



## Specification

### Piping Material Specifications



RIG/PLANT ORS Pioneer		
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REMARKS Additional remarks to the document		
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## **CHANGE DESCRIPTION**

Revision	Change description
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2	Re-Issued AFC – Changes are indicated with a bar in the right hand margin
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TABLE OF CONTENTS	PAGE
1 REFERENCE DOCUMENTS.....	4
2 CODES AND STANDARDS.....	4
3 GENERAL NOTES.....	5
4 DEFINITIONS AND ABBREVIATIONS.....	5
5 COMPOSITION OF PIPING CLASS SHEET NUMBERS.....	6
6 PIPING MATERIAL SELECTION.....	7
7 PIPING CLASS SHEETS - INDEX.....	9
8 PIPING CLASS SHEETS.....	10
9 ELEMENT DATA SHEETS – BRANCH CONNECTIONS.....	39

## 1 REFERENCE DOCUMENTS

### 1.1 Data Sheets

Piping Valve Data Sheets	R5188 – NOV – L – 4001
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### 1.2 Specifications

Piping Insulation Specification	R5188 – NOV – L – 4003
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### 1.3 Miscellaneous

Piping Wall Thickness Calculations	R5188 – NOV – L – 4002
Piping Special Item Data Sheets	R5188 – NOV – L – 4004
Piping Details - Miscellaneous	R5188 – NOV – L – 4006

## 2 CODES AND STANDARDS

2.1 This document is based on the latest issue of the ASME Code for pressure Piping, ASME B31.3, 'Process Piping', incorporating all published addenda, and on the following NORSOK Standards:

L-001	Piping and Valves
M-630	Material Data Sheets for Piping
M-601	Welding and Inspection of Piping

Refer to M-630, Section 3.2 for details of NORSOK deviations from ASME B31.3 code requirements.

2.2 The following standards and recommended practices are applicable:

ASME B31.3	Process Piping
ASME B16.5	Steel Pipe Flanges and Flanged Fittings
ASME B16.9	Factory Made Wrought Steel, Butt-Weld Fittings
ASME B16.10	Face-to-Face and End-to-End Dimensions of Valves
ASME B16.11	Forged Steel Fittings, Socket Welding and Threaded
ASME B16.20	Metallic Gaskets for Pipe Flanges
ASME B16.21	Non-Metallic Gaskets for Pipe Flanges
ASME B16.25	Butt welding Ends
ASME B16.34	Steel Valves
ASME B36.10M	Welded and Seamless Wrought Steel Pipe
ASME B36.19M	Stainless Steel Pipe
ASTM A153	Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
ASME B1.20.1	Pipe Threads, General Purpose. (Inch)
API 6D	Pipeline Valves
API 594	Wafer Check Valves
API RP 14E	Design and Installation of Offshore Production Platform Piping Systems
API 16A	Specification for Drill Through Equipment
API 6A	Specification for Wellhead and Christmas Tree Equipment.
API 600	Steel Gate valves, Flanged
API 609	Lug and Wafer Type Butterfly Valves
API 598	Valve Inspection and Testing
MSS-SP-75	High Test Wrought Butt Welded Fittings
MSS SP-97	Integrally Reinforced Forged Branch Outlet Fittings-Socket Welding, Threaded and Butt welding Ends
BS 2080	Dimensions of Valves
BS 6755 (part 1)	Testing of Valves
BS EN 10204:1991	Materials Testing Certificates
ISO 6164 (1994)	Hydraulic 4 Bolt Square Flanges

SAE J518	Hydraulic Flanged Tube, Pipe, and hose Connectors. Four Bolt Split Flange Type
NACE MR-0175-2003	Metals for Sulphide Stress Cracking & Stress Corrosion Cracking Resistance in Sour Oilfield Environments
NFPA	National Fire Prevention Association

For further normative references, refer to NORSOK L-001, Section 2

### 3 GENERAL NOTES

- 3.1 All materials shall conform to NORSOK Standards L-001, M-630 and M-601.
- 3.2 All piping materials and their dimensions, tolerance, chemical composition, physical properties, heat treatment, hydro test and other testing and marking shall conform to the codes and standards specified.
- 3.3 Test reports shall be supplied for all mandatory tests as per the applicable material specifications. Test reports shall also be furnished for any supplementary tests as specified.
- 3.4 Material test certificates (physical property, chemical composition and heat treatment report) shall also be furnished for the piping materials specified.
- 3.5 Material test certification shall comply with the requirements of BS EN 10204 or equivalent as required by class.

### 4 DEFINITIONS AND ABBREVIATIONS

- 4.1 NORSOK (Norsk Søkkel Konkurransesposisjon) is the Competitive Standing of the Norwegian Offshore Sector, the Norwegian initiative to reduce costs on offshore projects.

- 4.2 The abbreviations listed below are used in this document.

BE	-	Bevel end
BW	-	Butt weld
CJ	-	Compact flange end
CL	-	Clamped type end
CS	-	Carbon steel
CR	-	Compression fitting end
C & T	-	Coned & threaded
EDS	-	Element data sheet
FB	-	Full bore
FF	-	Flat face
FL SAE	-	SAE – Flanged SAE
FS	-	Female sub
FT	-	Female threaded end
Galv	-	Galvanised
Gr.	-	Grade
GRE	-	Glass Reinforced Epoxy
HP	-	High Pressure
KSI	-	Thousand pounds per square inch
LP	-	Low Pressure
LR	-	Long radius
LT	-	Low Temperature
MDS	-	Material data sheet
MS	-	Male sub

MT	-	male threaded end
NACE	-	National Association of Corrosion Engineers
NB	-	Nominal bore
NPT	-	National pipe thread
OBM	-	Oil Based Mud
OD	-	Outside diameter
OS&Y	-	Outside Screw & Yoke
PBE	-	Plain both ends
PE	-	Plain end
POE	-	Plain one end
PSI	-	Pounds per square inch
PSL	-	Product specification level
PWHT	-	Post weld heat treatment
RB	-	Reduced bore
RF	-	Raised face
RTJ	-	Ring type joint
SAE	-	Society of Automotive Engineers
Sch.	-	Schedule
SO	-	Slip on
SMLS	-	Seamless
St.Stl.	-	Stainless steel
SW	-	Socket weld
TE	-	Threaded end
TOE	-	Thread one end
VDS	-	Valve data sheet
VSK	-	Valve specification key
VSM	-	Valve selection manual
WN	-	Weld neck
WBM	-	Water Based Mud
WT	-	Wall thickness

For further abbreviations, refer to NORSOK L-001, Section 3.2

## 5 COMPOSITION OF PIPING CLASS SHEET NUMBERS

5.1 The Piping Class Sheets in this document are NORSK compatible. Each class sheet number comprises four, five or six characters which relate to the following definitions:

First character	Flange (pressure) rating	Remarks
A	ASME B16.5 Class 150	
B	ASME B16.5 Class 300	
C	not used	
D	not used	
E	not used	
F	ASME B16.5 Class 1500	250 Bar (For hydraulic piping specs.)
G	JS80X	
H	not used	
J	345 Bar	
K	API 10000 PSI	
K	API 10000 PSI	Modified to 7500 PSI WP
L	API 15000 PSI	
P	not used	
Z	not used	
Y	not used	
Second character	Base material type	Remarks
C	Carbon steel	
D	not used	
G	Galvanised carbon steel	Not listed in NORSOK L-001, Section 4.9
P	not used	
R	not used	
S	Austenitic stainless steel Type 316	
T	not used	
X	High strength low alloy steels	
Third & fourth character	Sequence number	
Fifth character	Special application	Remarks
S	Sour service	
X	Special application other than S	
Sixth character	Special application	Remarks
S	Sour service	To be used where X is the fifth character

## 6 PIPING MATERIAL SELECTION

Piping Class	Flange Rating	Pipe Material	Design Limits		Corrosion/ Erosion Allowance (mm)	Service	Service Code
			bar	°C			
AC11	ASME B16.5 Class 150	CS-ASTM A333 Gr.6	19.6/ 10.2	-46/ 300	3.0	Condensate-LP Drain-Sewer/Sanitary Mud-LP-Mixing & Storage Mud-LP-Supply Steam-LP-Utility Base Oil Mud-Drain Open Drain Atmos vent	CL DS ML ML SU WT DM DO VA
AC11S	ASME B16.5 Class 150	CS-ASTM A333 Gr.6 (NACE)	19.6/ 10.2	-46/ 300	3.0	Choke & Kill System Mud-LP-Solids Control Amos Vent	ML ML VA
AC21X	ASME B16.5 Class 150	CS-ASTM A106 Gr.B	19.6/ 10.2	-29/ 300	3.0	Oil - fuel	OF
AC71X	ASME B16.5 Class 150	CS-ASTM A106 Gr.B	8.0	-29/ 80	1.5	Cement-LP Mud-Bulk Cement-Bulk Atmos Vent	CM MB BC VA
AD75	ASME B16.5 Class 150	St Steel S32760	19.6/ 17.7	-29/ 38	0	Brine	FC
AG70X	ASME B16.5 Class 150	CS-ASTM A106 Gr.B Galvanised	19.6/ 17.7	-29/ 100	1.5	Foam-Fire Fighting Fire Fighting System/ Deluge Water-Drill Water-Sea Atmos Vent	FF WF WP WS VA
AS20	ASME B16.5 Class 150	St Steel 316	19.0/ 18.0	-101/ 60	0.0	Air-Bulk Air-Instrument Air-Plant Cement-Liquid Additive Chemical- Mud Additive Cooling-Medium Water-Potable Atmos Vent Lube Oil	AB AI AP BL CN WC WD VA OL



Piping Class	Flange Rating	Pipe Material	Design Limits		Corrosion/ Erosion Allowance (mm)	Service	Service Code
			bar	°C			
BC11XS	ASME B16.5 Class 300	CS-ASTM A333 Gr. 6 (NACE)	51.1/ 45.2	-46/ 150	12.7	Mud-LP-Diverter	ML
BS20X	ASME B16.5 Class 300	St Steel 316	49.6/ 46.9	-29/ 60	0.0	Oil-Hydraulic-LP Mixed Fluid-LP-BOP/Diverter Air Instrument – BOP Control Air – LP – Riser Tensioning	OH OH AI GI
FS20	ASME B16.5 Class 1500	St Steel 316	248.2/ 234.7	-101/ 60	0.0	Water-Washdown-HP	WJ
FS70X	250 bar	St Steel 316	250.0	-29/ 60	0.0	Air-HP-Riser Tensioning Oil-Hydraulic-HP Mixed Fluid-HP-BOP/Diverter	GI OH OH
JS80X	345 bar	St Steel 316	345.0	-29/ 60	0.0	Oil-Hydraulic-HP Mixed Fluid-HP-BOP/Diverter	OH
KX01X	API 10,000 psi (modified)	ASTM A519 Low alloy CS	518.0	-29/ 120	3.0	Mud-HP-Supply	MH
KX70XS	API 10000 psi	ASTM A519 Low alloy CS (NACE)	690.0	-29/ 121	3.0	Choke & Kill System	MH
LS01X	Autoclave Engineers	St Steel 316	1378.9/ 1327.2	-73/ 204	0.0	Glycol Injection	CG
LS02X	Autoclave Engineers	St Steel 316	2068.9	-73/ 204	0.0	Glycol Injection	CG
LX01	API 15000 Psi	ASTM A519 Low alloy CS	1035.0	-29/ 100	3.0	Cement-HP	CM
LX01S	API 15000 psi	ASTM A519 Low alloy CS (NACE)	1035.0	-29/ 121	3.0	Choke & Kill System	MK

