
MANA
COMPLETION SYSTEMS

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Gas Lift Equipment Catalog

Contents

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ABOUT US

MANA has decades of combined experience and expertise to meet all of your requirements. The focus of our company is to offer a quality product to our customers in the artificial lift industry. We strive to ensure that all customer specifications and expectations are met in a timely manner.

MANA offers mandrels in both oval and round configurations available in 2-3/8 inch through 7 inch tubing, featuring 1 inch and 1-1/2 inch inside diameter pocket profiles. The mandrels are designed with a tool discriminator that deflects larger tools from entering the pocket area and also protects the valve latch. These side pocket mandrels feature a single side pocket that accepts 1 inch and 1-1/2 inch outside diameter flow-control devices. An orienting sleeve in select designs allows an option to use positive kickover tool alignment to run or retrieve gas lift valves in deviated wells. We can manufacture mandrels in a variety of materials conforming to ASTM standards such as AISI 4130, 9Cr-1Mo, 13Cr, Inconel 718 and Incoloy 925 alloys. All mandrels are welded in accordance with ASME and are drifted and pressure tested to meet the design specification.

Quality

As an API Spec. Q1 and API Spec. 19G1 certified company, Mana Completion Systems is dedicated to providing our customers with the highest quality products in the industry. Mana Completion Systems strives for continuous improvement in all aspects of our business and maintains compliance to the most up-to-date industry regulations and guidelines. Mana Completion Systems brings all products through rigorous testing to ensure our products meet all industry and customer requirements.

Certifications

API 19G1 Licensed Manufacturer- License # 19G1-0020

Mana Completion Systems is an API 19G1 Monogram licensed manufacturer of Side Pocket Mandrels. API 19G1 is the industry standard for design, verification and validation testing of Side Pocket Mandrels. Through the strict requirements of API 19G1, Mana Completion Systems ensures that all Side Pocket Mandrels are manufactured to the highest level of quality in the industry.

API Specification Q1 - License # Q1-3316

Mana Completion Systems is an API Specification Q1 certified company. API Specification Q1 is the industry standard for Quality Management System requirements for manufacturing organizations in the petroleum and natural gas industry. Through the strict requirements of API Specification Q1, Mana Completion Systems ensures that a Quality Management System is in place to assure the quality, traceability and workmanship of all products throughout the production process.

Quality Policy Statement "As a quality-conscious organization, we are committed to achieving maximum customer satisfaction and quality of product at all times."

Gas Lift Application

Intermittent

In this application, high volumes of gas are injected into the annulus of the well. The reservoir fluid is produced intermittently by displacing fluid with high-pressure injection gas. This type of gas lift should only be used for tubular flow applications. Intermittent gas lift is applicable to low-productivity wells with low reservoir pressure. This application is best suited for wells that produce low volumes due to low BHP or low PI.

Continuous Gas Lift Tubular Flow

In this application, gas is injected continuously into the annulus. The majority of gas lift wells are continuous flow gas lift. The injected gas mixes with the produced well fluid and reduces the density of the fluid to a point where the reservoir pressure can push the fluid to the surface. This application is best suited for wells requiring artificial lift where a supply of pressurized gas is readily available.

Continuous Gas Lift Annular Flow

In this application, gas is injected continuously into the production tubing. The injected gas reduces the density of the fluid to a point where the reservoir pressure can push the fluid to the surface. This application has a larger flow area and will allow higher fluid rates to be produced. This application is best suited for wells that have a reservoir pressure that will support fluid to the surface.

Gas Lift Chamber Lift System

Chamber Lift is a form of intermittent-flow gas lift. High volumes of gas are injected intermittently into the annulus of the well. The injected gas travels down the annulus and displaces the fluid in an accumulation chamber and the tubing. This application uses an accumulation chamber to increase the volume of liquid produced in each cycle. This application is best suited for wells with low BHP and high PI.

