Level Gage and Gage Valve
Materials of Construction, Typical

Drawing: M191980

Date: 16-May-2019
Revision: 11
Revision Date: 2-Feb-2023

inferno MANUFACTURING CORPORATION

Level Gage and Gage Valve
Materials of Construction, Typical

see additional notes on last page of this document

Date: 16-May-2019
Revision: 11
Revision Date: 2-Feb-2023

MOC-1 standard: Carbon Steel… NACE wetted… MDMT -20°F
suitable for Sour Process

Model Number examples: *R100-27 AAN **AABCAA***; *FT15; FT25*

Item	Wetted Part	Material	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber [a]	yes	carbon steel	quench & tempered; hardness < 22 HRC	square bar	ASTM A105 & ASTM A961 [b] or A420 WPL6 & A960 [d]	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)				
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)				
Valve Body	yes	carbon steel	normalized	forging	ASTM A105	**Yes**
Bonnet	no	CF3 (T304L SS)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim	yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector T1	yes	carbon steel	normalized or quench & tempered	forging	ASTM A105 and/or ASTM A350 LF2	**Yes**
Vessel and/or Gage connector T2	yes	carbon steel	normalized	bar	ASTM A420 WPL6 [d]	
Union nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Bonnet nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	Viton O-Ring (std)	range: -15°F to 400°F			
Connecting nipple	yes	carbon steel	per Standard	seamless pipe	ASTM A106 Gr B	**Yes**

Footnotes

[a] Q & T condition has been used continuously since 2019 for MOC-1. In case of delays in receipt of raw material we may substitute with same chemistry material but in cold drawn & stress relieved condition per SA/A 696.

[b] meets chemical and mechanical requirements of ASTM A105. Exception: gage chamber is of square cross section not "cylindical" see ASTM A961-16 Para. 6.1.1

[c] Maxos®

[d] "Partial compliance" qualification per S58 -Special Fittings of ASME/ASTM A/960, except markings…. Meets all chemical & mechanical requirements of ASTM A420 WPL6

MOC-2: Carbon Steel... NACE Wetted & Non-Wetted… MDMT -20°F
suitable for Sour Process, Sour Atmosphere ….B7M requires 20% de-rating

Model Number examples: *R100-27 AAN **AABCCA***; *FT15-ATM; FT25-ATM*

Item	Wetted Part	Material	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber [a]	yes	carbon steel	quench & tempered; hardness < 22 HRC	square bar	ASTM A105 & ASTM A961 [b] or A420 WPL6 & A960 [d]	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7M	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2HM	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)				
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)				
Valve Body	yes	carbon steel	normalized; hardness < 22 HRC	forging	ASTM A105	**Yes**
Bonnet	no	CF3 (T304L SS)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim	yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector T1	yes	carbon steel	normalized or quench & tempered	forging	ASTM A105 and/or ASTM A350 LF2	**Yes**
Vessel and/or Gage connector T2	yes	carbon steel	normalized	bar	ASTM A420 WPL6 [d]	
Union nut	no	carbon steel	stress relieved, 1100°F min.	cold forging	ASTM A105	
Bonnet nut	no	carbon steel	stress relieved, 1100°F min.	cold forging	ASTM A105	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	Viton O-Ring (std)	range: -15°F to 400°F			
Connecting nipple	yes	carbon steel	per Standard	seamless pipe	ASTM A106 Gr B	**Yes**

Footnotes

[a] Q & T condition has been used continuously since 2019 for MOC-1. In case of delays in receipt of raw material we may substitute with same chemistry material but in cold drawn & stress relieved condition per SA/A 696.