**R5188 - NOV - L - 4000**  
**SECTION 7 - PIPING CLASS SHEETS - INDEX**

SERVICE CODE	SERVICE	BASE PIPING CLASS	PRESS CLASS	DESIGN LIMITS		MATERIAL	CORROSION ALLOWANCE (mm)
				BAR	°C		
AB	AIR - BULK	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
AI	AIR - INSTRUMENT	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
AI	AIR - INSTR. - BOP CONTROL	BS20X	ASME 300	49.6/46.9	-29/60	st steel 316	0.0
AP	AIR - PLANT	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
BC	CEMENT - BULK	AC71X	ASME 150	8.0	-29/80	carbon steel A106	1.5
BL	CEMENT - LIQUID ADDITIVE	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
CG	GLYCOL	LS01X	Manufacturer's standard	1378.9/1327.2	-73/204	st steel 316	0.0
CG	GLYCOL	LS01X	Manufacturer's standard	2068.9	-73/204	st steel 316	0.0
CL	CONDENSATE - LP	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
CM	CEMENT - HP	LX01	API 15,000	1035.0	-29/100	low alloy cs - 4130	3.0
CM	CEMENT - LP	AC71X	ASME 150	8.0	-29/80	carbon steel A106	1.5
CN	CHEMICAL - MUD ADDITIVE	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
DM	DRAIN - MUD	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
DO	OPEN DRAIN	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
DS	DRAIN - SEWER/SANITARY	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
FC	BRINE	AD75	ASME 150	19.6/17.7	-29/38	st steel S32760	0.0
FF	FOAM - FIRE FIGHTING	AG70X	ASME 150	19.6/17.7	-29/100	carbon steel A106 - galv	1.5
GI	AIR - HP - RISER TENSIONING	FS70X	250 BAR	250.0	-29/60	st steel 316	0.0
GI	AIR - HP - RISER TENSIONING	BS20X	ASME 300	49.6/46.9	-29/60	st steel 316	0.0
MB	MUD - BULK	AC71X	ASME 150	8.0	-29/80	carbon steel A106	1.5
MH	MUD - HP - SUPPLY	KX01X	API 10,000	518.0	-29/120	low alloy cs - 4130	3.0
MH	CHOKE & KILL SYSTEM	KX70XS	API 10,000	690.0	-29/121	low alloy cs - 4130	3.0
MK	CHOKE & KILL SYSTEM	LX01S	API 15,000	1035.0	-29/121	low alloy cs - 4130	3.0
ML	CHOKE & KILL SYSTEM	AC11S	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
ML	MUD - LP - MIXING & STORAGE	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
ML	MUD - LP - SUPPLY	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
ML	MUD - LP - SOLIDS CONTROL	AC11S	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
ML	MUD - LP - DIVERTER	BC11XS	ASME 300	51.1/45.2	-46/150	carbon steel A333	12.7
OF	OIL - FUEL	AC21X	ASME 150	19.6/10.2	-29/300	carbon steel A106	3.0
OH	OIL - HYDRAULIC - HP	FS70X	250 BAR	250.0	-29/60	st steel 316	0.0
OH	OIL - HYDRAULIC - LP	BS20X	ASME 300	49.6/46.9	-29/60	st steel 316	0.0
OH	OIL - MIXED FLUID - HP - BOP	JS80X	345 BAR	345.0	-29/60	st steel 316	0.0
OH	OIL - MIXED FLUID - HP - BOP	FS70X	250 BAR	250.0	-29/60	st steel 316	0.0
OH	OIL - MIXED FLUID - HP DIVERTER	FS70X	250 BAR	250.0	-29/60	st steel 316	0.0
OH	OIL - MIXED FLUID - LP - BOP	BS20X	ASME 300	49.6/46.9	-29/60	st steel 316	0.0
OH	OIL - MIXED FLUID - LP DIVERTER	BS20X	ASME 300	49.6/46.9	-29/60	st steel 316	0.0
OL	LUBE OIL	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
SU	STEAM - UTILITY	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0
VA	VENT - ATMOSPHERIC	Refer to Section 6 piping Material Spec					
WC	COOLING MEDIUM	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
WD	WATER - POTABLE	AS20	ASME 150	19.0/18.0	-101/60	st steel 316	0.0
WF	FIRE FIGHTING SYSTEM / DELUGE	AG70X	ASME 150	19.6/17.7	-29/100	carbon steel A106 - galv	1.5
WJ	WATER - WASH DOWN - HP	FS20	ASME 1500	248.2/234.7	-101/60	st steel 316	0.0
WP	WATER - DRILL	AG70X	ASME 150	19.6/17.7	-29/100	carbon steel A106 - galv	1.5
WS	WATER - SEA	AG70X	ASME 150	19.6/17.7	-29/100	carbon steel A106 - galv	1.5
WT	BASE OIL	AC11	ASME 150	19.6/10.2	-46/300	carbon steel A333	3.0

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC11</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	19.6	19.6	19.2	17.7	15.8	14.0	12.1	10.2
Temperature (degrees C)	-46	38	50	100	150	200	250	300

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	5.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00
<b>OD (mm)</b>	21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3	219.1	273.1	323.9	355.6	406.4	457.0
<b>PIPE SCHED</b>	160	160	160	80	80	40	40	40	40	20	20	20	20	20	20
<b>THK (mm)</b>	4.78	5.56	6.35	5.08	5.54	5.49	6.02	6.55	7.11	6.35	6.35	6.35	7.92	7.92	7.92
<b>WEIGHT</b>				XS	XS	STD	STD	STD	STD						

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	18.00	ASME B36.10M		BE	BE	A333 Gr 6 SMLS	C11			
PIPE NIPPLE 100mm LONG	0.50	1.00	ASME B36.10M		TE	PE	A333 Gr 6 SMLS	C11		XXS	
PIPE NIPPLE 100mm LONG	1.50	1.50	ASME B36.10M		TE	PE	A333 Gr 6 SMLS	C11		160	
BENDING	0.50	6.00	MADE FROM PIPE	NBE1							
CAP	0.50	18.00	ASME B16.9		BE		A420 WPL6	C11			
CONC REDUCER	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ECC REDUCER	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ELBOW L.R. 45°	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ELBOW L.R. 90°	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
STRAIGHT TEE	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
REDUCING TEE	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
Weldolet	2.00	18.00	NORSOK EDS	NOL 1	BE	BE	A350 LF2	C11			
REINFORCED NIPOFLANGE	2.00	18.00	NORSOK EDS	NOL 1	BE	RF	A350 LF2	C11			
BLIND FLANGE	0.50	18.00	ASME B16.5		RF		A350 LF2	C11			
WELD NECK FLG	0.50	18.00	ASME B16.5	NAF1	RF	BE	A350 LF2	C11			
WELD NECK ORIFICE FLANGE	1.00	18.00	ASME B16.36	NAF1	RF	BE	A350 LF2	C11	CL 300		
SPEC'LE BLIND	0.50	12.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
SPADE	14.00	18.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
SPACER	14.00	18.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
HAMMER LUG UNIONS & BLINDS	2.00	12.00	FIG 200 & FIG 400		BE	BE	AISI 4130/4140 VITON SEAL				3
MECHANICAL JOINT CLAMP	2.00	18.00	VICTAULIC ROLLED GROOVE TYPE 77				A536				18
MECHANICAL JOINT SEAL RING	2.00	18.00	VICTAULIC ROLLED GROOVE TYPE 77				NITRIL RUBBER SEAL GRADE T				18
GASKET FLAT	0.50	18.00	ASME B16.21		RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	0.50	1.50	ASME B16.11		MT		A350 LF2	C11	6000 LBS		
STUD BOLT C/W NUTS	0.50	18.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC11</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
BALL VALVE FULL BORE	2.00	18.00		BLAC41R	RF	RF			CL 150		
GATE VALVE WEDGE	0.50	1.00		GTRC05B	BE	BE			CL 800		11
GATE VALVE WEDGE	0.50	1.00		GTRC05D	BE	FT			CL 800		11
GATE VALVE WEDGE	1.50	1.50		GTRC03B	BE	BE			CL 800		11
GATE VALVE WEDGE	2.00	18.00		GTAC11R	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	1.50	1.50		GBDC03B	BE	BE			CL 600		11
GLOBE VALVE SWIVELLING	0.50	1.00		GBDC05B	BE	BE			CL 600		11
GLOBE VALVE SWIVELLING	2.00	10.00		GBAC11R	RF	RF			CL 150		11
BUTTERFLY VALVE WAFER SOFT SEAT	4.00	18.00		BUAC21R	RF	RF			CL 150		17
CHECK VALVE DUAL WAFER	2.00	18.00		CHAC51R	RF	RF			CL 150		
CHECK VALVE PISTON	0.50	1.00		CHDC05B	BE	BE			CL 600		11
CHECK VALVE PISTON	1.50	1.50		CHDC03B	BE	BE			CL 600		11

**Notes:**

- 3** TO BE SUPPLIED WITH A 'CERTIFICATE OF CONFORMITY' FROM A 'CERTIFYING AUTHORITY'
- 11** STEAM AND CONDENSATE SERVICE ONLY
- 17** BUTTERFLY VALVES SUPPLIED WITH LINERS DO NOT REQUIRE THE USE OF SEPARATE GASKET.
- 18** VICTAULIC COUPLINGS TO BE USED TO FACILITATE THE DISMANTLING FOR CLEAN-OUT PURPOSES. PIPE ENDS TO BE ROLL-GROOVED TO SUIT THE COUPLINGS AND LINES SHOULD BE SUPPORTED WITHIN 1 METER OF EACH COUPLING.
- 38** REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC11S</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	19.6	19.6	19.2	17.7	15.8	14.0	12.1	10.2
Temperature (degrees C)	-46	38	50	100	150	200	250	300

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	5.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00
<b>OD (mm)</b>	21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3	219.1	273.1	323.9	355.6	406.4	457.0
<b>PIPE SCHED</b>	160	160	160	80	80	40	40	40	40	20	20	20	20	20	20
<b>THK (mm)</b>	4.78	5.56	6.35	5.08	5.54	5.49	6.02	6.55	7.11	6.35	6.35	6.35	7.92	7.92	7.92
<b>WEIGHT</b>				XS	XS	STD	STD	STD	STD						

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	18.00	ASME B36.10M		BE	BE	A333 Gr 6 SMLS	C11			
PIPE NIPPLE 100mm LONG	0.50	1.00	ASME B36.10M		TE	PE	A333 Gr 6 SMLS	C11		XXS	
PIPE NIPPLE 100mm LONG	1.50	1.50	ASME B36.10M		TE	PE	A333 Gr 6 SMLS	C11		160	
BENDING	0.50	6.00	MADE FROM PIPE	NBE1							
CAP	0.50	18.00	ASME B16.9		BE		A420 WPL6	C11			
CONC REDUCER	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ECC REDUCER	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ELBOW L.R. 45°	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
ELBOW L.R. 90°	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
STRAIGHT TEE	0.50	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
REDUCING TEE	0.75	18.00	ASME B16.9		BE	BE	A420 WPL6	C11			
Weldolet	2.00	18.00	NORSOK EDS	NOL 1	BE	BE	A350 LF2	C11			
REINFORCED NIPOFLANGE	2.00	18.00	NORSOK EDS	NOL 1	BE	RF	A350 LF2	C11			
BLIND FLANGE	0.50	18.00	ASME B16.5		RF		A350 LF2	C11			
WELD NECK FLG	0.50	18.00	ASME B16.5	NAF1	RF	BE	A350 LF2	C11			
WELD NECK ORIFICE FLANGE	1.00	18.00	ASME B16.36	NAF1	RF	BE	A350 LF2	C11	CL 300		
SPEC'LE BLIND	0.50	12.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
SPADE	14.00	18.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
SPACER	14.00	18.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
HAMMER LUG UNIONS & BLINDS	2.00	12.00	FIG 200 & FIG 400		BE	BE	AISI 4130/4140 VITON SEAL				3
MECHANICAL JOINT CLAMP	2.00	18.00	VICTAULIC ROLLED GROOVE TYPE 77				A536				18
MECHANICAL JOINT SEAL RING	2.00	18.00	VICTAULIC ROLLED GROOVE TYPE 77				NITRIL RUBBER SEAL GRADE T				18
GASKET FLAT	0.50	18.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	0.50	1.50	ASME B16.11		MT		A350 LF2	C11	6000 LBS		
STUD BOLT C/W NUTS	0.50	18.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC11S</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GATE VALVE WEDGE	2.00	18.00		GTAC11R	RF	RF			CL 150		
GATE VALVE KNIFE	8.00	18.00		GTAC1BR	RF	RF			CL 150		19
BUTTERFLY VALVE WAFFER SOFT SEAT	4.00	18.00		BUAC21R	RF	RF			CL 150		17
CHECK VALVE DUAL WAFFER	2.00	18.00		CHAC51R	RF	RF			CL 150		

