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HOSE/CPLG. SELECTION
GLOBALSPIRAL COUPLINGS
PCS COUPLINGS
GLOBALSPIRAL HIGH PRESSURE COUPLINGS
STAINLESS STEEL
PCM COUPLINGS
MEGACRIMP COUPLINGS
STAINLESS STEEL BRAID
POWER CRIMP COUPLINGS
FIELD ATTACHABLE G1 & G2 COUPLINGS
AIR BRAKE COPPER TUBING
SURELOK
HOSE CUTTERS & TOOLS
COMPRESSION AIR BRAKE
AIR BRAKE HOSE ASSEMBLIES
AIR BRAKE FOR RUBBER HOSE
FIELD ATTACHABLE C5 COUPLINGS
LOCK-ON HOSE
SINGLE BEAD
BARBED STEM
C14 COUPLINGS
LOW PRESSURE COUPLINGS
GLX COUPLINGS
POLARSEAL COUPLINGS
POLARSEAL II COUPLINGS
ASSEMBLY FABRICATION
POWER STEERING
PCTS THERMO-PLASTIC COUPLINGS
ADAPTERS
ACCESSORIES
QUICK DISCONNECT COUPLERS
BALL VALVES
KITS

Seven Easy Steps for Selecting the Proper Hose

An effective way to remember hose selection criteria is to remember the word...

STAMPED

S = Size

T = Temperature

A = Application

M = Material to be conveyed

P = Pressure

E = Ends or couplings

D = Delivery (volume and velocity)

1. Hose Size (Dash Numbers)

The inside diameter of the hose must be adequate to keep pressure loss to a minimum and avoid damage to the hose due to heat generation or excessive turbulence. See hose sizing Nomographic Chart.

To determine the replacement hose size, read the layline printed on the side of the original hose. If the original hose layline is painted over or worn off, the original hose must be cut and the inside diameter measured for size.

NOTE: Before cutting an original hose assembly, measure the overall assembly length and fitting orientation. These measurements will be required to build the replacement assembly.

The hydraulics industry has adopted a measuring system called Dash Numbers to indicate hose and coupling size. The number which precedes the hose or coupling description is the dash size (see table). This industry standard number denotes hose I.D. in sixteenths of an inch. (The exception to this is the SAE100R5 hoses C5C, C5D, C5E, C5M as well as, C14 and AC134a, where dash sizes denote hose I.D. equal to equivalent tube O.D.) See chart to the right.

	Hose I.D. (Inches)			
	All Except C5 Series, C14 and AC134a		C5 Series, C14 and AC134a	
Dash No.	Inches	Millimeters	Inches	Millimeters
-2	1/8	3.2	–	–
-3	3/16	4.8	–	–
-4	1/4	6.4	3/16	4.8
-5	5/16	7.9	1/4	6.4
-6	3/8	9.5	5/16	7.9
-8	1/2	12.7	13/32	10.3
-10	5/8	15.9	1/2	12.7
-12	3/4	19.0	5/8	15.9
-14	7/8	22.2	–	–
-16	1	25.4	7/8	22.2
-20	1-1/4	31.8	1-1/8	28.6
-24	1-1/2	38.1	1-3/8	34.9
-32	2	50.8	1-13/16	46.0
-36	2-1/4	57.6	–	–
-40	2-1/2	63.5	2-3/8	60.3
-48	3	76.2	–	–
-56	3-1/2	88.9	–	–
-64	4	101.6	–	–
-72	4-1/2	115.2	–	–

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Selecting the Proper Hose — con't.

Hose O.D. can be a critical factor when hose routing clamps are used or hoses are routed through bulkheads. Check individual hose specification tables for O.D.'s.

2. Temperature

When selecting a replacement assembly, two areas of temperature must be considered. These are fluid temperature and ambient temperature. The hose selected must be capable of withstanding the minimum and maximum temperature seen by the system. Care must be taken when routing near hot manifolds and in extreme cases a heat shield may be advisable.

See the Gates Hydraulic Hose Selection Guide; Hose Specification Pages; and/or the Additional Temperature Limits for Gates Hydraulic Hoses Chart for temperature ranges and limits for water, water/oil emulsions and water/glycol solutions.