[b] meets chemical and mechanical requirements of ASTM A105. Exception: gage chamber is of square cross section not "cylindical" see ASTM A961-16 Para. 6.1.1

[c] Maxos®

[d] "Partial compliance" qualification per S58 -Special Fittings of ASME/ASTM A/960, except markings…. Meets all chemical & mechanical requirements of ASTM A420 WPL6

MOC-3: Low Temp -50°F Carbon Steel... NACE wetted… MDMT -50°F

suitable for Sour Process

Model Number examples: *R100-27 AAN **XXBCAA***; *FT15-LT; FT25-LT*

Item		Wetted Part	Material	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber [a]		yes	carbon steel	quench & tempered; hardness < 22 HRC	square bar	ASTM A420 WPL6 [d]	**Yes**
Cover flange		no	CF8M (T316 SS) or carbon steel	solution annealed normalized	casting	ASTM A351 ASTM A352 Gr LCC	
Bolt		no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut		no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]		yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket		yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)				
Cushion gasket		no	synthetic fiber with NBR binder (Klingersil® C4401)				
Valve Body		yes	carbon steel	quench & tempered; hardness < 22 HRC	forging	ASTM A350 LF2	**Yes**
Bonnet		no	CF3 (T304L SS)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim		yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector	T1	yes	carbon steel	normalized or quench & tempered	forging	ASTM A350 LF2	**Yes**
	T2	yes	carbon steel	normalized with Charpy test @ -50°F	bar	ASTM A420 WPL6 [d]	
Union nut		no	CF3M (T316L SS)	solution annealed	casting	ASTM A351	
Bonnet nut		no	CF3M (T316L SS)	solution annealed	casting	ASTM A351	
Stem Packing		yes	TFE	operating to 500°F			
Union Seal		yes	low temp Viton O-Ring (std)	range: -50°F to 400°F			
Connecting nipple		yes	stainless steel; low temp carbon steel	per Standard	seamless pipe	ASTM A312 (SS) ASTM A333 (CS)	**Yes**

Footnotes

[a] Q & T condition has been used continuously since 2019 for MOC-1. In case of delays in receipt of raw material we may substitute with same chemistry material but in cold drawn & stress relieved condition per SA/A 696.

[c] Maxos®

[d] "Partial compliance" qualification per S58 -Special Fittings of ASME/ASTM A/960, except markings…. Meets all chemical & mechanical requirements of ASTM A420 WPL6

MOC-4: LG = SS/CS… GV = SS/CS… NACE wetted… MDMT -20°F *suitable for Sour Process*	*Model Number examples*	*R100-27 AAN **EABCAA*** *FT15-SS/CS; FT25-SS/CS*

Item	Wetted Part	Material / Grade	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber	yes	T316	annealed & cold drawn; hardness < 22 HRC	square bar	ASTM A479	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)		sheet		
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)		sheet		
Valve body	yes	F316L	solution annealed; hardness < 22 HRC	forging	ASTM A182	**Yes**
Bonnet	no	CF3 (T304L)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim	yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector	yes	T316L	solution annealed; hardness < 22 HRC	bar	ASTM A479	**Yes**
Union nut	no	carbon steel	stress relieved, 1100°F min.	cold forging	ASTM A105	
Bonnet nut	no	carbon steel	stress relieved, 1100°F min.	cold forging	ASTM A105	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	TFE (std)	range: -250°F to 450°F			
Connecting nipple	yes	T316	solution annealed	seamless pipe	ASTM A312	**Yes**

Footnotes

[c] Maxos®

inferno MANUFACTURING CORPORATION

Level Gage and Gage Valve
Materials of Construction, Typical

see additional notes on last page of this document

MOC-5: LG = SS/CS… GV = SS/SS… NACE wetted... MDMT -20°F ***suitable for Sour Process***	*Model Number examples*	*R100-27 AAN **EABCAA*** *FT15-SS; FT25-SS*

Item	Wetted Part	Material / Grade	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber	yes	T316	annealed & cold drawn; hardness < 22 HRC	square bar	ASTM A479	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)		sheet		
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)		sheet		
Valve body	yes	F316L	solution annealed; hardness < 22 HRC	forging	ASTM A182	**Yes**
Bonnet	no	CF3M (T316L)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim	yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector	yes	T316L	solution annealed; hardness < 22 HRC	bar	ASTM A479	**Yes**
Union nut	no	Gr CF8M (T316)	solution annealed	casting	ASTM A351	
Bonnet nut	no	Gr CF8M (T316)	solution annealed	casting	ASTM A351	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	TFE (std)	range: -250°F to 450°F			
Connecting nipple	yes	T316	solution annealed	seamless pipe	ASTM A312	**Yes**