**Notes:**

- 1 MATERIALS SHALL BE SUITABLE FOR SOUR SERVICE IN ACCORDANCE WITH NACE SPECIFICATION MR-01-75
- 17 BUTTERFLY VALVES SUPPLIED WITH LINERS DO NOT REQUIRE THE USE OF SEPARATE GASKET.
- 18 VICTAULIC COUPLINGS TO BE USED TO FACILITATE THE DISMANTLING FOR CLEAN-OUT PURPOSES. PIPE ENDS TO BE ROLL-GROOVED TO SUIT THE COUPLINGS AND LINES SHOULD BE SUPPORTED WITHIN 1 METER OF EACH COUPLING.
- 19 SERVICES CONTAINING KNIFE GATE VALVES ARE LIMITED TO A SERVICE PRESSURE OF 10.3 BAR
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC21X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature									
Pressure (barg)	19.6	19.6	19.2	17.7	15.8	14.0	12.1	10.2	
Temperature (degrees C)	-29	38	50	100	150	200	250	300	

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	5.00	6.00						
OD (mm)	21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3						
PIPE SCHED	160	160	160	80	80	40	40	40	40						
THK (mm)	4.78	5.56	6.35	5.08	5.54	5.49	6.02	6.55	7.11						
WEIGHT				XS	XS	STD	STD	STD	STD						

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	6.00	ASME B36.10M		BE	BE	A106 B	C01			
PIPE NIPPLE 100mm LONG	0.50	1.00	ASME B36.10M		TE	PE	A106 B	C01		XXS	
PIPE NIPPLE 100mm LONG	1.50	1.50	ASME B36.10M		TE	PE	A106 B	C01		160	
BENDING	0.50	6.00	MADE FROM PIPE	NBE1							
CAP	0.50	6.00	ASME B16.9		BE		A234 WPB	C01			
CONC REDUCER	0.75	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
ECC REDUCER	0.75	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW L.R. 45°	0.50	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW L.R. 90°	0.50	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
STRAIGHT TEE	0.50	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
REDUCING TEE	0.75	6.00	ASME B16.9		BE	BE	A234 WPB	C01			
WELDOLET	0.50	6.00	NORSOK EDS	NOL 1	BE	BE	A105	C01			
REINFORCED NIPOFLANGE	2.00	6.00	NORSOK EDS	NOL 1	BE	RF	A105	C01			
BLIND FLANGE	0.50	6.00	ASME B16.5		RF		A105	C01			
BLIND FLANGE	0.05	6.00	MSS SP-44		RF		A105	C01			
WELD NECK FLG	0.50	6.00	ASME B16.5	NAF1	RF	BE	A105	C01			
WELD NECK ORIFICE FLANGE	1.00	6.00	ASME B16.36	NAF1	RF	BE	A105	C01	CL 300		
SPEC'LE BLIND	0.50	6.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
GASKET FLAT	0.50	6.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	0.50	1.50	ASME B16.11		MT		A105		6000 LBS		
STUD BOLT C/W NUTS	0.50	6.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC21X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
BALL VALVE FULL BORE	2.00	6.00		BLAC1AR	RF	RF			CL 150		
GATE VALVE WEDGE	0.50	1.00		GTRC04D	BE	FT			CL 800		
GATE VALVE WEDGE	0.50	1.50		GTAC0AR	RF	RF			CL 150		
GATE VALVE WEDGE	2.00	6.00		GTAC1AR	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	0.50	1.50		GBAC0AR	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	2.00	6.00		GBAC1AR	RF	RF			CL 150		
CHECK VALVE DUAL WAFER	2.00	6.00		CHAC5AR	RF	RF			CL 150		
CHECK VALVE PISTON	0.50	1.50		CHAC0AR	RF	RF			CL 150		

**Notes:**

38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS



<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC71X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	8.0	8.0	8.0	8.0
Temperature (degrees C)	-29	38	50	80

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	1.50
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)		1.00	1.50	2.00	3.00	4.00	5.00	6.00	8.00	10.00
OD (mm)		33.4	48.3	60.3	88.9	114.3	141.3	168.3	219.1	273.1
PIPE SCHED		40	40	40	40	40	40	40	20	20
THK (mm)		3.38	3.68	3.91	5.49	6.02	6.55	7.11	6.35	6.35
WEIGHT		STD	STD	STD	STD	STD	STD	STD		

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	1.00	10.00	ASME B36.10M		BE	BE	A106B	C01			
PIPE NIPPLE 100mm LONG	1.00	1.00	ASME B36.10M		TE	PE	A106B	C01		160	
BENDING	1.00	6.00	Radius = 5xNOM DIA	NBE1	PE	PE	A106B	C01			9
LATERAL TEE	5.00	6.00	MICS. DETAIL		BE	BE	A106B	C01			46
CAP	1.00	10.00	ASME B16.9		BE		A234 WPB	C01			
CONC REDUCER	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ECC REDUCER	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW L.R. 45°	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			40
ELBOW L.R. 90°	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			40
STRAIGHT TEE	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
REDUCING TEE	1.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
WELDOLET	2.00	10.00	NON STANDARD	NOL 1	BE	BE	A105	C01			
REINFORCED NIPOFLANGE	2.00	10.00	NORSOK EDS		BE	RF	A105	C01			
BLIND FLANGE	1.00	10.00	ASME B16.5		RF		A105	C01			
WELD NECK FLG	1.00	10.00	ASME B16.5	NAF1	RF	BE	A105	C01			
WELD NECK ORIFICE FLANGE	1.00	10.00	ASME B16.36	NAF1	RF	BE	A105	C01	CL 300		
SPEC'LE BLIND	1.00	10.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
HAMMER LUG UNIONS & BLIND	2.00	10.00	FIG 100		BE	BE	AISI 4130/4140 VITON SEAL				3
PIPE LINE COUPLING	2.00	10.00	STRAUB GRIP TYPE COUPLING				ST.STL. CASING, GRIP AND RETAINING RINGS, NBR SEAL WITH AISI 316 SPRING				41
MECHANICAL JOINT CLAMP	2.00	10.00	VICTAULIC ROLLED GROOVE TYPE 77				ASTM A536				18
MECHANICAL JOINT SEAL RING	2.00	10.00	VICTAULIC ROLLED GROOVE TYPE 77				NITRIL RUBBER SEAL GRADE T				18
GASKET FLAT	1.00	10.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	1.00	1.00	ASME B16.11		MT		A105	C01	6000 LBS		
STUD BOLT C/W NUTS	1.00	10.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AC71X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GATE VALVE WEDGE	0.50	1.50		GTAC0AR	RF	RF			CL 150		45
GATE VALVE WEDGE	2.00	10.00		GTAC1AR	RF	RF			CL 150		
BUTTERFLY VALVE WAFFER SOFT SEAT	4.00	10.00		BUAC2AR	RF	RF			CL 150		17
CHECK VALVE DUAL WAFFER	2.00	10.00		CHAC5AR	RF	RF			CL 150		

**Notes:**

- 9 FORMED BENDS 900 & 450 BENDS. RADIUS = 5x NOM DIA + 100mm TANGENT LENGTH.  
TO BE USED FOR BULK LOADING AND TRANSFER LINES ONLY
- 17 BUTTERFLY VALVES SUPPLIED WITH LINERS DO NOT REQUIRE THE USE OF SEPARATE GASKET.
- 18 VICTAULIC COUPLINGS TO BE USED FOR CONNECTION TO EQUIPMENT ONLY. PIPE ENDS TO BE ROLL-GROOVED TO SUIT THE COUPLINGS
- 21 PIPE SIZES 1" – 1½" TO BE USED FOR PURGE AIR CONNECTIONS AND VENTS ONLY.
- 22 2" FITTINGS AND VALVES ARE TO BE USED FOR DRAIN AND INSTRUMENT CONNECTIONS ONLY.
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 40 TO BE USED IN VENT SYSTEM ONLY
- 41 STRAUB COUPLINGS TO BE USED TO FACILITATE THE DISMANTLING FOR CLEAN-OUT PURPOSES. LINES SHOULD BE SUPPORTED WITHIN 1 METRE OF EACH COUPLING.
- 45 FOR HYROTEST ONLY
- 46 FOR DETAILS OF LATERAL TEES REFER TO DOC R5188-NOV-L-4006 - PIPING DETAILS-MISCELLANEOUS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AD75</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Max Design Pressure at Temperature									
Pressure (Barg)	19.6	19.6							
Temperature (Deg. C)	-29	38							

<b>Rating</b>	CL 150
<b>Branch Table:</b>	NBR3
<b>Service Code</b>	Refer to Sect.7

<b>Design Code</b>	ASME B31.3
<b>Corr. Allow.</b>	0.00
<b>Wall Thickness Under Tolerance</b>	12.5% - (Note 38)
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>	<b>0.50</b>	<b>0.75</b>	<b>1.00</b>	<b>1.50</b>	<b>2.00</b>	<b>3.00</b>	<b>4.00</b>	<b>6.00</b>										
<b>OD (mm)</b>	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3										
<b>THK (mm)</b>	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.40										
<b>SCH</b>	40S	40S	40S	40S	10S	10S	10S	10S										
<b>WEIGHT</b>																		

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	6.00	ASME B36.19M		BE	BE	A790 S32760	D51			
PIPE NIPPLE 100MM LONG	0.50	1.00	ASME B36.19M		TE	BE	A790 S32760	D51		80S	
BENDING	0.50	6.00	MADE FROM PIPE	NBE1							
CAP	0.50	6.00	ASME B16.9		BE		A815 S32760-S	D53			
CONCENTRIC REDUCER	0.75	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
ECCENTRIC REDUCER	0.75	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
ELBOW LONG RADIUS 45 DEG	0.50	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
ELBOW LONG RADIUS 90 DEG	0.50	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
STRAIGHT TEE	0.50	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
REDUCING TEE	0.75	6.00	ASME B16.9		BE	BE	A815 S32760-S/WX	D53			
WELDOLET	2.00	6.00	NORSOK EDS	NOL1	BE	BE	A182 S32760	D54			
REINFORCED NIPOFLANGE	2.00	6.00	NORSOK EDS	NOL1	BE	RF	A182 S32760	D54			
BLIND FLANGE	0.50	6.00	ASME B16.5		RF		A182 S32760	D54			
WELDNECK FLANGE	0.50	6.00	ASME B16.5	NAF1	RF	BE	A182 S32760	D54			
WELDNECK ORIFICE FLANGE	1.00	6.00	ASME B16.36	NAF1	RF	BE	A182 S32760	D54	CL 300		
SPECTACLE BLIND	0.50	6.00	NORSOK EDS	NLB1	FF	FF	A240 S32760	D55			
GASKET FLAT	0.50	6.00	ASME B16.21	NGA2	RF	RF	GLASS FIBRE W/NBR BINDER				
STUD BOLT C/W NUTS	0.50	6.00	ASME B16.5	NBO1			A193 B7/A194 2H				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AD75</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
BALL VALVE REDUCED BORE	3.00	6.00		BLAR37R	RF	RF			CL 150		
GATE VALVE WEDGE	0.50	1.50		GTAD01R	RF	RF			CL 150		
GATE VALVE WEDGE	2.00	6.00		GTAD11R	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	2.00	6.00		GBAD11R	RF	RF			CL 150		
BUTTERFLY VALVE WAFFER SOFT SEAT	4.00	6.00		BUAD21R	RF	RF			CL 150		
CHECK VALVE DUAL WAFER	2.00	6.00		CHAD51R	RF	RF			CL 150		
CHECK VALVE PISTON	0.50	1.50		CHAD01R	RF	RF			CL 150		