3. Application

Determine where or how the replacement hose or assembly is to be used. Most often only a duplicate of the original hose will have to be made. To fulfill the requirements of the application, additional questions may need to be answered, such as:

- Where Will Hose be Used?
- Fluid and/or Ambient Temperature?
- Hose Construction?
- Equipment Type?
- Fluid Compatibility?
- Thread End Connection Type?
- Working and Surge Pressures?
- Environmental Conditions?
- Permanent or Field Attachable Couplings?
- Suction Application?
- Routing Requirements?
- Thread Type?
- Government and Industry Standards Being Met?
- Unusual Mechanical Loads?
- Minimum Bend Radius?
- Non-Conductive Hose Required?
- Excessive Abrasion?

4. Material to be Conveyed

Some applications require specialized oils or chemicals to be conveyed through the system. Hose selection must ensure compatibility of the hose tube, cover,couplings and O-rings with the fluid used. Additional caution must be exercised in hose selection for gaseous applications such as refrigerants and LPG.

NOTE: All block type couplings contain nitrile O-rings which must be compatible with the fluids being used.

5. Pressure

Most important in the hose selection process is knowing system pressure, including pressure spikes. Published working pressures must be equal to or greater than the system pressure. Pressure spikes greater than the published working pressure will shorten hose life and must be taken into consideration. Gates DOES NOT recommend using hoses on applications having pressure spikes greater than published working pressures of the hose.

6. Ends of Couplings

Identify end connections using Gates coupling templates and measuring tools or Coupling Identification section. Once thread ends have been identified, consult the appropriate section of the catalog for specific part number selection.

7. Delivery (Volume and Velocity)

If the same I.D. of the original hose is used, assume the system is properly sized to efficiently transport fluid. If the system is new or altered, determine the hose I.D. needed to transport required fluid volume flow by using the Nomographic Chart.

Agency Specifications and Hose Selection Guide

INDUSTRY AGENCIES

ABS — American Bureau of Shipping
AS — Australia Standard
DIN — Deutsch Industry Norm, German
DNV — Det Norske Veritas for North Sea Floating Vessels
EN — European Norm/Standard
GL — Germanischer Lloyds
IJS — Industrial Jack Specifications
RCCC — Regular Commom Carrier Conference for Fleet Truck and Bus
SAE — Society of Automotive Engineers

GOVERNMENT AGENCIES

DOT/FMVSS — U.S. Department of Transportation/ Federal Motor Vehicle Safety Standard
MSHA — U.S. Mine Safety and Health Administration
USCG — U.S. Coast Guard

Meets These Agency Specifications

Hose Type	ABS	AS	DIN	DNV	EN	GL	IJS	RCCC	SAE	DOT/ FMVSS	MSHA	USCG J1942	
												Fuel Oil	Power
EFG6K, G6K	X	X	20023 4SH/4SP	X	EN 856 4SH/4SP				100R15		X		X
EFG5K, G5K	X	X	20023 4SH/4SP	X	EN 856 4SH/4SP				100R13		X		X
EFG4K, G4K	X	X	20023 4SP		EN 856 4SP				100R12		X		X
EFG3K, G3K	X		20023 4SP		EN 856 4SP				100R12		X		X
M5K		X				X							
M4K+	X	X				X			100R19		X		X
M4KH	X					X			100R19		X		X
G2XH									100R2 Type AT		X		X
G2AT-HMP									100R2 Type AT		X		X*
M2T®	X	X		X	EN 853 2SN				100R16		X		X
M2T® Plus					EN 853 2SN				100R16		X		
CM2T					EN 857 2CS				100R16		X		
G2		X	20022 2SN	X	EN 853 2SN	X			100R2 Type AT		X		X
G2H		X		X	EN 853 2SN				100R2 Type AT		X	X	X
J2AT							X				X		
M3K	X	X		X	EN 857	X			100R17		X		X
M3K -12, -16	X	X		X	EN 857	X			100R17, 100R9		X	X	X
G1		X	20022 1SN	X	EN 853 1SN	X			100R1 Type AT		X		X
G1H				X	EN 853 1SN				100R1 Type AT		X	X	
MegaTech™									J1402, J1405	106-74 (-4 to -10)			
TR500									J1402	106-74			
NABT									J844				
C5C								RP305(B)	100R5	106-74 Type AII (-4 to -10)			
C5E									J1405	106-74 Type AI			
C5D									J1405	106-74 Type AII			
C5M	X								J30R2, J1527		X	X	
G3H					EN 854 R3				100R3				
GTH, GTHX					EN 854 R6				100R6				
GMV	X@	X							100R4		X		X
LOL											X		
THERMOPLASTIC													
TH7, TH7NC***									100R7				
TH8, TH8NC									100R8				
TH18, TH18NC									100R18				
C14									100R14				
REFRIGERANT													
PolarSeal® AC134a									J51 Type 2, J2064				
POWER STEERING													
PS188									2050				