Footnotes

[c] Maxos®

MOC-6: All Stainless Steel... NACE wetted... MDMT -320°F ***suitable for Sour Process... B8M Cl2 requires 15% de-rating***	*Model Number examples*	*R100-27 AAN **EEBCEA*** *FT15-SS; FT25-SS*

Item	Wetted Part	Material / Grade	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber	yes	T316	annealed & cold drawn; hardness < 22 HRC	square bar	ASTM A479	**Yes**
Cover flange	no	CF3M (T316L)	solution annealed	casting	ASTM A351	
Bolt	no	T316	mechanically strengthened (strain hardened)	fabricated	ASTM A193 Gr B8M Cl 2	
Nut	no	T316	per Standard	fabricated	ASTM A194 Gr 8M	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)		sheet		
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)		sheet		
Valve body	yes	F316L	solution annealed; hardness < 22 HRC	forging	ASTM A182	**Yes**
Bonnet	no	CF3M (T316L)	solution annealed; hardness < 22 HRC	casting	ASTM A351	
Trim	yes	T316 SS	solution annealed; hardness < 22 HRC	bar	ASTM A479	
Vessel and/or Gage connector	yes	T316L	solution annealed; hardness < 22 HRC	bar	ASTM A479	**Yes**
Union nut	no	Gr CF8M (T316)	solution annealed	casting	ASTM A351	
Bonnet nut	no	Gr CF8M (T316)	solution annealed	casting	ASTM A351	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	TFE (std)	range: -250°F to 450°F			
Connecting nipple	yes	T316	solution annealed	seamless pipe	ASTM A312	**Yes**

Footnotes

[c] Maxos®

MOC-7: Carbon Steel…. Non-NACE gage valves… MDMT -20°F

Model 15A valve workings are susceptible to corrosion by H2O, CO2 & trace H2S. MOC-1 is recommended for crude.

Model Number examples: *R100-27 AAN **AABCAA***; *15A Non-NACE trim*

Item	Wetted Part	Material	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber [a]	yes	carbon steel	quench & tempered; hardness < 22 HRC	square bar	ASTM A105 & ASTM A961 [b] or A420 WPL6 & A960 [d]	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)				
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)				
Valve Body	yes	carbon steel	normalized	forging	ASTM A105	**Yes**
Trim	yes	T410 SS (non-NACE)	annealed	bar	ASTM A479	
Vessel connector T1	yes	carbon steel	normalized	bar	ASTM A420 WPL6 [d]	**Yes**
Vessel connector T2	yes	carbon steel	normalized or quench & tempered	forging	ASTM A105 and/or ASTM A350 LF2	
Union nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Bonnet nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	Viton O-Ring (std)	range: -15°F to 400°F			
Connecting nipple	yes	carbon steel	per Standard	seamless pipe	ASTM A106 Gr B	**Yes**

Footnotes

[a] Q & T condition has been used continuously since 2019 for MOC-1. In case of delays in receipt of raw material we may substitute with same chemistry material but in cold drawn & stress relieved condition per SA/A 696.

[b] meets chemical and mechanical requirements of ASTM A105. Exception: gage chamber is of square cross section not "cylindical" see ASTM A961-16 Para. 6.1.1

[c] Maxos®

[d] "Partial compliance" qualification per S58 -Special Fittings of ASME/ASTM A/960, except markings…. Meets all chemical & mechanical requirements of ASTM A420 WPL6

MOC-8: Carbon Steel… *NACE wetted… MDMT -20°F

15A "conventional" style gage valves were not designed for sour service. Although trim conforms to NACE, workings are susceptible to corrosion by H2O, CO2 & trace H2S. For crude use MOC-1, Free Turn ® valves