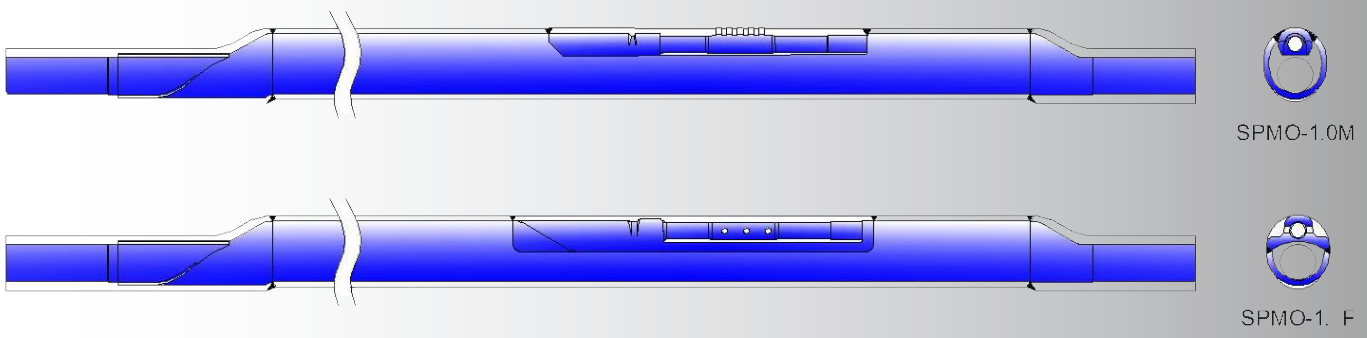
Gas Lift Application

Dual Well Gas Lift

In this application, gas is injected continuously into the annulus. The gas travels down the annulus and into the fluid column. This application is best suited for wells that have more than one reservoir which have to be produced independently.

Oval Body Design

Mana Completion Systems oval body design features either an integral one-piece machined pocket and tool discriminator or an integral one-piece forged pocket and tool discriminator that is offset from the tubing bore to allow full tubing drift room for well service operations. The tool discriminator deflects larger tools from entering the pocket area and also protects the valve latch. These side pocket mandrels feature a single side pocket that accepts 1 inch and 1-1/2 inch outside diameter flow-control devices. An orienting sleeve in select designs allows an option to use positive kick over tool alignment to run or retrieve gas lift valves in deviated wells. Depending on well applications, Mana's oval body design can be used to run in both single and dual completions. Besides tubing flow, our mandrels can also be used for specialized applications such as gauge monitoring, casing flow, chamber lift, waterflood, chemical injection and side string.

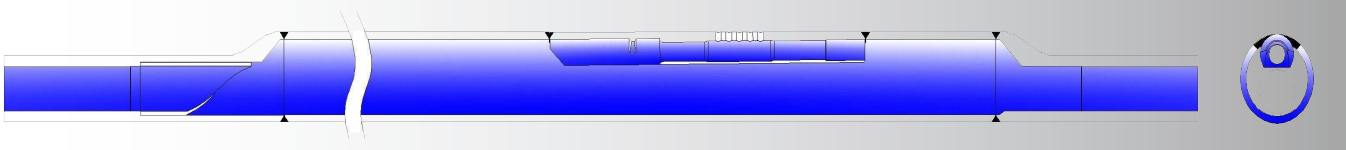


- Complete material and testing traceability is accomplished
- Mandrels are manufactured in accordance with API 19G1
- Mandrels manufactured of AISI 4130 or 13CR materials. Other materials available upon customer request.

Round Body Design

Mana Completion Systems round body design incorporates an integral one-piece machined pocket and tool discriminator that is offset from the tubing bore to allow full tubing drift room for well service operations. The tool discriminator deflects larger tools from entering the pocket area and also protects the valve latch. These side pocket mandrels feature a single side pocket that accepts 1 inch and 1-1/2 inch outside diameter flow-control devices. An orienting sleeve in select designs allows an op on to use positive kickover tool alignment to run or retrieve gas lift valves in deviated wells.

Depending on well applications, Mana's round body design can be used to run in slim hole completions or high pressure well applications. Besides tubing flow, our mandrels can also be used for specialized applications such as gauge monitoring, casing flow, chamber lift , water-flood, chemical injection and side string.



SPMO-1.0R

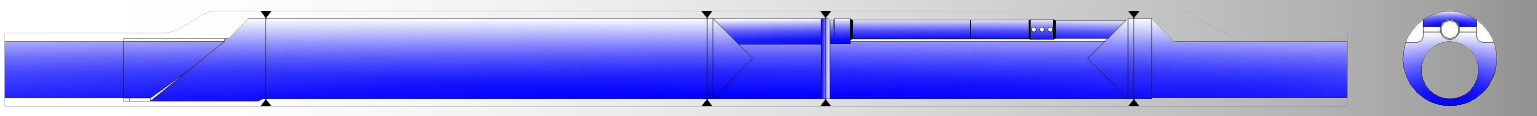
- Complete material and testing traceability is accomplished
- Mandrels are manufactured in accordance with API 19G1
- Round body mandrels are designed to be run in high-pressure well applications
- Mandrels manufactured of AISI 4130, 13CR, Incoloy 925 and other materials upon customer request

Side Pocket Mandrels

Round Solid Body Design

Mana Completion Systems round solid body design are manufactured from solid round bar stock and are utilized where corrosion resistance, superior strength and increased pressure capabilities are desired. These mandrels include a solid body deflector and pocket to allow full tubing drift room for well service operations. The deflector prevents larger tools from entering the pocket area and also protects the valve latch. The solid body pocket accepts 1-1/2 inch outside diameter flow-control devices. The upper swage section contains an orienting sleeve that allows the use of positive kickover tool alignment to run or retrieve gas lift valves in deviated wells.