* Except 1/4"
** Except 3/8" & 1/2"

*** TH7NC meets ANSI A92.2 for vehicle mounted aerial devices (-3 to -8)

@ to be used with a fire sleeve

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Characteristics of Hose Stock Types

The characteristics shown below are for the normal or usual range of these specific stocks. Stocks can be changed somewhat through different compounding to meet the requirements of specialized applications.

Tube and cover stocks may occasionally be upgraded to take advantage of improved materials and technology.

For detailed information on a specific hose tube or cover stock, check the Chemical Resistance Table and also the specific hose page.

	Neoprene (Poly-Choroprene) Type A	Nitrile (Acrylonitrile and Butadiene) Type C	Nylon Type Z	Hypalon* (Chlorosulfonated Polyethylene) Type M	EPDM (Ethylene Propylene Diene) Type P	CPE (Chlorinated Polyethylene) Type J	PTFE (Poly-tetrafluoro-ethylene) Type T
Flame Resistance	Very Good	Poor	Good	Good	Poor	Good	Good
Petroleum Base Oils	Good	Excellent	Good to Excellent	Good	Poor	Very Good	Excellent
Diesel Fuel	Fair to Good	Good to Excellent	Good to Excellent	Good	Poor	Good	Excellent
Resistance to Gas Permeation	Good	Good	Good To Excellent	Good to Excellent	Fair to Good	Good	Good to Excellent
Weather	Good to Excellent	Poor	Excellent	Very Good	Excellent	Good	Excellent
Ozone	Good to Excellent	Poor for Tube; Good For Cover	Excellent	Very Good	Outstanding	Good	Excellent
Heat	Good	Good	Good	Very Good	Excellent	Excellent	Excellent
Low Temperature	Fair to Good	Poor to Fair	Excellent	Poor	Good to Excellent	Good	Excellent
Water-Oil Emulsions	Excellent	Excellent	Good to Excellent	Good	Poor	Excellent	Excellent
Water/Glycol Emulsions	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Diesters	Poor	Poor	Excellent	Fair	Excellent	Very Good	Excellent
Phosphate Esters	Fair (For Cover)	Poor	Excellent	Fair	Very Good	Very Good	Excellent
Phosphate Ester Base Emulsions	Fair (For Cover)	Poor	Excellent	Fair	Very Good	Very Good	Excellent

*Registered trademark of DuPont.

Cover Abrasion Resistance

These comparisons are based on test results per ISO 6945 abrasion testing. The table shows the expected number of times of extended cover service life as compared to a standard cover.

	Modified Nitrile (Standard cover)	Nylon Sleeve	XtraTuff™	MegaTuff®
Relative Abrasion Resistance	1	**15 X** Standard Cover	**25 X** Standard Cover	**300 X** Standard Cover

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Additional Temperature Limits for Gates Hydraulic Hoses

Caution: Water, water/oil emulsions and water/glycol solutions must be kept below the temperatures listed in the table below, relative to line pressures.

Maximum Temperature Limits for Water, Water/Oil Emulsions and Water/Glycol Solutions

Hose	Pressure Lines	Return Lines
EFG6K, EFG5K, EFG4K, EFG3K, G5K, G3K, G2, G2L, MCPB+, M2T®, M6K, M5K, M4K+, M3K, RFS, RLA, C5C, C5E, CPS, LOC, LOL	+200°F (+93°C)	+180°F (+82°C)
G2H, G1H, MegaTech™ Line, G2XH, C5D, G3H, GTH, G4H, GMV, RLC, TR500, PowerClean™, M3KH, M4KH	+225°F (+107°C)	+180°F (+82°C)

Caution: The fluid manufacturer's recommended maximum operating temperature for any given fluid must not be exceeded. If different than the above listed hose temperatures, the lower limit must take precedence. Actual service life at temperatures approaching the recommended limit will depend on the particular application and the fluid being used in the hose. Intermittent (up to 10 percent of operating time) refers to momentary temperature surges. Detrimental effects increase with increased exposure to elevated temperatures.

