

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE (CORE)

MANUAL

PIPING CLASSES – REFINING AND CHEMICALS – CLASS 900

PTS 31.38.01.12

JANUARY 2010



PREFACE

PETRONAS Technical Standards (PTS) publications reflect the views, at the time of publication, of PETRONAS OPU/Divisions.

They are based on the experience acquired during the involvement with the design, construction, operation and maintenance of processing units and facilities. Where appropriate they are based on, or reference is made to, national and international standards and codes of practice.

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PIPING CLASSES - CLASS 900

The piping class files below are embedded MS-Word files.

To open a file, double-click on the desired piping class (if you are viewing the PDF version of this document, open the MS-Word version of this document and double-click on the desired piping class).

CLASS 91042-20
CLASS 91011-20
CLASS 91013
CLASS 91013-20
CLASS 91015
CLASS 91015-KS
CLASS 91031
CLASS 91031-KS
CLASS 91041
CLASS 91041-20
CLASS 91042
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CLASS 91055-20
CLASS 91071
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CLASS 91076
CLASS 91076-KS
CLASS 91176
CLASS 91180
CLASS 91261
CLASS 91374
CLASS 91374-KS
CLASS 91380
CLASS 92010
CLASS 92011
CLASS 92020
CLASS 92021
CLASS 92040
CLASS 92090
CLASS 92110
CLASS 92120
CLASS 92121
CLASS 93012
CLASS 93015
CLASS 93021
CLASS 93052
CLASS 93055
CLASS 93095

CLASS 91011-20

Design limits

	Temperature (°C)									
	-20	0	50	100	150	200	250	300	350	400
Pressure (Bar ga)										
DN 15- 600	153.2	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	104.2
DN 750-1200	153.2	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	100.7

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1
- Design limits DN750 and larger limited by maximum allowable pressure acc. ASME B31.3
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piping class design meets full vacuum at ambient temperature condition
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120
750	40.0
900	48.0
1050	56.0
1200	64.0

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
1200	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
1050	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
900	C	C	C	C	E	E	E	E	E	E	E	E	E	B	B	B
750	C	C	C	C	E	E	E	E	E	E	E	E	B	B	B	A
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
400	C	C	C	C	E	E	E	E	E	B	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	B	A			
300	C	C	C	C	E	E	E	B	B	B	B	A				
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel		Plant
Class no.	91011-20	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	O	Contr. job no.
Revision date	08/2005	Project no.



COMPONENT MATERIAL DESCRIPTION

(For full material description see relevant MESG buying description.)

Pipe

PIPE	Pipe	DN 15-150	ASTM A106-B
PIPE	Pipe	DN 200-600	ASTM A333-6
PIPE	Pipe	DN 750-1200	ASTM A671-CC65 cl 22
PISM	Pipe (API 5L-B sml)	DN 15-200	API 5L-B (sml)

Flanges

BLFL	Blind flange	DN 15-150	ASTM A105
BLFL	Blind flange	DN 200-1200	ASTM A350-LF2
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPFL	Spade	DN 750-1200	ASTM A516-70
SPRT	Spacer ring	DN 15-1200	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-150	ASTM A105
WNFL	Welding neck flange	DN 200-1200	ASTM A350-LF2

Fittings

CAPB	Cap bw	DN 15-150	ASTM A234-WPB
CAPB	Cap bw	DN 200-1200	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-150	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 200-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 750-1200	ASTM A420-WPL6W
E90B	Elbow 90 deg bw	DN 15-150	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 200-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 750-1200	ASTM A420-WPL6W
TEEB	Tee equal bw	DN 15-150	ASTM A234-WPB
TEEB	Tee equal bw	DN 200-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 750-1200	ASTM A420-WPL6W

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-150	ASTM A105
BROB	Branch outlet bw	DN 200-1200	ASTM A350-LF2
RECB	Reducer concentric bw	DN 20-150	ASTM A234-WPB
RECB	Reducer concentric bw	DN 200-600	ASTM A420-WPL6
RECB	Reducer concentric bw	DN 750-1200	ASTM A420-WPL6W
RETB	Reducer eccentric bw	DN 20-150	ASTM A234-WPB
RETB	Reducer eccentric bw	DN 200-600	ASTM A420-WPL6
RETB	Reducer eccentric bw	DN 750-1200	ASTM A420-WPL6W
TERB	Tee reducing bw	DN 20-150	ASTM A234-WPB
TERB	Tee reducing bw	DN 200-600	ASTM A420-WPL6
TERB	Tee reducing bw	DN 750-1200	ASTM A420-WPL6W

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-1200	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-1050	Body: ASTM A216-WCB/WCC Trim: AISI 410
CHVF	Check valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GAVF	Gate valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GLVF	Globe valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 50-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKMG	Gasket metal groove	DN 750-1200	AISI 316, graphite, SS centring ring
GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 200-600	ASTM A350-LF2
ORFS	Orifice flange set	DN 50-150	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7/A194-2H