**Notes :**

38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AG70X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	19.6	19.6	19.2	17.7				
Temperature (degrees C)	-29	38	50	100				

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR5
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	1.50
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	<=10": 1.0 >10": 0.95

ND (inch)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	5.00	6.00	8.00	10.00
<b>OD (mm)</b>	21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3	219.1	273.1
<b>PIPE SCHED</b>	160	160	160	160	80	40	40	40	40	20	20
<b>THK (mm)</b>	4.78	5.56	6.35	7.14	5.54	5.49	6.02	6.55	7.11	6.35	6.35
<b>WEIGHT</b>					XS	STD	STD	STD	STD		

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	2.00	ASME B36.10M	NGZ1	TE	TE	A106 Gr B				
PIPE	3.00	10.00	ASME B36.10M		BE	BE	A106 Gr B	C01			
BENDING	3.00	10.00	MADE FROM PIPE	NBE1							
CAP	0.50	2.00	ASME B16.11	NGZ1	FT		A105		3000 LBS		
CAP	3.00	10.00	ASME B16.9		BE		A234 WPB	C01			
CONC REDUCER	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ECC REDUCER	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW L.R. 45°	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW L.R. 90°	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
ELBOW 45° THREADED	0.50	2.00	ASME B16.11	NGZ1	FT	FT	A105		3000 LBS		
ELBOW 90° THREADED	0.50	2.00	ASME B16.11	NGZ1	FT	FT	A105		3000 LBS		
STRAIGHT TEE	0.50	2.00	ASME B16.11	NGZ1	FT	FT	A105		3000 LBS		
STRAIGHT TEE	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
REDUCING TEE	0.50	2.00	ASME B16.11	NGZ1	FT	FT	A105		3000 LBS		
REDUCING TEE	3.00	10.00	ASME B16.9		BE	BE	A234 WPB	C01			
SWAGE NIPPLE CONCENTRIC	0.50	2.00	BS 3799	NGZ1	MT	MT	A234 WPB SMLS		6000 LBS		
SWAGE NIPPLE CONCENTRIC	2.00	4.00	BS 3799		BE	MT	A234 WPB SMLS	C01			
SWAGE NIPPLE ECCENTRIC	0.50	2.00	BS 3799	NGZ1	MT	MT	A234 WPB SMLS		6000 LBS		
SWAGE NIPPLE ECCENTRIC	2.00	4.00	BS 3799		MT	MT	A234 WPB SMLS	C01			
UNION THREADED	0.50	2.00	BS 3799	NGZ1	FT	FT	A105		3000 LBS		
THREADOLET	2.00	10.00	NORSOK EDS	NOL1	BE	FT	A105	C01	3000 LBS		
WELDOLET	3.00	10.00	NORSOK EDS	NOL 1	BE	BE	A105	C01			
REINFORCED NIPOFLANGE	3.00	10.00	NORSOK EDS	NOL 1	BE	RF	A105	C01			
BLIND FLANGE	0.50	10.00	ASME B16.5	NGZ1	RF		A105	C01			
THREADED FLANGE	0.50	2.00	ASME B16.5	NGZ1	RF	FT	A105				
WELD NECK FLG	3.00	10.00	ASME B16.5	NAF1	RF	BE	A105	C01			
WELD NECK ORIFICE FLANGE	3.00	10.00	ASME B16.36	NAF1	RF	BE	A105	C01	CL 300		
SPEC'LE BLIND	0.50	10.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 60	C11			

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AG70X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GASKET FLAT	0.50	10.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	0.50	2.00	ASME B16.11	NGZ1	MT		A105	C01	6000 LBS		
STUD BOLT C/W NUTS	0.50	10.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				
GATE VALVE WEDGE	0.50	2.00		GTAK00T	FT	FT			CL 150		23
GATE VALVE WEDGE	2.00	10.00		GTAK10R	RF	RF			CL 150		23
GLOBE VALVE SWIVELLING	0.50	1.50		GBAD00R	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	0.50	2.00		GBRC00T	FT	FT			CL 800		
GLOBE VALVE SWIVELLING	2.00	10.00		GBAD10R	RF	RF			CL 150		
BUTTERFLY VALVE WAFFER SOFT SEAT	4.00	10.00		BUAD20R	RF	RF			CL 150		17
CHECK VALVE DUAL WAFER	2.00	10.00		CHAD50R	RF	RF			CL 150		
CHECK VALVE PISTON	0.50	1.00		CHRC00T	FT	FT			CL 800		
CHECK VALVE PISTON	0.50	1.50		CHAK00R	RF	RF			CL 150		23

17 BUTTERFLY VALVES SUPPLIED WITH LINERS DO NOT REQUIRE THE USE OF SEPARATE GASKET.

23 SERVICE TEMPERATURE LIMITED TO 90°C

29 HOT DIPPED GALVANISED IN ACCORDANCE WITH EDS NGZ1

30 FABRICATED SPOOLS 3" AND ABOVE TO BE FLANGED AND SHALL BE HOT DIPPED GALVANISED IN ACCORDANCE WITH ASTM

38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AS20</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	19.0	19.0	18.4	18.0				
Temperature (degrees C)	-101	38	50	60				

<b>Rating:</b>	Class 150
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)	0.50	0.75	1.00	1.25	1.50	2.00	3.00	4.00	6.00	8.00
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	88.9	114.3	168.3	219.1
PIPE SCHED	40S	40S	40S	40S	40S	10S	10S	10S	10S	10S
THK (mm)	2.77	2.87	3.38	3.56	3.68	2.77	3.05	3.05	3.40	3.76
WEIGHT										

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	8.00	ASME B36.19M		BE	BE	A312 TP316 SMLS	S01			
PIPE NIPPLE 100mm LONG	0.50	1.50	ASME B36.19M		TE	PE	A312 TP316 SMLS	S01		80S	
BENDING	0.50	8.00	MADE FROM PIPE	NBE1							
CAP	0.50	8.00	ASME B16.9		BE		A403 WP 316 S/WX	S01			
CONC REDUCER	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ECC REDUCER	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 45°	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 90°	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
STRAIGHT TEE	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
STRAIGHT TEE	1.00	8.00	ASME B16.9		BE	BE	A403 WP 316W	S01			
REDUCING TEE	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
Weldolet	2.00	8.00	MSS SP-97		BE	BE	A182 F316	S01			
REINFORCED NIPOFLANGE	2.00	8.00	NORSOK EDS	NOL 1	BE	RF	A182 F316	S01			
BLIND FLANGE	0.50	8.00	ASME B16.5		RF		A182 F316	S01			
BLIND FLANGE	0.50	8.00	ASME B16.5		RF		A240 316	S01			
WELD NECK FLG	0.50	8.00	ASME B16.5	NAF1	RF	BE	A182 F316	S01			
WELD NECK ORIFICE FLANGE	1.00	8.00	ASME B16.36	NAF1	RF	BE	A182 F316	S01	CL 300		
SPEC'LE BLIND	0.50	8.00	NORSOK EDS	NLB1	FF	FF	A182 F316	S01			
SPEC'LE BLIND	0.50	8.00	NORSOK EDS	NLB1	FF	FF	A240 316	S01			
GASKET FLAT	0.50	8.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
HEX HEAD PLUG	0.50	1.00	ASME B16.11		MT		A182 F316	S01	6000 LBS		
STUD BOLT C/W NUTS	0.50	8.00	ASME B16.5	NB01			A320 Gr L7 A194 Gr 7				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>AS20</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
BALL VALVE REDUCED BORE	0.50	8.00		BLAS30R	RF	RF			CL 150		
GATE VALVE WEDGE	0.50	1.50		GTAS00R	RF	RF			CL 150		
GATE VALVE WEDGE	2.00	8.00		GTAS10R	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	0.50	1.50		GBAS00R	RF	RF			CL 150		
GLOBE VALVE SWIVELLING	2.00	8.00		GBAS10R	RF	RF			CL 150		
CHECK VALVE DUAL WAFER	2.00	8.00		CHAS50R	RF	RF			CL 150		
CHECK VALVE PISTON	0.50	1.50		CHAS00R	RF	RF			CL 150		

**Notes:**

38      REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS



<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>BC11XS</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	50.0	50.0	50.1	46.4	45.2			
Temperature (degrees C)	-46	38	50	100	150			

<b>Rating:</b>	Class 300
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	12.70
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>	<b>12.00</b>	<b>14.00</b>	<b>16.00</b>
<b>OD (mm)</b>	323.9	355.6	406.4
<b>PIPE SCHED</b>	100	100	100
<b>THK (mm)</b>	25.40	23.83	26.19
<b>WEIGHT</b>			

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	12.00	16.00	ASME B36.10M		BE	BE	A333 Gr6 SMLS	C11			
BENDING	12.00	16.00	ASME B36.10M		BE	BE	A333 Gr6 SMLS	C11			8
CAP			NOT TO BE USED								
CONC REDUCER											
ECC REDUCER											
ELBOW L.R. 45°											
ELBOW L.R. 90°											
STRAIGHT TEE											
REDUCING TEE											
REINFORCED NIPOFLANGE	2.00	6.00	NORSOK EDS	NOL 1	BE	RF	A350 LF2	C11			
BLIND FLANGE	12.00	16.00	ASME B16.5		RF		A350 LF2	C11			
WELD NECK FLG	4.00	16.00	ASME B16.5	NAF1	RF	BE	A350 LF2	C11			
SPADE	12.00	16.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
SPACER	12.00	16.00	NORSOK EDS	NLB1	FF	FF	A516 Gr 70	C11			
GASKET FLAT	4.00	16.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
STUD BOLT C/W NUTS	4.00	16.00	ASME B16.5	NB01			A193 Gr B 7 A194 Gr 2H				
BALL VALVE FULL BORE	2.00	16.00		BLBC41R	RF	RF			CL 300		
GATE VALVE WEDGE	2.00	16.00		GTBC11R	RF	RF			CL 300		

**Notes:**

- 1 MATERIALS SHALL BE SUITABLE FOR SOUR SERVICE IN ACCORDANCE WITH NACE SPECIFICATION MR-01-75
- 8 PIPE BENDING IS ALLOWED. BEND RADIUS = 10xD MINIMUM
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>BS20X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature								
Pressure (barg)	49.6	49.6	48.1	46.9				
Temperature (degrees C)	-101	38	50	60				

<b>Rating:</b>	Class 300
<b>Branch Table:</b>	NBR2X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	TUBE:- <=12mm: 15% >12mm: 10% NOTE 38 PIPE:- 12.5% Note 38
<b>Longitudenal Weld Efficiency</b>	1.0

ND (mm)	10.0	12.0	16.0	20.0	25.0	30.0	38.0	ND (inch)	2.00	2.50	3.00	4.00
OD (mm)	10.0	12.0	16.0	20.0	25.0	30.0	38.0	OD (mm)	60.3	73.0	88.9	114.3
PIPE SCHED	40S	40S	40S	40S				SCH	10S	10S	10S	10S
THK (mm)	1.5	1.5	2.0	2.5	3.0	3.5	4.0	THK (mm)	2.77	3.05	3.05	3.05
WEIGHT								WEIGHT				