Model Number examples — *R100-27 AAN **AABCAA** 15A*

Item	Wetted Part	Material	Condition	Raw Mat'l Form	Specification qualifications shown in footnotes	Traceability MTR's available
Gage chamber [a]	yes	carbon steel	quench & tempered; hardness < 22 HRC	square bar	ASTM A105 & ASTM A961 [b] or A420 WPL6 & A960 [d]	**Yes**
Cover flange	no	carbon steel	normalized	casting	ASTM A216 Gr WCC	
Bolt	no	alloy steel	quench & tempered	fabricated	ASTM A193 Gr B7	
Nut	no	carbon steel	quench & tempered	fabricated	ASTM A194 Gr 2H	
Glass [c]	yes	borosilicate glass	tempered (thermally toughened)	molded	DIN 7081	
Seal gasket	yes	flexible graphite with SS insert (Garlock Graph-Lock® 3125 SS)				
Cushion gasket	no	synthetic fiber with NBR binder (Klingersil® C4401)				
Valve Body	yes	carbon steel	normalized	forging	ASTM A105	**Yes**
Trim	yes	T410 SS (per NACE)	HT per Table A.23 of NACE MR01-73-3 Part 3	bar	ASTM A479	
Vessel connector T1	yes	carbon steel	normalized	bar	ASTM A420 WPL6 [d]	**Yes**
Vessel connector T2	yes	carbon steel	normalized or quench & tempered	forging	ASTM A105 and/or ASTM A350 LF2	
Union nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Bonnet nut	no	carbon steel	stress relieved	cold forging	ASTM A105	
Stem Packing	yes	TFE	operating to 500°F			
Union Seal	yes	Viton O-Ring (std)	range: -15°F to 400°F			
Connecting nipple	yes	carbon steel	per Standard	seamless pipe	ASTM A106 Gr B	**Yes**

Footnotes

[a] Q & T condition has been used continuously since 2019 for MOC-1. In case of delays in receipt of raw material we may substitute with same chemistry material but in cold drawn & stress relieved condition per SA/A 696.

[b] meets chemical and mechanical requirements of ASTM A105. Exception: gage chamber is of square cross section not "cylindical" see ASTM A961-16 Para. 6.1.1

[c] Maxos®

[d] "Partial compliance" qualification per S58 -Special Fittings of ASME/ASTM A/960, except markings…. Meets all chemical & mechanical requirements of ASTM A420 WPL6

Notes:

1. Cold Ambient conditions

* LG's holding water subject to freezing weather must be insulated or heat traced to prevent ice formation from damaging seal gaskets. WARNING- freezing water can extrude seals and require re-building. Consider draining standing water from level gage during freezing weather.

2. Cold Process applications

* Non-Frost extensions recommended for cold process; use final letter "F" to indicate this option. Also note possible interference with valve handwheel in Fig 4-1 position if connecting pipe nipple is 2" or less in OAL. For more info see A212162
* Extended valve stem available to provide clearance for insulation under handwheel. Designate model number as FT15-LS (example)

3. Gage Glass

Inferno uses Maxos® brand glass. This glass is melted and pressed at factory of Auer Lighting GmbH in Germany. Factory quality control includes mechanical testing (destructive test by sampling) to insure conformance to worldwide quality standard DIN 7081.
Beware of non-conforming Counterfeit glass. For example, see letter Dec. 11, 2018

4. High Temperature limitations

* R100, T100, T200 catalog cut sheets show non-steam pressure ratings to 572°F. Inferno's previous publications showing 600°F limit was based on satisfactory history & consistent with other published industry ratings. Our glass supplier, Maxos®, recommends 572°F (300°C) maximum upper limit for operation.

It is to be noted that temperature experienced by the glass pane, installed in the Level Gage does not normally translate to the same temperature as the fluid of the vessel itself. The glass panes in the LG are remote from the fluid in vessel to the extent of the connecting piping where cooling by ambient air may occur. Generally there is no warming flow through the LG because of the static operating nature. Exceptions are during blow-down when vessel operating fluid may flow through the LG.

Maxos® reports their gage glass conforms and exceeds the standard DIN 7081 limit of 536°F. Maxos® recommends that the glass may be used at full pressure ratings up to 572°F without loss of strength. In addition, the glass used in Level Gages may be used in non-steam applications up to 600°F, such as thermal transfer (hot oil) systems, provided that operating pressure is limited to 145 PSI (10 bar), as provided by the "Explanatory Notes" in the DIN Standard.

5. Thermal Shock

* During cooling or warming, the rate of temperature change should not exceed 73˚F (23˚C) per minute, otherwise excessive thermal stresses can cause glass breakage.

6. Steam Service Applications

* Boilers (fired vessels) fall under special ASME rules. Consult factory for appropriate configurations meeting PG60 and Appendix A-18.