Do NOT expose hose to maximum temperature and maximum rated working pressure at the same time.

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Standard Industry Specification	Description	Construction (Reinforcement)	Use	Stock			
				Tube		Cover	
				Name	Type	Name	Type
SAE 100R15 EN 856 TYPE 4SP/4SH	EFG6K	4&6-spiral, wire	Extremely High Pressure, Petrol, Oils, Environmental Fluids	Nitrile	C	Neoprene	A
SAE 100R13 EN 856 TYPE 4SP/4SH	EFG5K	4&6-spiral, wire	Extremely High Pressure, Petrol, Oils, Environmental Fluids	Nitrile	C	Neoprene	A
SAE 100R12 EN 856 TYPE 4SP	EFG4K	4&6-spiral, wire	Extremely High Pressure, Petrol, Oils, Environmental Fluids	Nitrile	C	Neoprene	A
SAE 100R12 EN 856 TYPE 4SP	EFG3K	4-spiral, wire	Extremely High Pressure Petrol, Oils	Nitrile	C	Neoprene	A
SAE 100R15 EN 856 TYPE 4SP/4SH	G6K	4&6-spiral, wire	Extremely High Pressure	Neoprene	A	Neoprene	A
SAE 100R13 EN 856 TYPE R13/4SP/4SH	G5K	4&6-spiral, wire	Extremely High Pressure Petrol, Oils	Neoprene	A	Neoprene	A
SAE 100R12 EN 856 TYPE 4SP	G3K	4-spiral, wire	Extremely High Pressure Petrol, Oils	Neoprene	A	Neoprene	A
SAE 100R12 EN 856 TYPE R12	C12	4-spiral, wire	High Pressure, Petrol, Oils	Neoprene	A	Neoprene	A
SAE 100R2 Type AT EN 853 Type 2SN	G2	2-braid, wire	Petroleum Oils	Nitrile	C	NBR/PVC	C_2
SAE 100R2 Type AT	MegaTech™ II	2-braid, wire	Petroleum Oils	CPE	J	Blue Textile	---
SAE 100R2 Type AT EN 853 Type 2SN	G2L	2-braid, wire	Petroleum Oils, Low Temperatures	Nitrile	C	Neoprene	A
SAE 100R16	M2T®	2-braid, wire	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2
Gates Proprietary	M6K	2-braid, wire	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2
Gates Proprietary	M5K	2-braid, wire	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2
SAE 100R19	M4K+	2-braid, wire	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2
SAE 100R17	M3K	1 & 2-braid, wire	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2
SAE 100R17 EN 857 1SC	M3KH	1-braid, wire	High Pressure Oil	Nitrile	C	NBR/PVC	C_2
SAE 100R2 Type AT EN 853 TYPE 2SN	G2H	2-braid, wire	High Temperature	Nitrile	C	Hypalon+	M
SAE 100R2 Type AT	G2XH	2-braid, wire	Multi-Fluid, High Temperature	CPE	J	CPE	J
IJ100	J2AT	2-braid, wire	Industrial Jack Hose	Nitrile	C	NBR/PVC	C_2
SAE 100R1 Type AT EN 853 Type 1SN	G1	1-braid, wire	Petroleum Oils	Nitrile	C	NBR/PVC	C_2
SAE 100R1 Type AT EN 853 TYPE 1SN	G1H	1-braid, wire	High Temperature	Nitrile	C	Hypalon+	M
SAE 100R3 EN 854 TYPE R3	G3H	2-braid, textile	Petrol. Oils, Antifreeze, Water, High Temperature	Nitrile	C	Neoprene	A
SAE 100R6 EN 854 TYPE R6	GTH	1-braid, textile	Petrol. Oils, Antifreeze, Water, High Temperature	Nitrile	C	Neoprene	A