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
TUBE	10mm	38mm	DIN 2391.C		PE	PE	A269 TP316	S01			25
PIPE	2.00	4.00	ASME B36.19M		BE	BE	A312 TP316 SMLS	S01			
BENDING	10mm	38mm	MADE FROM PIPE				A269 TP316	S01			
BENDING	2.00	4.00	MADE FROM PIPE	NBE1						80S	
EL UNION 90° 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
STRAIGHT TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING UNION 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A269 TP316	S01			36
CAP	2.00	4.00	ASME B16.9		BE		A403 WP 316 S/WX	S01			
CONC REDUCER	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ECC REDUCER	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 45°	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 90°	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>BS20X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
STRAIGHT TEE	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
REDUCING TEE	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
WELDOLET	1.50	4.00	NORSOK EDS	NOL 1	BE	BE	A182 F316	S01			
WN FLANGE HEADS	10mm	38mm	SAE J518 CODE 61		RF		ASTM A182 F316	S01			24
SPLIT FLANGE CLAMP	10mm	38mm	SAE J518 CODE 61				ASTM A182 F316	S01			24
SEALS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				BONDED SEAL				24
SOCKET HEAD CAP SCREWS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				SAE GRADE 5 OR BETTER				24
WN FLANGE HEADS	2.00	4.00	ISO 6164 RETAIN RING FLANGE		BE		ASTM A182 F316	S01			24
SEALS	2.00	4.00	ISO 6164				BONDED SEAL AISI + PERBUNAN				24
SOCKET HEAD CAP SCREWS	2.00	4.00	DIN 934, 8.8 QUALITY				A320 Gr L7 A194 Gr 7				24
WELD NECK FLG	2.00	4.00	ASME B16.5	NAF1	RF	BE	A182 F316	S01			
BLIND FLANGE	2.00	4.00	ASME B16.5		RF		A182 F316	S01			
GASKET FLAT	2.00	4.00	ASME B16.21	NGA1	RF	RF	GRAPHITE/METAL LAMINATED				
STUD BOLT C/W NUTS	2.00	4.00	ASME B16.5	NB01			A320 Gr L7 A194 Gr 7				
BALL VALVE FULL BORE	10mm	38mm		BLGS00T	FT	FT			6000 PSI		48
BALL VALVE FULL BORE	2.00	4.00		BLBS10R	RF	RF			CL 300		
CHECK VALVE PISTON	10mm	38mm		CHGS00T	FT	FT			6000 PSI		48
CHECK VALVE DUAL WAFER	2.00	4.00		CHBS50R	RF	RF			CL 300		

**Notes:**

- 25** NPT SIZES ASSOCIATED WITH TUBE OD SIZES ARE AS FOLLOWS:  
OD10 - NPT 1/4": OD12 - NPT 3/8": OD16 - NPT 1/2": OD20 - NPT 3/4": OD25 - NPT 1": OD30 - NPT 1.1/4": OD38 - NPT 1.1/2":
- 24** SAE AND ISO 6164 FLANGES TO BE USED FOR CONNECTION TO EQUIPMENT, VALVES AND FOR BRANCH CONNECTIONS ONLY
- 36** NUT AISI 316, SEALING RING AISI 316, BODY ZINC PLATED YELLOW CHROMATISED STEEL
- 37** YELLOW CHROMATISED STEEL SHALL BE PRESERVED WITH DENSOTAPE IN EXPOSED AREAS
- 38** REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 48** VALVES TO HAVE BSP FEMALE THREADED ENDS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>FS20</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	248.2	248.2	240.6	234.7
Temperature (degrees C)	-101.0	38.0	50.0	60.0

<b>Rating:</b>	Class 1500
<b>Branch Table:</b>	NBR3
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	12.5% Note 38
<b>Longitudinal Weld Efficiency</b>	1.0

ND (inch)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	6.00	8.00
OD (mm)	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1
PIPE SCHED	80S	80S	80S	160	160	160	160	160	160
THK (mm)	3.73	3.91	4.55	7.14	8.74	11.13	13.49	18.26	23.01
WEIGHT									

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	0.50	8.00	ASME B36.19M		BE	BE	A312 TP316 SMLS	S01			
PIPE NIPPLE 100mm LONG	0.50	1.50	ASME B36.19M		TE	PE	A312 TP316 SMLS	S01		160	
BENDING	0.50	4.00	MADE FROM PIPE	NBE1							
CAP	0.75	8.00	ASME B16.9		BE		A403 WP 316 S/WX	S01			
CONC REDUCER	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ECC REDUCER	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 45 <sup>o</sup>	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 90 <sup>o</sup>	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
STRAIGHT TEE	0.50	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
REDUCING TEE	0.75	8.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
WELDOLET	2.00	8.00	NORSOK EDS	NOL 1	BE	BE	A182 F316	S01			
REINFORCED NIPOFLANGE	2.00	8.00	NORSOK EDS	NOL 1	BE	RJ	A182 F316	S01			
BLIND FLANGE	0.50	8.00	ASME B16.5		RJ		A182 F316	S01			
WELD NECK FLG	0.50	8.00	ASME B16.5	NAF1	BE	RJ	A182 F316	S01			
WELD NECK ORIFICE FLANGE	1.00	3.00	ASME B16.36	NAF1	BE	RJ	A182 F316	S01			
SPEC'LE BLIND	0.50	8.00	NORSOK EDS	NLB1	RJ	RJ	A182 F316	S01			
GASKET OCTAGONAL RING	0.50	8.00	ASME B16.20				AISI 316				
HEX HEAD PLUG	0.50	1.50	ASME B16.11		MT		A182 F316	S01	6000 LBS		
STUD BOLT C/W NUTS	0.50	8.00	ASME B16.5	NB01			A320 Gr L7 A194 Gr 7				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>FS20</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
BALL VALVE METAL SEAT FULL BORE	2.00	8.00		BLFS60J	RJ	RJ			CL 1500		
GATE VALVE WEDGE	0.50	1.50		GTFS00J	RJ	RJ			CL 1500		
GATE VALVE WEDGE	2.00	8.00		GTFS10J	RJ	RJ			CL 1500		
GLOBE VALVE SWIVELLING	0.50	1.50		GBFS00J	RJ	RJ			CL 1500		
GLOBE VALVE SWIVELLING	2.00	6.00		GBFS10J	RJ	RJ			CL 1500		
CHECK VALVE DUAL WAFER	2.00	8.00		CHFS50J	RJ	RJ			CL 1500		
CHECK VALVE PISTON	1.50	1.50		CHFS00J	RJ	RJ			CL 1500		

**Notes:**

38      REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>FS70X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	250.0	250.0	250.0	
Temperature (degrees C)	-29	38	60	

<b>Rating:</b>	250 BAR
<b>Branch Table:</b>	NBR2X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	TUBE:- <=12mm: 15% >12mm: 10% Note 38 PIPE:- 12.5% Note 38
<b>Longitudenal Weld Efficiency</b>	1.0

ND (mm)	10.0	12.0	16.0	20.0	25.0	30.0	38.0	ND (inch)	2.00	2.50	3.00	4.00	6.00
OD (mm)	10.0	12.0	16.0	20.0	25.0	30.0	38.0	OD (mm)	60.3	73.0	88.9	114.3	168.3
PIPE SCHED								SCH	160	160	160	160	160
THK (mm)	1.5	1.5	2.0	2.5	3.0	3.5	4.0	THK (mm)	8.74	9.53	11.13	13.49	18.26
WEIGHT								WEIGHT					

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
TUBE	10mm	38mm	DIN 2391.C		PE	PE	A269 TP316	S01			
PIPE	2.00	4.00	ASME B36.19M		BE	BE	A312 TP316 SMLS	S01			
BENDING	10mm	38mm	MADE FROM TUBE	NBE1			A269 TP316				
BENDING	2.00	4.00	MADE FROM PIPE	NBE1							
EL UNION 90° 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
STRAIGHT TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING UNION 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A269 TP316	S01			36
CAP	2.00	4.00	ASME B16.9		BE		A403 WP 316 S/WX	S01			
CONC REDUCER	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ECC REDUCER	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 45°	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 90°	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>FS70X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
STRAIGHT TEE	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
REDUCING TEE	2.00	4.00	ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
WELDOLET	1.50	4.00	NORSOK EDS	NOL 1	BE	BE	A182 F316	S01			
REINFORCED NIPOFLANGE	2.00	4.00	NORSOK EDS	NOL 1	BE	SAE	A182 F316	S01			
WN FLANGE HEADS	10mm	38mm	SAE J518 CODE 62		BE	SAE	ASTM A182 F316	S01			24
SPLIT FLANGE CLAMP	10mm	38mm	SAE J518 CODE 62				ASTM A182 F316	S01			24
SEALS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				BONDED SEAL				24
SOCKET HEAD CAP SCREWS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				SAE GRADE 5 OR BETTER				24
WN FLANGE HEADS	2.00	4.00	ISO 6164 RETAIN RING FLANGE		BE	SAE	ASTM A182 F316	S01			24
SEALS	2.00	4.00	ISO 6164				BONDED SEAL AISI + PERBUNAN				24
SOCKET HEAD CAP SCREWS	2.00	4.00	DIN 934, 8.8 QUALITY				A320 Gr L7 A194 Gr 7				24
BALL VALVE FULL BORE	10mm	38mm		BLGS00T	FT	FT			6000 PSI		48, 51
CHECK VALVE PISTON	10mm	2"		CHGS00T	FT	FT			6000 PSI		48, 51
CHECK VALVE	2.50	4.00	DRILLED TO SUIT ISO 6164 FLANGES	CHGS0AX	FL	FL			6000 PSI		51
BALL VALVE FULL BORE	2.00	4.00	DRILLED TO SUIT ISO 6164 FLANGES	BLGS0AX	FL	FL			6000 PSI		51

**Notes:**

- 24 SAE AND ISO 6164 FLANGES TO BE USED FOR CONNECTION TO EQUIPMENT, VALVES AND FOR BRANCH CONNECTIONS ONLY
- 25 NPT SIZES ASSOCIATED WITH TUBE OD SIZES ARE AS FOLLOWS:  
OD10 - NPT 1/4": OD12 - NPT 3/8": OD16 - NPT 1/2": OD20 - NPT 3/4": OD25 - NPT 1": OD30 - NPT 1.1/4": OD38 - NPT 1.1/2":
- 36 NUT AISI 316, SEALING RING AISI 316, BODY ZINC PLATED YELLOW CHROMATISED STEEL
- 37 YELLOW CHROMATISED STEEL SHALL BE PRESERVED WITH DENSOTAPE IN EXPOSED AREAS
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>JS80X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	345.0	345.0	345.0	
Temperature (degrees C)	-29	38	60	

<b>Rating:</b>	345 BAR
<b>Branch Table:</b>	NBR2X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	TUBE:- <=12mm: 15% >12mm: 10% Note 38 PIPE:- 12.5% Note 38
<b>Longitudenal Weld Efficiency</b>	1.0

<b>ND (mm)</b>	<b>10.0</b>	<b>12.0</b>	<b>16.0</b>	<b>20.0</b>	<b>25.0</b>	<b>30.0</b>	<b>38.0</b>	<b>ND (inch)</b>	<b>2.00</b>				
<b>OD (mm)</b>	10.0	12.0	16.0	20.0	25.0	30.0	38.0	<b>OD (mm)</b>	60.3				
<b>PIPE SCHED</b>								<b>SCH</b>	160				
<b>THK (mm)</b>	2.0	2.0	2.5	3.5	4.0	5.0	6.0	<b>THK (mm)</b>	8.74				
<b>WEIGHT</b>								<b>WEIGHT</b>					

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
TUBE	10mm	38mm	DIN 2391.C		PE	PE	A269 TP316	S01			
PIPE	2.00		ASME B36.19M		BE	BE	A312 TP316 SMLS	S01			
BENDING	10mm	38mm	MADE FROM TUBE	NBE1			A269 TP316				
BENDING	2.00		MADE FROM PIPE	NBE1							
EL UNION 90° 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
STRAIGHT TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING TEE UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
UNION - 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A182 F316	S01			36
REDUCING UNION 24° BITE TYPE FITTING	10mm	38mm	ISO 8434-1		CR	CR	A269 TP316	S01			36
CAP	2.00		ASME B16.9		BE		A403 WP 316 S/WX	S01			
CONC REDUCER	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ECC REDUCER	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 45°	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
ELBOW L.R. 90°	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			