Mana's round solid body design can be used to run in high pressure well applications and deep-water completions. Our solid body configuration can be custom designed with protective rails or milled slots for cable and control line bypass applications.



SPMO-1.5RSB

- Complete material and testing traceability is accomplished
- Mandrels are manufactured in accordance with API 19G1
- Round solid body mandrels are designed to be used in high-pressure well applications and deep-water completions
- Mandrels manufactured of AISI 4130, 13CR, Incoloy 925 and other materials upon customer request

Tubing Retrievable Mandrels

Conventional Mandrels

Mana Completion Systems' Conventional Mandrels are manufactured to accept both 1 inch and 1.5 inch IPO valves and checks, which are mounted externally on the mandrel body via an external lug. Mana Completion Systems regular "flatbar" conventional mandrels, CM-1.0 and CM-1.5, feature external side guards to protect the gas lift valves from damage as they are run downhole.

The Mana Completion Systems valve retaining Conventional Mandrels, CM-1.0VR and CM-1.5VR, feature an external tube mounted to the mandrel body that protects the gas lift valves from damage as they are run downhole. Both style Conventional Mandrels are available in 2 3/8 inch through 5 1⁄2 inch tubing sizes. All Mana Completion Systems' Conventional Mandrels are welded and pressure tested per internal quality procedures to ensure they meet all industry standards and are of the highest quality.

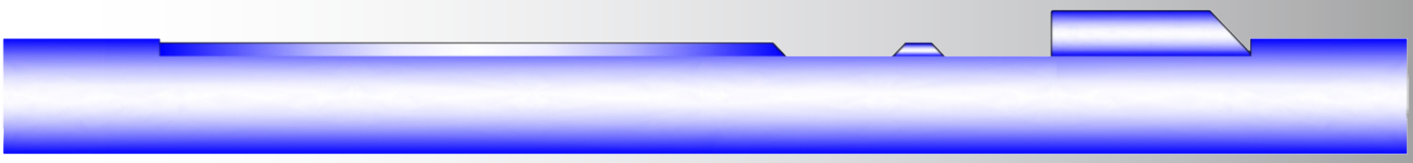
Internally Mounted Mandrels

Mana Completion Systems' series IM-1.0 Internally Mounted Mandrels, also referred to as Concentric Mandrels, are manufactured to accept 1 inch outside diameter (O.D.) gas lift and orifice valves. The IPO gas lift valves are mounted internally in the mandrel body, which does not allow an internal full-bore drift . The IM series mandrel has the same outside diameter dimensions as the tubing and is ideal in wells with limited clearance between the tubing and casing.

Mana Completion Systems' Internally Mounted Mandrels, IM-1.0, are available in 1 1⁄4 inch through 3 1⁄2 inch tubing sizes. Mana Completion Systems' IM-1.0 series mandrels are coated with "EP-2" red, epoxy phenolic coating and are welded and pressure tested per internal quality procedures to ensure they meet all industry standards and are of the highest quality.

Washover Mandrels

Mana Completion Systems' series CM-3 Washover Mandrels feature an exterior ported lug which accepts 5/8 inch and 1 inch IPO valves. The Mana Completion Systems CM-3 series Washover Mandrel is installed as part of the tubing string and is designed for single-string applications. The Mana Completion Systems CM-3 mandrel is ideal for slimhole operations and features a smooth inside diameter (I.D.) to ensure safe passage of wireline-tools. All Mana Completion Systems series CM-3 mandrels are drifted and hydro- statically tested per Mana Completion Systems internal quality procedures to ensure they meet all industry standards and are of the highest quality.