SAE 100R4	G4H	2-spiral, textile, helical wire	Return & Suction High Temperature	Nitrile	C	Neoprene	A
SAE 100R4	GMV	2-spiral, textile, helical wire	Return & Suction High Temperature	Nitrile	C	Neoprene	A
SAE 30R2 Type 1 & 2	RLA	1-braid, textile	Return & Low Pressure	Nitrile	C	NBR/PVC	C_2
	RLC	3-braid, textile	Return & Low Pressure	Nitrile	C	NBR/PVC	C_2
	LOC	1-braid, textile	Petrol, Oils, Antifreeze, Water & Air	Nitrile	C	Textile	--
	LOL	1-braid, textile	Petrol, Oils, Antifreeze, Water & Air	Nitrile	C	***	A/C_2
SAE J1402, J1019	MegaTech™	2-braid, wire, textile	Hot Oil, Air Return Line	CPE	J	Textile	--
SAE J1019	MegaTech™v 250	2-braid, wire, textile	Transmission Oil Cooler, Hot Oil, Air Return Line	CPE	J	Textile	--
SAE J1402, DOT FMVSS106-74	TR500	2-braid, wire, textile	Petrol & Syn. Fluids, Air Brakes	Nitrile	C	Textile	—
SAE 100R5, DOT FMVSS106-74, Type AII	*C5C	3-braid, T-W-T	Petr. Oil, Air Brake, Power Steering	*Nitrile	C	Textile	—
SAE J1402, DOT FMVSS106-74, Type AII	C5D	3-braid, T-W-T	Petrol & Syn. Fluids, Air Brakes	CPE	J	Textile	—
SAE J1527, SAE J1942, ISO 7840	C5M	1-braid, wire	Marine Fuel & Oil	Nitrile	C	NBR/PVC	C_2
DOTFMVSS106-74, Type AI	C5E	3-braid, T-W-T	Air Brake, Power Steering, Lube	Nitrile	C	Textile	—
PTFE							
SAE 100R14	C14	1-braid, stainless steel	High Temperature, Multi Fluid, Nonconductive	PTFE	—	Stainless Steel	—
SAE 100R14	C14CT	1-braid, stainless steel	High Temperature, Multi Fluid, Conductive	PTFE	—	Stainless Steel	—
Thermoplastic							
SAE 100R7	TH7	1-braid, polyester	Petroleum & Synthetic Fluids	Nylon	Z	Urethane	U
SAE 100R7	TH7NC/TH7NCDL	1-braid, polyester	Non-conductive	Nylon	Z	Urethane	U
SAE 100R7	TH7DL	1-braid, polyester	Petroleum & Synthetic Fluids, Dual Line	Nylon	Z	Urethane	U
SAE 100R7	TH7NCDL	1-braid, polyester	Non-conductive, Dual Line	Nylon	Z	Urethane	U
SAE 100R8	TH8	2-braid, Polyester	Petroleum & Synthetic Fluids	Nylon	Z	Urethane	U
SAE 100R8	TH8NC	2-braid, Polyester	Non-conductive	Nylon	Z	Urethane	U
SAE 100R18	TH18	1-band, Synthetic Fiber	Petroleum & Synthetic Fluids	Nylon	Z	Urethane	U
SAE 100R18	TH18NC	2-band, Synthetic Fiber	Non-conductive	Nylon	Z	Urethane	U
Refrigerant							
SAE J51 Type AII Dimensions/ Type D Performance J2064, Type C, Class II Performance	PolarSeal® AC134a	Nylon barrier, 2-spiral, Polyester	Air Conditioning (R12 and R134a)	Chloroprene	A	EPDM	P
Power Steering, SAE J2050	PS188	2-braid, Nylon	Power Steering Fluids, High Temperature	Hypalon+	M	Neoprene	A
PowerClean™	PowerClean™	1 & 2-braid, wire,	Tight Bends, High Flexibility	Nitrile	C	NBR/PVC	C_2

* -4 and -5 sizes have a Neoprene tube. ** Nitrile or Neoprene † Registered trademark of DuPont.