<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>JS80X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
STRAIGHT TEE	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
REDUCING TEE	2.00		ASME B16.9		BE	BE	A403 WP 316 S/WX	S01			
HEX HEAD PLUG	2.00		BSPP		MT		A403 WP 316 S/WX	S01			
WN FLANGE HEADS	10mm	38mm	SAE J518 CODE 62		BE	SAE	ASTM A182 F316	S01			24
SPLIT FLANGE CLAMP	10mm	38mm	SAE J518 CODE 62				ASTM A182 F316	S01			24
SEALS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				BONDED SEAL				24
SOCKET HEAD CAP SCREWS	10mm	38mm	DIMN'S TO SAE J518 TABLE 1B				SAE GRADE 5 OR BETTER				24
WN FLANGE HEADS	2.00		ISO 6164 RETAIN RING FLANGE		BE	SAE	ASTM A182 F316	S01			24
SEALS	2.00		ISO 6164				BONDED SEAL AISI + PERBUNAN				24
SOCKET HEAD CAP SCREWS	2.00		DIN 934, 8.8 QUALITY				A320 Gr L7 A194 Gr 7				24
BALL VALVE FULL BORE	10mm	38mm		BLGS00T	FT	FT			6000 PSI		48, 51
CHECK VALVE PISTON	10mm	2"		CHGS00T	FT	FT			6000 PSI		48, 51
BALL VALVE FULL BORE	2.00		DRILLED TO SUIT ISO 6164 FLANGES	BLGS0AX	FL	FL			6000 PSI		51

**Notes:**

- 24 SAE AND ISO 6164 FLANGES TO BE USED FOR CONNECTION TO EQUIPMENT, VALVES AND FOR BRANCH CONNECTIONS ONLY
- 25 NPT SIZES ASSOCIATED WITH TUBE OD SIZES ARE AS FOLLOWS:  
OD10 - NPT 1/4": OD12 - NPT 3/8": OD16 - NPT 1/2": OD20 - NPT 3/4": OD25 - NPT 1": OD30 - NPT 1.1/4": OD38 - NPT 1.1/2":
- 36 NUT AISI 316, SEALING RING AISI 316, BODY ZINC PLATED YELLOW CHROMATISED STEEL
- 37 YELLOW CHROMATISED STEEL SHALL BE PRESERVED WITH DENSOTAPE IN EXPOSED AREAS
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 48 VALVES TO HAVE BSP FEMALE THREADED ENDS
- 51 VALVES TO BE OF FIRE RATED PATTERN

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>KX01X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	518.0	518.0	Note 26	
Temperature (degrees C)	-29	120		

<b>Rating:</b>	Note 26
<b>Branch Table:</b>	NBR1X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	2" : 12.5%, >2" : 10% (Note 38)
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>					<b>2.00</b>	<b>3.00</b>	<b>4.00</b>	<b>5.00</b>	<b>6.00</b>									
<b>OD (mm)</b>					60.3	88.9	114.3	141.3	168.3									
<b>PIPE SCHED</b>																		
<b>THK (mm)</b>					11.10	15.20	17.10	19.10	21.90									
<b>WEIGHT</b>					XXS	XXS	XXS	XXS	XXS									

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	2.00	6.00	ASME B36.10M		BE	BE	A519 AISI 4130 Seamless hot Finished)	X01 Mod			2, 4
BENDING											8
CAP	2.00	6.00	ASME B16.9		BE		MSS SP-75, WHPY-75 AISI 4130	X01 Mod			47
CONC REDUCER	2.00	6.00	ASME B16.9		BE	BE					
ECC REDUCER	2.00	6.00	ASME B16.9		BE	BE					
BW TEE	2.00	6.00	ASME B16.9		BE	BE					
ELBOW 45°	2.00	6.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE	MSS SP-75, WHPY-75 AISI 4130	X01 Mod			3
ELBOW L.R. 90°	2.00	6.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE					
STRAIGHT TEE	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
REDUCING TEE	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
GOOSE NECK	2.00	6.00	160° FULL FLOW. MFR STD		BE	BE					
CROSS	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
BULL PLUG	2.00	6.00			BE						
WELD NECK FLG	2.00	6.00	API 6A TYPE 6BX 10000 PSI		RJ	BE	API 6A TYPE 60K, PSL3.				2,6,7, 28, 31
BLIND FLANGE	2.00	6.00	API 6A TYPE 6BX 10000 PSI		RJ		API 6A TYPE 60K, PSL3.				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>KX01X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GASKET OCTAGONAL RING	2.00	6.00	API 6A TYPE 6BX , API 10000 PSI				TP 316 ST.STL. HARDNESS HB83, PRESSURE ENERGISED				
STUD BOLT C/W NUTS	2.00	6.00	API 6A	NB01			A193 Gr B 7 A194 Gr 2H				
MECH JOINT BLIND HUB	2.00	6.00	MANUFACTURERS STANDARD	NMJ1			A778 AISI 4130	X02			3
MECH JOINT HUB	2.00	6.00	MANUFACTURERS STANDARD	NMJ1	BE		A778 AISI 4130	X02			3
MECH JOINT CLAMP	2.00	6.00	MANUFACTURERS STANDARD	NMJ1			A778 AISI 4130	X02			3
MECH JOINT SEAL RING	2.00	6.00	MANUFACTURERS STANDARD	NMJ1			AISI 4140 PTFE COAT				3
HAMMER LUG UNION	2.00	6.00	WECO FIG 1502		BE	BE	AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	6.00	WECO FIG 1502, FEMALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	6.00	WECO FIG 1502, MALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
MUD GATE VALVE	2.00	6.00	MANUFACTURERS STANDARD	GTKX4AC	CL	CL	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		
MUD GATE VALVE	2.00	6.00	MANUFACTURERS STANDARD	GTKX4AJ	FL	FL	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		42
MUD GATE VALVE	2.00	6.00	MANUFACTURERS STANDARD	GTKX4AB	BE	BE	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		43

**Notes:**

- 2 EQUIPMENT SHALL COMPLY WITH THE FOLLOWING API 6A CLASSIFICATION:  
MATERIAL CLASS AA; TEMPERATURE CLASS P + U
- 3 TO BE SUPPLIED WITH A 'CERTIFICATE OF CONFORMITY' FROM A 'CERTIFYING AUTHORITY'
- 4 MATERIAL SHALL BE SUPPLIED IN A QUENCHED AND TEMPERED CONDITION TO ACHIEVE THE FOLLOWING MINIMUM  
MECHANICAL PROPERTIES:- TENSILE STRENGTH 95 KSI. YIELD STRENGTH 75 KSI.
- 6 ALL FLANGES, FITTINGS AND VALVES SHALL BE BORED AND PREPARED TO SUIT ANSI B36.10 PIPE DIMENSIONS. WALL  
THICKNESS TO MATCH PIPE WALL THICKNESS. BEVELLED ENDS TO BE IN ACCORDANCE WITH ASME B16.25
- 7 RTJ GROOVES ON FLANGES, VALVES, AND EQUIPMENT TO BE OVERLAID WITH 316 STAINLESS STEEL
- 8 PIPE BENDING IS NOT PERMITTED
- 26 PIPING SPECIFICATION OF 10000 PSI MODIFIED TO SUIT MAXIMUM RELIEF VALVE SETTING OF 7500 PSI. PRESSURE  
ACCUMULATION = 10% AND VALVE SETTING TOLERANCE = 3%. DESIGN PRESSURE LIMIT THEREFORE = 8475 PSI
- 27 HAMMER LUG UNIONS ONLY TO BE USED WHERE INDICATED ON P & ID'S.
- 28 USE FLANGES ONLY WHERE NECESSARY AT VALVES AND EQUIPMENT
- 31 FLANGE SIZES TO BE AS FOLLOWS:- 2"- API 1.13/16" 10K, 2.1/2" - API 2.1/16" 10K, 3"- API 2.9/16" 10K, 4"- API 3.1/16" 10K, 5"- API  
4.1/16" 10K, 6" - API 5.1/8" 10K.
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 42 USE FLANGED VALVES ONLY WHERE NECESSARY AT INSTRUMENT AND EQUIPMENT CONNECTIONS
- 43 USE BW ENDED VALVES ONLY WHERE SHOWN ON P&ID'S
- 47 ASME B16.9 FITTINGS TO BE USED FOR VENT, DRAIN AND INSTRUMENT CONNECTIONS ONLY.

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>KX70XS</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	690.0	690.0		
Temperature (degrees C)	-29	121		

<b>Rating:</b>	10000 PSI
<b>Branch Table:</b>	NBR1X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	10% - (Note 38)
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>	<b>0.50</b>	<b>0.75</b>	<b>1.00</b>	<b>1.50</b>	<b>2.00</b>	<b>3.00</b>	<b>4.00</b>	<b>5.00</b>	<b>6.00</b>									
<b>OD (mm)</b>	21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3									
<b>PIPE SCHED</b>																		
<b>THK (mm)</b>	7.47	7.82	9.09	10.16	11.07	15.24	18.50	21.00	25.00									
<b>WEIGHT</b>	XXS	XXS	XXS	XXS	XXS	XXS												

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	1/2"	6.00	ASME B36.10M		BE	BE	A519 AISI 4130 Seamless hot Finished)	X01 Mod			2, 4
BENDING											8
CAP	2.00	6.00	ASME B16.9		BE		MSS SP-75, WHPY-75 AISI 4130	X01 Mod			47
CONC REDUCER	2.00	6.00	ASME B16.9		BE	BE					
ECC REDUCER	2.00	6.00	ASME B16.9		BE	BE					
BW TEE	2.00	6.00	ASME B16.9		BE	BE					
ELBOW 45°	2.00	6.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE	MSS SP-75, WHPY-75 AISI 4130	X01 Mod			3
ELBOW L.R. 90°	2.00	6.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE					
STRAIGHT TEE	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
REDUCING TEE	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
GOOSE NECK	2.00	6.00	160° FULL FLOW. MFR STD		BE	BE					
CROSS	2.00	6.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
BULL PLUG	2.00	6.00			BE						
WELD NECK FLG	2.00	6.00	API 6A TYPE 6BX, API 10000 PSI		RJ	BE	API 6A TYPE 60K, PSL3.				2,6,7, 28,31
BLIND FLANGE	2.00	6.00	API 6A TYPE 6BX, API 10000 PSI		RJ		API 6A TYPE 60K, PSL3.				
GASKET OCTAGONAL RING	2.00	6.00	API 6A TYPE 6BX , API 10000 PSI				TP 316 ST.STL. HARDNESS HB83, PRESSURE ENERGISED				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>KX70XS</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
STUD BOLT C/W NUTS	2.00	6.00	API 6A	NB01			A193 Gr B 7 A194 Gr 2H				
HAMMER LUG UNION	2.00	6.00	WECO FIG 1502		BE	BE	AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	6.00	WECO FIG 1502, FEMALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	6.00	WECO FIG 1502, MALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
GATE VALVE THROUGH CONDUIT SLAB	2.00	6.00	API 6A 10K PSI FLGD. RTJ, FULL BORE	GTXK0AJ	RJ	RJ	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		1,5,7
CHECK VALVE SWING	2.00	6.00	API 6A 10K PSI FLGD. RTJ, FULL BORE	CHKX0AJ	RJ	RJ	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		1,5,7
PLUG VALVE	2.00	4.00	API 6A 10K PSI FLGD. RTJ, FULL BORE	PGKX0AJ	RJ	RJ	MATL. GR. 75K API 6A FORMAT, PSL 3		10000 PSI		1,5,7

**Notes:**

- 1 MATERIALS SHALL BE SUITABLE FOR SOUR SERVICE IN ACCORDANCE WITH NACE SPECIFICATION MR-01-75
- 2 EQUIPMENT SHALL COMPLY WITH THE FOLLOWING API 6A CLASSIFICATION:  
MATERIAL CLASS DD; TEMPERATURE CLASS P + U
- 3 TO BE SUPPLIED WITH A 'CERTIFICATE OF CONFORMITY' FROM A 'CERTIFYING AUTHORITY'
- 4 MATERIAL SHALL BE SUPPLIED IN A QUENCHED AND TEMPERED CONDITION TO ACHIEVE THE FOLLOWING MINIMUM MECHANICAL PROPERTIES:- TENSILE STRENGTH 95 KSI. YIELD STRENGTH 75 KSI.
- 6 ALL FLANGES, FITTINGS AND VALVES SHALL BE BORED AND PREPARED TO SUIT ANSI B36.10 PIPE DIMENSIONS. WALL THICKNESS TO MATCH PIPE WALL THICKNESS. BEVELLED ENDS TO BE IN ACCORDANCE WITH ASME B16.25
- 7 RTJ GROOVES ON FLANGES, VALVES, AND EQUIPMENT TO BE OVERLAID WITH 316 STAINLESS STEEL
- 8 PIPE BENDING IS NOT PERMITTED
- 27 HAMMER LUG UNIONS ONLY TO BE USED WHERE INDICATED ON P & ID'S.
- 28 USE FLANGES ONLY WHERE NECESSARY AT VALVES AND EQUIPMENT
- 31 FLANGE SIZES TO BE AS FOLLOWS:- 2"- API 1.13/16" 10K, 2.1/2" - API 2.1/16" 10K, 3"- API 2.9/16" 10K, 4"- API 3.1/16" 10K, 5"- API 4.1/16" 10K, 6" - API 5.1/8" 10K.
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 47 ASME B16.9 FITTINGS TO BE USED FOR VENT, DRAIN AND INSTRUMENT CONNECTIONS ONLY.

