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
H09076005*	5	-3	3/16"	-	-	11.6	0.45	80	1,160	320	4,640	35	1.37	131	0.09	MF+M00310-03	
H09076006*	6	-4	1/4"	-	-	13.0	0.51	75	1,080	300	4,350	40	1.57	148	0.10	MF+M00830-04	
H09076008*	8	-5	5/16"	-	-	14.6	0.57	68	980	272	3,940	50	1.97	169	0.11	MF+M00830-05	
H09076010*	10	-6	3/8"	-	-	16.1	0.63	63	910	252	3,650	60	2.36	202	0.14	MF+M00820-06	
H09076012*	12	-8	1/2"	-	-	19.2	0.76	58	840	232	3,360	70	2.76	249	0.17	MF+M00820-08	
H09076016*	16	-10	5/8"	-	-	23.6	0.93	50	720	200	2,900	90	3.54	333	0.22	MF+M00820-10	
H09076019*	19	-12	3/4"	-	-	26.5	1.04	45	650	180	2,610	110	4.33	409	0.27	MF+M00820-12	
H09076025*	25	-16	1"	-	-	33.4	1.31	40	580	160	2,320	130	5.12	522	0.35	MF+M00820-16	
H09076031*	31	-20	1.1/4"	-	-	41.5	1.63	35	500	140	2,030	140	5.51	742	0.50	MF+M00820-20	

## KEY FEATURES

- Wide range of fluid compatibility
- High flexibility of the hose structure
- Cover has low smoke density when burnt (EN 45545-2)

## APPLICATIONS & FLUIDS

- Hydraulics: low pressure lines, return lines
- Low pressure compressed air up to 70°C max.
- Mineral oils, vegetable and rape seed oils, glycol and polyglycol based oils, synthetic ester based oils, oils in aqueous emulsion, water, low pressure compressed air up to 70°C max.

## CONTINUOUS SERVICE TEMPERATURE RANGE

-40 °C, -40 °F

125 °C, 257 °F

## TUBE

Oil resistant synthetic rubber

## REINFORCEMENT

One high resistance textile braid

## COVER

Weather resistant synthetic rubber

## APPLICABLE SPECS

EN 854 2TE; ISO 4079 2TE; EN 45545-2;

## TYPE APPROVALS

EN 45545-2; ISO 15540 (pending)

## REMARKS



- Size DN 31 is not listed in EN 854 2TE specification - Exceeds specification temperature resistance
- Hose cover must be pin-pricked for use with compressed air.

# 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

## TUBE

Oil resistant synthetic rubber

## REINFORCEMENT

Four high tensile steel spirals

## COVER

STRONG - TYPE "SD"

Synthetic rubber with high abrasion, 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

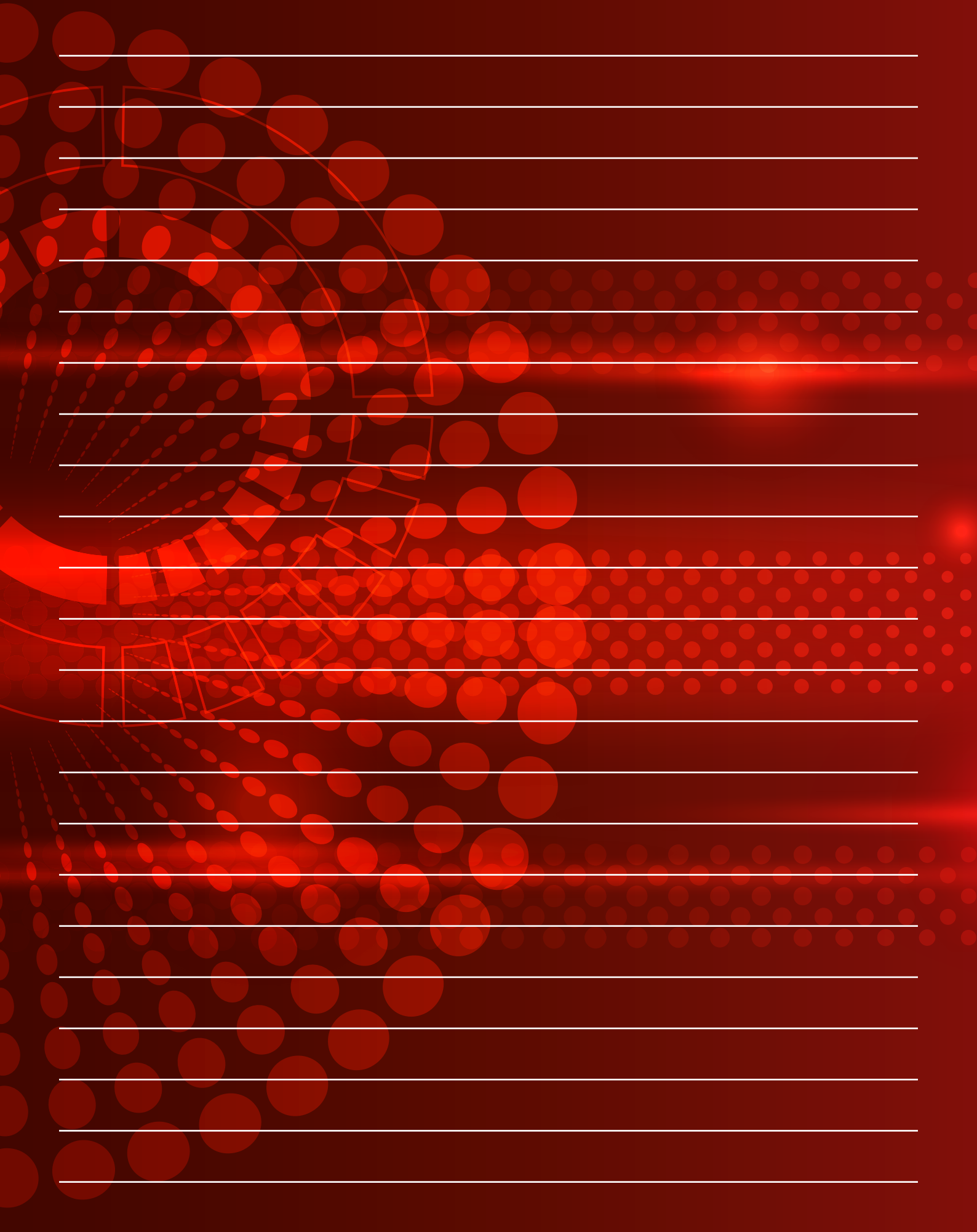
## TYPE APPROVALS

ABS; DNV-GL; DNV-GL (MED); BV; FRAS; CU-TR; MA; MSHA; RINA; B; LR; NK; DB (EN 45545-2); CCS; KRS



# NOTES

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