Gates Hydraulic Hose Selection Guide

Description	Temp. Range (°F)	Dash Size vs. Rated Working Pressure (psi)															
		-2	-3	-4	-5	-6	-8	-10	-12	-16	-20	-24	-32	-40	-48	-56	-64
EFG6K	-40 +250					6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000				
EFG5K	-40 +250					5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000				
EFG4K	-40 +250					4,000	4,000	4,000	4,000	4,000	4,000						
EFG3K	-40 +250										3,000	3,000	3,000				
G6K	-40 +250					6,000	6,000	6,000	6,000	6,000	6,000	6,000					
G5K	-40 +250						5,000	5,000	5,000	5,000	5,000	5,000	5,000				
G3K	-40 +250										3,000	3,000	3,000				
C12	-40 +250											2,500	2,500				
G2	-40 +212		6,000	5,800		4,800	4,000	3,625	3,100	2,400	1,825	1,300	1,175				
MegaTech™ II											2,250	1,500	1,300				
G2L	-70 +212			5,800		4,800	4,000	3,625	3,100	2,400	1,825	1,300	1,175	1,195			
M2T®	-40 +212			5,000		4,000	3,500	3,000	2,250	2,000							
M6K	-40 +212			6,000													
M5K	-40 +212			5,000	5,000	5,000	5,000										
M4K+	-40 +212			4,000	4,000	4,000	4,000	4,000	4,000								
M3K	-40 +212		3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000							
M3KH	-40 +250			3,000		3,000											
G2H	-40 +275										1,650	1,300	1,175				
G2XH	-40 +300			6,000		5,000	4,250	3,625	3,100	2,500							
J2AT	-40 +120			10,000		10,000											
G1	-40 +212		3,625	3,275	3,125	2,600	2,325	1,900	1,525	1,275	925	725	600				
G1H	-40 +275			2,750		2,250	2,000	1,500	1,250	1,000	625	725	600				
G3H(C3H)	-40 +275			1,250		1,125	1,000	900	750	565	375						
GTH(C6H)	-40 +275		500	400	400	400	400	350	300	250							
G4H	-40 +275								300	212	200						
GMV	-40 +275								350	300	250	162	112	68	62	56	56
RLA	-40 +212		250	250	250	250	200	200	200	160							
RLC	-40 +275									200	200	200	200	150	150	150	
LOC	-40 +212			300		300	300	300	300								
LOL	-40 +212		300	300	300	300	300	300	300								
TR500	-40 +250			500		500	500	500	500	500							
MegaTech™	-40 +300			1000		1000	1000	1000	1000	1000	1000	500	500	500	500		
MegaTech™ 250	-40 +212			250		250	250	250	250	250	250						
C5C	-40 +212			3,000	3,000	2,250	2,000	1,750	1,500	800	625	500	350	350			
C5D	-40 +300•			1,500	1,500	1,500	1,250	1,250	750	400							
C5M	-40 +212				500	500	500	500	500	500							
C5E	-40 +300•			1,500	1,500	1,500	1,250	1,250	750	400	300						
C14	***			1,500	1,500	1,500	1,000	800	800	800							
C14CT	***					1,500	1,000										
TH7	-40 +212	2,500	3,000	2,750	2,500	2,250	2,000		1,250	1,000							
TH7NC	-40 +212	2,500	3,000	2,750	2,500	2,250	2,000		1,250	1,000							
TH7DL	-40 +212			2,750	2,500	2,250	2,000										
TH7NCDL	-40 +212			2,750		2,250	2,000										
TH8	-40 +212		5,000	5,000		4,000	3,500		2,250	2,000							
TH8NC	-40 +212			5,000		4,000	3,500										
TH18	-40 +212			3,000	3,000	3,000	3,000	3,000									
TH18NC	-40 +212			3,000	3,000	3,000	3,000	3,000									
PolarSeal® AC134a	-22 +257					500	500	500	500								
PS188	-40 +300					1,500											
PowerClean	-40 +212			3,500 6,000		3,000 4,000 5,000	2,500 4,000										

*** Dynamic temperatures -65 +400; Static temperatures +73 +450 • All purpose fleet application service — 40°F to +300°F (-40°C to +149°C), air to +250°F

SELECTION, INSTALLATION AND MAINTENANCE OF HOSE AND HOSE ASSEMBLIES— SAE J1273 OCT96 SAE Recommended Practice

Report of the Fluid Conductors and Connectors Technical Committee, approved September 1979 and reaffirmed May 1986. Completely revised by the SAE Fluid Conductors and Connectors Technical Committee SC2—Hydraulic Hose and Hose Fittings October 1996. Rationale statement available.