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LS01X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	1378.9	1378.9	1327.2	
Temperature (degrees C)	-73	93	204	

<b>Rating:</b>	manufacturer's standard
<b>Branch Table:</b>	N/A
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	Autoclave Engineers proprietary design
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	n/a
<b>Longitudinal Weld Efficiency</b>	n/a

ND (inch)	1/4"	3/8"	9/16"	3/4"	1"								
OD (mm)			14.3										
PIPE SCHED			n/a										
THK (mm)			3.18										
WEIGHT													

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
TUBE	9/16"	9/16"	MANUFACTURER'S STANDARD		PE	PE	Type 316 stainless steel		Medium pressure		
NIPPLES CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD		C & T	C & T	Type 316 stainless steel		Medium pressure		13
BENDING	9/16"	9/16"	MANUFACTURER'S STANDARD						Medium pressure		12
ELBOW - SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15
TEE - SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15
CROSS - SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15
COUPLINGS - STRAIGHT SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15
COUPLINGS - UNION SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15
COUPLINGS - BULKHEAD SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		Medium pressure		14, 15

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LS01X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
ADAPTOR SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	NPT	Type 316 stainless steel		Medium pressure		14, 15
ADAPTOR SF562CX CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	BSPP	Type 316 stainless steel		Medium pressure		14, 15

CHECK VALVE - SF562CX	9/16"	9/16"	MANUFACTURER'S STANDARD	CHLS0AT	C & T	C & T			Medium pressure		
NEEDLE VALVE - SF562CX	9/16"	9/16"	MANUFACTURER'S STANDARD	NELS0AT	C & T	C & T			Medium pressure		16

**Notes:**

- 12 BEND (MANDRILL) RADIUS 67mm (2.625")
- 13 STANDARD LENGTHS 4", 6", 8", 10" & 12"
- 14 AUTOCLAVE FITTINGS SUPPLIED COMPLETE WITH GLANDS AND COLLARS
- 15 FITTINGS ORIFICE TO MATCH HIGH-FLOW SERIES SM VALVES
- 16 VALVE TO BE SUPPLIED WITH CRYOGENIC TRIM MATERIALS AND TEFLON PACKING SUITABLE FOR MINUS 73°C

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LS02X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	2068.9	2068.9	2068.9	
Temperature (degrees C)	-73	93	204	

<b>Rating:</b>	manufacturer's standard
<b>Branch Table:</b>	N/A
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	Autoclave Engineers proprietary design
<b>Corrosion Allowance (mm):</b>	0.00
<b>Wall thickness Under-tolerance:</b>	n/a
<b>Longitudinal Weld Efficiency</b>	n/a

ND (inch)	1/4"	3/8"	9/16"	3/4"	1"								
OD (mm)			14.3										
PIPE SCHED			n/a										
THK (mm)			6.35										
WEIGHT													

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
TUBE	9/16"	9/16"	MANUFACTURER'S STANDARD		PE	PE	Type 316 stainless steel		High pressure		
NIPPLES CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD		C & T	C & T	Type 316 stainless steel		High pressure		13
BENDING	9/16"	9/16"	MANUFACTURER'S STANDARD						High pressure		12
ELBOW - F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50
TEE - F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50
CROSS - F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50
COUPLINGS - STRAIGHT F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50
COUPLINGS - UNION F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50
COUPLINGS - BULKHEAD F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	C & T	Type 316 stainless steel		High pressure		14, 50



<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LS01X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
ADAPTOR F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	NPT	Type 316 stainless steel		High pressure		14, 50
ADAPTOR F562C40 CONED & THREADED	9/16"	9/16"	MANUFACTURER'S STANDARD - SERIES SF		C & T	BSPP	Type 316 stainless steel		High pressure		14, 50

CHECK VALVE - F562C40	9/16"	9/16"	MANUFACTURER'S STANDARD	CHLS1AT	C & T	C & T			High pressure		
NEEDLE VALVE - 30VM - F562C40	9/16"	9/16"	MANUFACTURER'S STANDARD	NELS1AT	C & T	C & T			High pressure		50

**Notes:**

- 12 BEND (MANDRILL) RADIUS 67mm (2.625")
- 13 STANDARD LENGTHS 4", 6", 8", 10" & 12"
- 14 AUTOCLAVE FITTINGS SUPPLIED COMPLETE WITH GLANDS AND COLLARS
- 16 VALVE TO BE SUPPLIED WITH CRYOGENIC TRIM MATERIALS AND TEFLON PACKING SUITABLE FOR MINUS 73°C
- 50 FITTINGS ORIFICE TO MATCH HIGH-FLOW SERIES 30VM VALVES

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LX01</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	1035.0	1035.0		
Temperature (degrees C)	-29	100		

<b>Rating:</b>	15000 PSI
<b>Branch Table:</b>	NBR1X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	2" : 10.0%, >2" : 7.5% (Note 38)
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>					<b>2.00</b>	<b>3.00</b>	<b>4.00</b>	<b>5.00</b>										
<b>OD (mm)</b>					60.3	88.9	114.3	141.3										
<b>PIPE SCHED</b>																		
<b>THK (mm)</b>					15.00	20.00	25.00	30.00										
<b>WEIGHT</b>																		

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	2.00	5.00	ASME B36.10M		BE	BE	A519 AISI 4130 Seamless hot Finished)	X01 Mod			2,4
BENDING											8
STUDDED BLOCK FITTINGS											4
STUDDED TEE	2.00	5.00	API-6A. FLGD RTJ API 15000 PSI				API 6A GRADE 75K PSL3	X01 Mod			
STUDDED CROSS	2.00	5.00	API-6A. FLGD RTJ API 15000 PSI				API 6A GRADE 75K PSL3				47
CAP	2.00	5.00	ASME B16.9		BE		MSS SP-75, WHPY-75 AISI 4130	X01 Mod			
CONC REDUCER	2.00	5.00	ASME B16.9		BE	BE					
ECC REDUCER	2.00	5.00	ASME B16.9		BE	BE					
BW TEE	2.00	5.00	ASME B16.9		BE	BE	MSS SP-75, WHPY-75 AISI 4130	X01 Mod			
ELBOW 45°	2.00	5.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE					
ELBOW L.R. 90°	2.00	5.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE					
STRAIGHT TEE	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
REDUCING TEE	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
GOOSE NECK	2.00	5.00	160° FULL FLOW. MFR STD		BE	BE					
CROSS	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
BULL PLUG	2.00	5.00			BE						2,5,6,7, 28
WELD NECK FLG	2.00	5.00	API 6A TYPE 6BX 15000psi		RJ	BE	API 6A TYPE 75K PSL3.				
BLIND FLANGE	2.00	5.00	API 6A TYPE 6BX 15000psi		RJ		API 6A TYPE 75K PSL3.				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LX01</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GASKET OCTAGONAL RING	2.00	5.00	API 6A TYPE 6BX , API 15000 PSI				TP 316 ST.STL. HARDNESS HB83, PRESSURE ENERGISED				
STUD BOLT C/W NUTS	2.00	5.00	API 6A	NB01			A193 Gr B 7 A194 Gr 2H				
HAMMER LUG UNION	2.00	5.00	WECO FIG 1502		BE	BE	AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	5.00	WECO FIG 1502, FEMALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	5.00	WECO FIG 1502, MALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
PLUG VALVE	2.00	5.00	MANUFACTURERS STANDARD	PGLX0AX	FIG 1502 UNION M x F				API 15000 PSI		2

**Notes:**

- 2 EQUIPMENT SHALL COMPLY WITH THE FOLLOWING API 6A CLASSIFICATION:  
MATERIAL CLASS AA; TEMPERATURE CLASS P + U
- 3 TO BE SUPPLIED WITH A 'CERTIFICATE OF CONFORMITY' FROM A 'CERTIFYING AUTHORITY'
- 4 MATERIAL SHALL BE SUPPLIED IN A QUENCHED AND TEMPERED CONDITION TO ACHIEVE THE FOLLOWING MINIMUM  
MECHANICAL PROPERTIES:- TENSILE STRENGTH 95 KSI. YIELD STRENGTH 75 KSI.
- 5 FLANGE SIZES TO BE AS FOLLOWS:- 2"- API 1.13/16" 15K, 3"- API 2.9/16" 15K, 4"- API 3.1/16" 15K, 5"- API 4.1/16" 15K.
- 6 ALL FLANGES, FITTINGS AND VALVES SHALL BE BORED AND PREPARED TO SUIT ANSI B36.10 PIPE DIMENSIONS. WALL  
THICKNESS TO MATCH PIPE WALL THICKNESS. BEVELLED ENDS TO BE IN ACCORDANCE WITH ASME B16.25
- 7 RTJ GROOVES ON FLANGES, VALVES, AND EQUIPMENT TO BE OVERLAID WITH 316 STAINLESS STEEL
- 8 PIPE BENDING IS NOT PERMITTED
- 27 HAMMER LUG UNIONS ONLY TO BE USED WHERE INDICATED ON P & ID'S.
- 28 USE FLANGES ONLY WHERE NECESSARY AT VALVES AND EQUIPMENT
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 47 ASME B16.9 FITTINGS TO BE USED FOR VENT, DRAIN AND INSTRUMENT CONNECTIONS ONLY.