* In steam service, R100 is rated to 250 WSP; T100/T200 with protective mica shield is rated to 450 WSP. T100/T200 without mica protection is rated same as reflex, to 250 WSP. Exposure of unprotected glass to hot water in excess of these limits causes chemical and structural breakdown to the glass, and consequent loss of strength, leading to leaks and eventual glass breakage.

7. Standard Factory Finish (carbon steel parts):

Component	Standard Finish	Alternate Finish
Gage chamber	zinc electroplate- gold, green or black	Spray paint for fast turn-arounds and gage sizes longer than 96"
Cover flange	powder paint- red	
Cap Screw	zinc electroplate	
U-Bolt	mechanical zink plate	
Nut	zinc electroplate	
Valve Body	2 part epoxy- grey	
Vessel and/or Gage connector	2 part epoxy- grey	phosphatize only, or spray paint
Union nut	2 part epoxy- grey	
Bonnet nut	2 part epoxy- grey	
Handwheel	2 part epoxy or powder: red, yellow, blue and grey according to material	

8. OPTIONAL MATERIALS	Wetted Part	Material	Temperature Range
LG Seal	yes	Gylon 3504 Blue, 3500 Fawn, 3510 Off-White	to 500°F
LG Shield	yes	Mica	to 457°F (450 WSP)
LG Bolting Accessory	no	Belleville Washer, 17-7 PH SS	to 457°F (450 WSP)
Valve Stem Packing	yes	Grafoil	to 572°F (limited by glass)
Valve Union Seal, Alternate	yes	TFE	-250°F to 450°F
		Low Temp Viton, use for sour service	-50°F to 400°F
		HSN Highly Saturated Nitrile (HNBR)	-55°F to 300°F
		Low Temp Nitrile	-65°F to 250°F
		Aflas	+25°F to 450°F
		Kalrez (Hi Temp)	Depends on compound

9. ACCESSORIES/OPTIONS	Wetted Part	Item	Application
LG Cleaning Brush	no	Nylon bristle x 40" handle	Large diameter fits thru 1/2" S160 and larger
LG Non-Frost Extension	no	Clear Acrylic Plastic & SS mounting hardware	Low process temperature
LG Insulation Jacket	no	Low ambient temperature, or low process temp	Low ambient temperature, or low process temp
LG Illuminator	no	LED type	
LG Scale	no	English or Metric	Aluminum, Stainless, Plastic Hi Vis. Yellow
LG Vertical Rising Ball	yes	safety ball check per ASME BPVC PG60	Integral in gage chamber or separate pipe nipple for steam boiler service, or "nuisance" checking
GV: Extra Long Valve Stem	yes	T316 SS, TFE coated threads	To accommodate insulation, or to avoid interference with plastic non-frost extension
GV: Spherical Union	yes	includes O-ring seal	Close Hook-Up or "Tee Combo" assemby
GV: Upgrade	no	change CS nut to T316	
GV: Flanged Vessel Conn	yes	threaded or welded w PWHT (CS)	
LG—GV Combo:	yes	assembly on vessel centers at Inferno factory	End Connected S80 standard; S160 optional Close Hook-Up: S160
LG—GV Combo:	yes	full port ball valve at vent/drain	2000#, 3000#
LG—GV Combo:	yes	pipe plugs installed at open ports	Normally supplied open unless directed
LG—GV Combo:	no	gage support	Heavy gage assembly: Welded bracket or no-weld bottom support

10. History of Revisions

Revision #	Date	Main changes
8	5/24/2021	Renamed material "Groups" to MOC numbers; Re-ordered; Added two new MOC's for special case Model 15A
9	1/12/2022	On page 10, corrected max temp for LT Viton (should be 400°F, not 450°F); Added table of contents
10	7/17/2022	For steel construction, if surface hardness of quench & tempered raw material exceeds 187 BHN, then we will certify gage chamber material to ASTM A420 Grade WPL6 *instead* of A105
11	2/2/2023	MOC 5 & 6: changed Packing Bonnet to CF3M (T316L) from CF3 (T304L), MOC 1, 2, 7 & 8: added "and/or ASTM A350 LF2" to forged vessel connector