1. Scope

Hose (also includes hose assemblies) has a finite life and there are a number of factors which will reduce its life. This SAE recommended practice is intended as a guide to assist system designers and/or users in the selection, installation, and maintenance of hose. The designers and users must make a systematic review of each application and then select, install, and maintain the hose to fulfill the requirements of the application. The following are general guidelines and are not necessarily a complete list.

WARNING—IMPROPER SELECTION, INSTALLATION, OR MAINTENANCE MAY RESULT IN PREMATURE FAILURES, BODILY INJURY, OR PROPERTY DAMAGE.

2. References

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS — Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

J516—Hydraulic Hose Fittings

J517—Hydraulic Hose

3. Selection

The following is a list of factors which must be considered before final hose selection can be made:

3.1 Pressure

After determining the system pressure, hose selection must be made so that the recommended maximum operating pressure is equal to or greater than the system pressure. Surge pressures higher than the maximum operating pressure will shorten hose life and must be taken into account by the hydraulic designer.

3.2 Suction

Hoses used for suction applications must be selected to ensure the hose will withstand the negative pressure of the system.

3.3 Temperature

Care must be taken to ensure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds.

3.4 Fluid Compatibility

Hose selection must assure compatibility of the hose tube, cover, and fittings with the fluid used. Additional caution must be observed in hose selection for gaseous applications.

3.5 Size

Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage to the hose due to heat generation or excessive turbulence.

3.6 Routing

Attention must be given to optimum routing to minimize inherent problems.

3.7 Environment

Care must be taken to ensure that the hose and fittings are either compatible with or protected from the environment to which they are exposed. Environmental conditions such as ultraviolet light, ozone, salt water, chemicals, and air pollutants can cause degradation and premature failure and, therefore, must be considered.

3.8 Mechanical Loads

External forces can significantly reduce hose life. Mechanical loads which must be considered include excessive flexing, twisting, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adapters may be required to ensure no twist is put into the hose. Unusual applications may require special testing prior to hose selection.

3.9 Abrasion

While a hose is designed with a reasonable level of abrasion resistance, care must be taken to protect the hose from excessive abrasion which can result in erosion, snagging, and cutting of the hose cover. Exposure of the reinforcement will significantly accelerate hose failure.

3.10 Proper End Fitting

Care must be taken to ensure proper compatibility exists between the hose and coupling selected based on the manufacturer's recommendations substantiated by testing to industry standards such as SAE J517. End fitting components from one manufacturer are usually not compatible with end fitting components supplied by another manufacturer (i.e., using a hose fitting nipple from one manufacturer with a hose socket from another manufacturer). It is the responsibility of the fabricator to consult the manufacturer's written instruction or the manufacturer directly for proper end fitting componentry.

3.11 Length

When establishing proper hose length, motion absorption, hose length changes due to pressure, as well as hose and machine tolerances must be considered.

3.12 Specifications and Standards

When selecting hose, government, industry, and manufacturers' specifications and recommendations must be reviewed as applicable.

3.13 Hose Cleanliness

Hose components vary in cleanliness levels. Care must be taken to ensure that the assemblies selected have an adequate level of cleanliness for the application.

3.14 Electrical Conductivity

Certain applications require that hose be non-conductive to prevent electrical current flow. Other applications require the hose to be sufficiently conductive to drain off static electricity. Hose and fittings must be chosen with these needs in mind.

4. Installation

After selection of proper hose, the following factors must be considered by the installer.

4.1 Pre-Installation Inspection

Prior to installation, a careful examination of the hose must be performed. All components must be checked for correct style, size, and length. In addition, the hose must be examined for cleanliness, I.D. obstructions, blisters, loose cover, or any other visible defects.