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LX01S</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

Maximum Design Pressure at Temperature				
Pressure (barg)	1035.0	1035.0		
Temperature (degrees C)	-29	121		

<b>Rating:</b>	15000 PSI
<b>Branch Table:</b>	NBR1X
<b>Service Code:</b>	Refer to Sect.7

<b>Design Code:</b>	ASME B31.3
<b>Corrosion Allowance (mm):</b>	3.00
<b>Wall thickness Under-tolerance:</b>	2" : 10.0%, >2" : 7.5% (Note 38)
<b>Longitudinal Weld Efficiency</b>	1.0

<b>ND (inch)</b>					<b>2.00</b>	<b>3.00</b>	<b>4.00</b>	<b>5.00</b>										
<b>OD (mm)</b>					60.3	88.9	114.3	141.3										
<b>PIPE SCHED</b>																		
<b>THK (mm)</b>					15.00	20.00	25.00	30.00										
<b>WEIGHT</b>																		

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
PIPE	2.00	5.00	ASME B36.10M		BE	BE	A519 AISI 4130 Seamless hot Finished)	X01 Mod			1,2,4
BENDING											8
STUDDERED TEE	2.00	5.00	API-6A. FLGD RTJ API 15000 PSI				API 6A GRADE 75K PSL3	X01 Mod			47
STUDDERED CROSS	2.00	5.00	API-6A. FLGD RTJ API 15000 PSI				API 6A GRADE 75K PSL3				
CAP	2.00	5.00	ASME B16.9		BE		MSS SP-75, WHPY-75 AISI 4130	X01 Mod			
CONC REDUCER	2.00	5.00	ASME B16.9		BE	BE					
ECC REDUCER	2.00	5.00	ASME B16.9		BE	BE					1,2,5,6, 7,28
BW TEE	2.00	5.00	ASME B16.9		BE	BE					
ELBOW 45°	2.00	5.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE	MSS SP-75, WHPY-75 AISI 4130	X01 Mod			
ELBOW L.R. 90°	2.00	5.00	REINFORCED 3D DOUBLE BACK ELBOW. MFR STD		BE	BE					
STRAIGHT TEE	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
REDUCING TEE	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
GOOSE NECK	2.00	5.00	160° FULL FLOW. MFR STD		BE	BE					
CROSS	2.00	5.00	LONG SWEEP FULL FLOW. MFR STD		BE	BE					
BULL PLUG	2.00	5.00			BE						
WELD NECK FLG	2.00	5.00	API 6A TYPE 6BX 15000psi		RJ	BE	API 6A TYPE 75K PSL3.				1,2,5,6, 7,28
BLIND FLANGE	2.00	5.00	API 6A TYPE 6BX 15000psi		RJ		API 6A TYPE 75K PSL3.				

<b>Title:</b>	Piping Material Specification	<b>Piping Class:</b>	<b>LX01S</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling			<b>Revision:</b>	4

ITEM TYPE	RANGE (from/to)		GEOMETRIC STANDARD	EDS/VDS	END CONN (1 & 2)		MATERIAL DESCRIPTION	MDS	RATING	SCHD	NOTES
GASKET OCTAGONAL RING	2.00	5.00	API 6A TYPE 6BX , API 15000 PSI				TP 316 ST.STL. HARDNESS HB83, PRESSURE ENERGISED				
STUD BOLT C/W NUTS	2.00	5.00	API 6A	NB01			A193 Gr B 7 A194 Gr 2H				
MECHANICAL JOINT BLIND HUB	2.00	5.00	MANUFACTURERS STANDARD	NMJ1			A778 AISI 4130	X02			
MECHANICAL JOINT HUB	2.00	5.00	MANUFACTURERS STANDARD	NMJ1	BE		A778 AISI 4130	X02			
MECHANICAL JOINT CLAMP	2.00	5.00	MANUFACTURERS STANDARD	NMJ1			A778 AISI 4130	X02			
MECHANICAL JOINT SEAL RING	2.00	5.00	MANUFACTURERS STANDARD	NMJ1			AISI 4140 PTFE COAT				
HAMMER LUG UNION	2.00	5.00	WECO FIG 2202		BE	BE	AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	5.00	WECO FIG 2202, FEMALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
HAMMER LUG UNION, BLIND	2.00	5.00	WECO FIG 2202, MALE BLIND SUB		BE		AISI 4130/4140 VITON SEAL				3,27
GATE VALVE THROUGH CONDUIT SLAB	2.00	5.00	MANUFACTURERS STANDARD	GTLX40C	CL	CL			API 15000 PSI		1, 3

**Notes:**

- 1 MATERIALS SHALL BE SUITABLE FOR SOUR SERVICE IN ACCORDANCE WITH NACE SPECIFICATION MR-01-75
- 2 EQUIPMENT SHALL COMPLY WITH THE FOLLOWING API 6A CLASSIFICATION:  
MATERIAL CLASS DD; TEMPERATURE CLASS P + U
- 3 TO BE SUPPLIED WITH A 'CERTIFICATE OF CONFORMITY' FROM A 'CERTIFYING AUTHORITY'
- 4 MATERIAL SHALL BE SUPPLIED IN A QUENCHED AND TEMPERED CONDITION TO ACHIEVE THE FOLLOWING MINIMUM  
MECHANICAL PROPERTIES:- TENSILE STRENGTH 95 KSI. YIELD STRENGTH 75 KSI.
- 5 FLANGE SIZES TO BE AS FOLLOWS:- 2"- API 1.13/16" 15K, 3"- API 2.9/16" 15K, 4"- API 3.1/16" 15K, 5"- API 4.1/16" 15K.
- 6 ALL FLANGES, FITTINGS AND VALVES SHALL BE BORED AND PREPARED TO SUIT ANSI B36.10 PIPE DIMENSIONS. WALL  
THICKNESS TO MATCH PIPE WALL THICKNESS. BEVELLED ENDS TO BE IN ACCORDANCE WITH ASME B16.25
- 7 RTJ GROOVES ON FLANGES, VALVES, AND EQUIPMENT TO BE OVERLAID WITH 316 STAINLESS STEEL
- 8 PIPE BENDING IS NOT PERMITTED
- 27 HAMMER LUG UNIONS ONLY TO BE USED WHERE INDICATED ON P & ID'S.
- 28 USE FLANGES ONLY WHERE NECESSARY AT VALVES AND EQUIPMENT
- 38 REFER TO DOC.NO. R5188 NOV L 4002 FOR WALL THICKNESS CALCULATIONS
- 47 ASME B16.9 FITTINGS TO BE USED FOR VENT, DRAIN AND INSTRUMENT CONNECTIONS ONLY.

## SECTION 9 - ELEMENT DATA SHEETS

<b>Title:</b>	Piping Material Specification	<b>Element Data</b>	<b>NBR1X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling	<b>Sheet:</b>		<b>Revision:</b>	4

PIPE BRANCH SPECIFICATION FOR PIPING CLASSES:    KX01X  
    KX70XS  
    LX01  
    LX01S

B R A N C H  S I Z E	NOMINAL HEADER SIZE					
	(INS)	6.00	5.00	4.00	3.00	2.00
	2.00	WRT	WRT	WRT	WRT	WT
	3.00	WRT	WRT	WRT	WT	
	4.00	WRT	WRT	WT		
	5.00	WRT	WT			
	6.00	WT				

**WT**                BUTT WELD EQUAL LONG SWEEP FULL FLOW TEE  
**WRT**             BUTT WELD REDUCING LONG SWEEP FULL FLOW TEE

<b>Title:</b>	Piping Material Specification	<b>Element Data</b>	<b>NBR2X</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling	<b>Sheet:</b>		<b>Revision:</b>	4

PIPE BRANCH SPECIFICATION FOR PIPING CLASSES:            BS20X            FS70X

		NOMINAL HEADER SIZE											
		(MM)						(INS)					
		4.00	3.00	2.50	2.00	38.00	30.00	25.00	20.00	16.00	12.00	10.00	
N O M I N A L  B R A N C H  S I Z E	(MM)	10.00				CRT	CRT	CRT	CRT	CRT	CRT	CT	
		12.00				CRT	CRT	CRT	CRT	CRT	CT		
		16.00				CRT	CRT	CRT	CRT	CT			
		20.00				CRT	CRT	CRT	CT				
		25.00				CRT	CRT	CT					
		30.00				CRT	CT						
		38.00	WRT	WRT	WRT	WT	CT						
	(INS)	2.00	WRT	WRT	WRT	WT							
		2.50	WRT	WRT	WT								
		3.00	WRT	WT									
		4.00	WT										

**NOTE:**            FOR HEADER SIZES 2"-4" MINIMUM SIZE BRANCH IS 38mm

**WT**            BUTT WELD TEE TO ASME B16.9 / MSS-SP-75

**WRT**            BUTT WELD REDUCING TEE TO ASME B16.9 / MSS-SP-75

**WOL**            WELDOLET OR LATROLET/ELBOLET.

**CT**            BITE TYPE EQUAL TEE

**CRT**            BITE TYPE REDUCING TEE

<b>Title:</b>	Piping Material Specification	<b>Element Data</b>	<b>NBR3</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling	<b>Sheet:</b>		<b>Revision:</b>	4

PIPE BRANCH SPECIFICATION FOR PIPING CLASSES:    AC11            AS20  
    AC11S          BC11XS  
    AC21X          FS20  
    AC71X          AD75

NOMINAL HEADER SIZE															
N O M I N A L  B R A N C H  S I Z E	(INS)	18.00	16.00	14.00	12.00	10.00	8.00	6.00	5.00	4.00	3.00	2.00	1.50	1.00	0.75
	0.50	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WRT
	0.75	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WRT	WT
	1.00	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WT	
	1.50	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WRT	WT		
	2.00	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WT			
	3.00	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WRT	WRT	WT				
	4.00	WOL	WOL	WOL	WOL	WRT	WRT	WRT	WRT	WT					
	5.00	WOL	WOL	WOL	WRT	WRT	WRT	WRT	WT						
	6.00	WOL	WRT	WRT	WRT	WRT	WRT	WT							
	8.00	WRT	WRT	WRT	WRT	WRT	WT								
	10.00	WRT	WRT	WRT	WRT	WT									
	12.00	WRT	WRT	WRT	WT										
	14.00	WRT	WRT	WT											
	16.00	WRT	WT												
	18.00	WT													

**TOL**            THREADOLET (THREADS ACCORDING TO ASME B16.11) UP TO & INCLUDING 1" MAY BE USED IN PLACE OF WOL FOR PRESSURE TESTING VENTS & DRAINS UP TO ASME B16.5 CLASS 600 PRESSURE RATING

**WOL**            WELDOLET OR LATROLET/ELBOLET.

**WT**             BUTT WELD TEE TO ASME B16.9 / MSS-SP-75

**WRT**            BUTT WELD REDUCING TEE TO ASME B16.9 / MSS-SP-75

**NOTE:**        MUD DRAINS (AC11) & BULK POWDER LINES (AC71X):  
 LATERAL BRANCHES TO BE USED. DESIGN IN ACCORDANCE WITH ASME B31.3 SECTION 328.5.4, "WELDED BRANCH CONNECTIONS". ALL BRANCH CONNECTIONS AT 45°



<b>Title:</b>	Piping Material Specification	<b>Element Data</b>	<b>NBR5</b>	<b>Doc.Number:</b>	R5188 - NOV - L - 4000
<b>Project:</b>	ORS Pioneer Drilling	<b>Sheet:</b>		<b>Revision:</b>	4

**PIPE BRANCH SPECIFICATION FOR PIPING CLASSES: AG70X**

NOMINAL HEADER SIZE												
N O M I N A L  B R A N C H  S I Z E	(INS)	10.00	8.00	6.00	5.00	4.00	3.00	2.00	1.50	1.00	0.75	0.50
	0.50	TOL	TOL	TOL	TOL	TOL	TOL	SRT	SRT	SRT	SRT	ST
	0.75	TOL	TOL	TOL	TOL	TOL	TOL	SRT	SRT	SRT	ST	
	1.00	TOL	TOL	TOL	TOL	TOL	TOL	SRT	SRT	ST		
	1.50	TOL	TOL	TOL	TOL	TOL	TOL	SRT	ST			
	2.00	TOL	TOL	TOL	TOL	TOL	TOL	ST				
	3.00	WOL	WOL	WRT	WRT	WRT	WT					
	4.00	WRT	WRT	WRT	WRT	WT						
	5.00	WRT	WRT	WRT	WT							
	6.00	WRT	WRT	WT								
	8.00	WRT	WT									
	10.00	WT										

**TOL**      THREADOLET OR THREADED NIPOLET OR THREADED LATROLET/ELBOLET. THREADS ACCORDING TO ASME B16.11

**SRT**      SCREWED (THREADED) REDUCING TEE WITH REDUCTION BUSHING TO ASME B16.11

**ST**        SCREWED (THREADED) TEE TO ASME B16.11

**WOL**      WELDOLET OR LATROLET/ELBOLET.

**WT**        BUTT WELD TEE TO ASME B16.9

**WRT**      BUTT WELD REDUCING TEE TO ASME B16.9