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Specification Chart

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SIDE POCKET MANDRELS
TECHNICAL DATA

Tubing Size		Mandrel Pocket I.D.		Mandrel Body Design	Mandrel Series		Major O.D.		Minor O.D.		Drift		Rated Test Pressures								Latch Type	Kickover Tool
													Standard Service				Sour Service					
					Mandrel Type	Assembly Number							Internal Test		External Test		Internal Test		External Test			
in.	mm	in.	mm				in.	mm	in.	mm	in.	mm	psi	bars	psi	bars	psi	bars	psi	bars		
2.375	60.3	1.000	25.4	Oval	SPMO-1.0M	1-110121-X0-XXX	4.250	108	2.910	73.9	1.901	48.3	8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	BK-2 BEK-2 INTEGRAL	OK-1 MERLA KOT-1
					SPM-1.0M	1-111121-X0-XXX													5,000	344.7		
					SPMO-1.0F	1-110111-X0-XXX													4,000	275.8		
					SPMO-1.0M-CI	1-110125-X0-XXX			3.410	86.6									5,000	344.7		
					SPMO-1.0F-CI	1-110115-X0-XXX																
				Round	SPMO-1.0R	1-110251-X0-XXX	4.125	104.8	N/A	N/A			11,500	792.9	11,500	792.9	9,500	655.0	9,500	655.0		
					SPMO-1.0R	1-110271-X0-XXX	4.500	114.3					13,500	930.2	13,500	930.2	12,000	827.4	11,000	758.4		
					SPMO-1.0R	1-110221-X0-XXX	3.850	97.8					6,000	413.7	3,600	248.2	5,000	344.7	3,300	227.5		
					SPM-1.0R	1-111211-X0-XXX	3.750	95.3					6,000	413.7	4,750	327.5	5,000	344.7	4,000	275.8		
		1.500	38.1	Oval	SPM-1.5M	1-211121-X0-XXX	4.750	120.7	4.000	101.6			8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	RK RKP	OM-1 KOT-2
					SPMO-1.5M	1-210121-X0-XXX																
2.875	73.0	1.000	25.4	Oval	SPMO-1.0M	1-120121-X0-XXX	4.750	120.7	4.000	101.6	2.347	59.6	8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	BK-2 BEK-2 INTEGRAL	OK-1 MERLA KOT-1
					SPM-1.0M	1-121121-X0-XXX																
					SPMO-1.0F	1-120111-X0-XXX													5,000	344.7		
					SPMO-1.0M-CI	1-120125-X0-XXX			4.500	114.3									4,000	275.8		
					SPMO-1.0F-CI	1-120115-X0-XXX													5,000	344.7		
				Round	SPMO-1.0R	1-120261-X0-XXX	5.000	127.0	N/A	N/A			13,500	930.8	13,500	930.8	12,000	827.4	11,000	758.4		
					SPMO-1.0R	1-120251-X0-XXX	4.750	120.7					11,000	758.4	9,000	620.5	9,000	620.5	7,500	517.1		
					SPMO-1.0R-CI	1-120255-X0-XXX	5.250	133.4					11,000	758.4	9,000	620.5	9,000	620.5	7,500	517.1		
					SPMO-1.0R	1-120231-X0-XXX	4.500	114.3					9,700	668.8	6,300	434.4	7,800	537.8	5,500	379.2		
		1.500	38.1	Oval	SPMO-1.5M	1-220121-X0-XXX	5.500	139.7	4.593	116.7			8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	RK RKP	OM-1 KOT-2
					SPM-1.5M	1-221121-X0-XXX																
					SPMO-1.5M-WF	1-220124-X0-XXX																
					SPMO-1.5F	1-220111-X0-XXX							7,500	517.1					5,000	344.7		
					SPMO-1.5F-WF	1-220114-X0-XXX																
				Round	SPMO-1.5R	1-220251-X0-XXX	5.500	139.7	N/A	N/A			11,500	792.9	9,500	655.0	9,500	655.0	8,000	551.5		
3.500	88.9	1.000	25.4	Oval	SPMO-1.0M	1-130121-X0-XXX	5.313	135.0	4.125	104.8	2.867	72.7	8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	BK-2 BEK-2 INTEGRAL	OK-1 MERLA KOT-1
					SPM-1.0M	1-131121-X0-XXX																
					SPMO-1.0F	1-130111-X0-XXX							7,000	482.6	5,500	379.2			4,500	310.3		
					SPMO-1.0M-CI	1-130125-X0-XXX			N/A	N/A			8,000	517.1	6,000	413.7			4,000	275.8		