4.2 Follow Manufacturers' Assembly Instructions

Hose assemblies may be fabricated by the manufacturer, an agent for or customer of the manufacturer, or by the user. Fabrication of permanently attached fittings to hydraulic hose requires specialized assembly equipment. Field-attachable fittings (screw style and segment clamp style) can usually be assembled without specialized equipment, although many manufacturers provide equipment to assist in this operation. SAE J517 hose from one manufacturer is usually not compatible with SAE J516 fittings supplied by another manufacturer. It is the responsibility of the fabricator to consult the manufacturer's written assembly instructions or the manufacturers directly before intermixing hose and fittings from two manufacturers. Similarly, assembly equipment from one manufacturer is usually not interchangeable with that of another manufacturer. It is the responsibility of the fabricator to consult the manufacturer's written instructions or the manufacturer directly for proper assembly equipment. Always follow the manufacturer's instructions for proper preparation and fabrication of hose assemblies.

4.3 Minimum Bend Radius

Installation at less than minimum bend radius may significantly reduce hose life. Particular attention must be given to preclude sharp bending at the hose/fitting juncture.

EQUIPMENT
HOSE/CPLG. SELECTION
GLOBALSPIRAL COUPLINGS
PCS COUPLINGS
GLOBALSPIRAL HIGH PRESSURE COUPLINGS
STAINLESS STEEL
PCM COUPLINGS
MEGACRIMP COUPLINGS
STAINLESS STEEL BRAID
POWER CRIMP COUPLINGS
FIELD ATTACHABLE G1 & G2 COUPLINGS
AIR BRAKE COPPER TUBING
SURELOK
HOSE CUTTERS & TOOLS
COMPRESSION AIR BRAKE
AIR BRAKE HOSE ASSEMBLIES
AIR BRAKE FOR RUBBER HOSE
FIELD ATTACHABLE C5 COUPLINGS
LOCK-ON HOSE
SINGLE BEAD
BARBED STEM
C14 COUPLINGS
LOW PRESSURE COUPLINGS
GLX COUPLINGS
POLARSEAL COUPLINGS
POLARSEAL II COUPLINGS
ASSEMBLY FABRICATION
POWER STEERING
PCTS THERMO-PLASTIC COUPLINGS
ADAPTERS
ACCESSORIES
QUICK DISCONNECT COUPLERS
BALL VALVES
KITS

4.4 Twist Angle and Orientation

Hose installations must be such that relative motion of machine components produces bending of the hose rather than twisting.

4.5 Securement

In many applications, it may be necessary to restrain, protect, or guide the hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to ensure such restraints do not introduce additional stress or wear points.

4.6 Proper Connection of Ports

Proper physical installation of the hose requires a correctly installed port connection while ensuring that no twist or torque is put into the hose.

4.7 Avoid External Damage

Proper installation is not complete without ensuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated.

4.8 System Check Out

After completing the installation, all air entrapment must be eliminated, and the system pressurized to the maximum system pressure and checked for proper function and freedom from leaks.

NOTE—Avoid potential hazardous areas while testing.

5. Maintenance

Even with proper selection and installation, hose life may be significantly reduced without a continuing maintenance program.

Frequency should be determined by the severity of the application and risk potential. A maintenance program should include the following as a minimum:

5.1 Hose Storage

Hose products in storage can be affected adversely by temperature, humidity, ozone, sunlight, oils, solvents, corrosive liquids and fumes, insects, rodents, and radioactive materials. Storage areas should be relatively cool and dark and free of dust, dirt, dampness, and mildew.

5.2 Visual Inspections

Any of the following conditions requires replacement of the hose:

a. Leaks at fitting or in hose.
(Leaking fluid is a fire hazard.)

b. Damaged, cut, or abraded cover.
(Any reinforcement exposed.)

c. Kinked, crushed, flattened, or twisted hose.

d. Hard, stiff, heat cracked, or charred hose.

e. Blistered, soft, degraded, or loose cover.

f. Cracked, damaged, or badly corroded fittings.

g. Fitting slippage on hose.

5.3 Visual Inspections

The following items must be tightened, repaired, or replaced as required:

a. Leaking port conditions.

b. Clamps, guards, shields.

c. System fluid level, fluid type, and any air entrapment.

5.4 Functional Test

Operate the system at maximum operating pressure and check for possible malfunctions and freedom from leaks.

NOTE—Avoid potential hazardous areas while testing.

5.5 Replacement Intervals

Specific replacement intervals must be considered based on previous service life, government or industry recommendations, or when failures could result in unacceptable down time, damage, or injury risk.