					SPMO-1.0F-CI	1-130115-X0-XXX							7,000	482.6	5,500	379.2			4,500	310.3		
				Round	SPMO-1.0R	1-130261-X0-XXX	5.750	146.1					13,500	930.8	13,500	930.8	12,000	827.4	11,000	758.4		
					SPMO-1.0R	1-130251-X0-XXX	5.500	139.7					11,000	758.4	9,000	620.5	9,000	620.5	8,000	551.5		
					SPMO-1.0R-CI	1-130255-X0-XXX	6.000	152.4					11,000	758.4	9,000	620.5	9,000	620.5	8,000	551.5		
		1.500	38.1	Oval	SPMO-1.5M	1-230121-X0-XXX	5.968	151.6	5.000	127			8,000	551.5	6,000	413.7	6,000	413.7	4,000	275.8	RK RKP	OM-1 KOT-2
					SPM-1.5M	1-231121-X0-XXX																
					SPMO-1.5M-WF	1-230124-X0-XXX																
					SPMO-1.5F	1-230111-X0-XXX									6,500	448.2	7,000	482.6	5,500	379.2		
				Round	SPMO-1.5R	1-230251-X0-XXX	5.968	150.8	N/A	N/A			12,000	827.4	11,000	758.4	10,000	689.5	9,500	655.0		
					SPMO-1.5R-CI	1-230255-X0-XXX	6.438	163.5	N/A	N/A			12,000	827.4	11,000	758.4	10,000	689.5	9,500	655.0		
					SPMO-1.5R	1-230231-X0-XXX	5.800	147.3	N/A	N/A			11,000	758.4	10,000	689.5	9,000	620.5	8,500	586.1		
4.500	114.3	1.000	25.4	Oval	SPMO-1.0M	1-140121-X0-XXX	6.437	163.5	5.500	139.7	3.833	97.4	7,500	517.1	6,000	413.7	6,000	413.7	4,000	275.8	BK-2 BEK-2 INTEGRAL	OK-1 MERLA KOT-1
					SPMO-1.0F	1-140111-X0-XXX	6.437	163.5					7,000	482.6	5,000	344.7						
				Round	SPMO-1.0R	1-140251-X0-XXX	6.625	168.3	N/A	N/A			12,000	827.4	10,000	689.5	9,500	655.0	8,500	586.1		
					SPMO-1.0R	1-140231-X0-XXX	6.375	161.9	N/A	N/A			10,000	689.5	8,500	586.1	9,000	620.5	8,000	551.5		
					SPMO-1.0R	1-140211-X0-XXX	5.984	152.0	N/A	N/A			8,000	551.5	5,500	379.2	6,000	413.7	5,000	344.7		
					SPMO-1.0R	1-140221-X0-XXX	6.125	155.6	N/A	N/A			9,000	620.5	6,000	413.7	7,200	496.4	5,500	379.2		
					SPMO-1.0R-CI	1-140225-X0-XXX	6.625	168.3	N/A	N/A			9,000	620.5	6,000	413.7	7,200	496.4	5,500	379.2		
		1.500	38.1	Oval	SPMO-1.5M	1-240121-X0-XXX	7.031	178.6	6.080	154.4			7,500	517.1	6,000	413.7	6,000	413.7	5,000	344.7	RK RKP	OM-1 KOT-2
					SPMO-1.5F	1-240111-X0-XXX																
				Round	SPMO-1.5R	1-240251-X0-XXX	7.031	178.6	N/A	N/A			11,500	792.9	11,500	723.9	9,000	620.5	9,000	620.5		
					SPMO-1.5RSB	1-240451-X0-XXX																
					SPMO-1.5R-CI	1-240255-X0-XXX	7.531	191.3														
					SPMO-1.5RSB-CI	1-240455-X0-XXX																
5.500	139.7	1.500	38.1	Oval	SPMO-1.5M	1-250121-X0-XXX	7.938	201.6	6.812	173	4.653	118.2	7,500	517.1	6,000	413.7	6,000	413.7	5,000	344.7	RK RKP	OM-1 KOT-2
					SPMO-1.5F	1-250111-X0-XXX							8,500	586.1	7,000	482.6	6,500	448.2	5,500	379.2		
				Round	SPMO-1.5R	1-250251-X0-XXX	7.740	196.6	N/A	N/A			10,000	689.5	9,000	620.5	8,500	586.1	7,500	517.1		
					SPMO-1.5RSB	1-250451-X0-XXX																
					SPMO-1.5R	1-250261-X0-XXX	7.875	200.0					10,750	741.2	9,100	627.4	9,000	620.5	7,800	537.8		
					SPMO-1.5RSB	1-250461-X0-XXX																
					SPMO-1.5R-CI	1-250255-X0-XXX	8.240	209.3					10,000	689.5	9,000	620.5	8,500	586.1	7,500	517.1		
					SPMO-1.5RSB-CI	1-250455-X0-XXX																
					SPMO-1.5R-CI	1-250265-X0-XXX	8.375	212.3					10,750	741.2	9,100	627.4	9,000	620.5	7,800	537.8		
					SPMO-1.5RSB-CI	1-250465-X0-XXX																

www.manacompletionsystems.com
2415 South College Road
Lafayette, LA 70508
Tel:337-234-6060
Fax: 337-234-6611