PIPING COMPONENTS

Item description	MESC	Nominal pipe size																			
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600	750	900	1050	1200
Pipe																					
Pipe	743005	0181	0281	0381	0581	0711	1091	1571	2231												
Pipe	743010																	4071	5391	6081	6681
Pipe	743017									1001	1121	1241	1371	1461	1821	2181	2501				
Pipe (API 5L-B sml)	741312	0181	0281	0381	0581	0711	1091	1571	2231	2631											
Flanges																					
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261												
Blind flange	766212									6281	6301	6321	6341	6361	6381	6401	6421				
Blind flange	767013																	2561	2621	2681	2741
Spacer ring	768816	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441								
Spacer ring	768817													6361	6381	6401	6441				
Spacer ring	768875																	3331	3361	3391	3421
Spade	768813	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441								
Spade	768860													0721	0731	0741	0751				
Spade	768895																	3331	3361	3391	3421
Spectacle blind	768803	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401										
Welding neck flange	766279	9021	9041	9061	9081	9101	8321	8341	8661												
Welding neck flange	766286									4181	4201	4221	4241	4261	4281	4301	4341				
Welding neck flange	767086																	5651	6411	7171	7931
Fittings																					
Cap bw	763019	0181	0241	0301	0381	0581	0781	0981	1201												
Cap bw	763115																	6811	7471	8171	8921
Cap bw	763118									2911	3121	3351	3551	3751	3911	4011	4121				
Elbow 45 deg bw	763038	5681	5741	5801	5881	6081	6281	6481	6701												
Elbow 45 deg bw	763138									2911	3121	3351	3551	3751	3911	4011	4121				
Elbow 45 deg bw	763144																	6421	7081	7781	8531
Elbow 90 deg bw	763040	5681	5741	5801	5881	6081	6281	6481	6701												
Elbow 90 deg bw	763139									2911	3121	3351	3551	3751	3921	4021	4131				
Elbow 90 deg bw	763146																	6441	7081	7781	8531
Tee equal bw	763084	5681	5741	5801	5881	6081	6281	6481	6701												
Tee equal bw	763184									2911	3121	3351	3551	3751	3931	4031	4131				
Tee equal bw	763190																	6421	7081	7781	8531
Valves																					
Butterfly valve triple ex flgd	774130									1651	1661	1671	1681	1691	1701	1711	1731	1761	1791	1821	1841
Check valve dual plate flgd	776711											1671	1681	1691	1701	1711	1731	1761	1791	1821	
Check valve flgd	771005	5031	5041	5051	5071																
Check valve flgd	771020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Gate valve flgd	772004	5031	5041	5051	5071																
Gate valve flgd	772020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Globe valve flgd	773005	5031	5041	5051	5071																
Globe valve flgd	773020					2081	1601	1621	1641												
Miscellaneous																					
Gasket metal groove	854172																	1481	1541	1601	1661
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921				
Meter run	766596	2821	2841	2861	2881																
Orifice flange set	766295					3011	2081	2091	2341												
Orifice flange set	766297									2281	2291	2301	2311	2321	2331	2341	2351				

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630721371	7630731371	7630890351	400	x	50	7679063681				15	40	- 40	7680373611	7680310361
25	x	15		7630721471	7630731471	7630890451	400	x	80	7679063921				15	50	- 50	7680373631	7680310371
25	x	20		7630721571	7630731571	7630890551	400	x	100	7679064041				15	80	- 200	7680373641	7680310381
40	x	15		7630721671	7630731671		400	x	150	7679067001				15	250	- 1200	7680373651	7680310391
40	x	20		7630721771	7630731771	7630890751	400	x	200	7679067181	7631704571	7631714571		20	50	- 50	7680373661	7680310401
40	x	25		7630721871	7630731871	7630890851	400	x	250		7631704661	7631714661	7631855091	20	80	- 100	7680373671	7680310411
50	x	20		7630721941	7630731941		400	x	300		7631704761	7631714761	7631855351	20	150	- 300	7680373691	7680310431
50	x	25		7630721971	7630731971	7630891061	400	x	350		7631704901	7631714901	7631855601	20	350	- 1200	7680373711	7680310441
50	x	40		7630722071	7630732071	7630891151	450	x	50	7679063701				25	80	- 80	7680373731	7680310451
80	x	40		7630722271	7630732271		450	x	80	7679063941				25	100	- 100	7680373751	7680310461
80	x	50		7630722371	7630732371	7630891331	450	x	100	7679064051				25	150	- 250	7680373761	7680310471
100	x	40		7630722511	7630732511		450	x	150	7679067021				25	300	- 1200	7680373771	7680310491
100	x	50		7630722671	7630732671	7630891541	450	x	200	7679067201				40	80	- 80	7680373791	7680310511
100	x	80		7630722771	7630732771	7630891661	450	x	250		7631705281	7631715281	7631856081	40	100	- 100	7680373801	7680310521
150	x	50	7679023581				450	x	300		7631705581	7631715581	7631856321	40	150	- 150	7680373821	7680310531
150	x	80		7630722991	7630732991	7630891841	450	x	350		7631705891	7631715891	7631856561	40	200	- 300	7680373831	7680310551
150	x	100		7630723101	7630733101	7630891981	450	x	400		7631706191	7631716191	7631856801	40	350	- 600	7680373851	7680310571
200	x	50	7679063601				500	x	50	7679063721				40	750	- 1200	7680373861	7680310151
200	x	80	7679063841				500	x	80	7679063961								
200	x	100		7629443291	7629593291	7631852181	500	x	100	7679064061								
200	x	150		7631703391	7631713391	7631852271	500	x	150	7679067041								
250	x	50	7679063621				500	x	200	7679067221								
250	x	80	7679063861				500	x	250	7679067381								
250	x	100		7629443521	7629593521	7631852651	500	x	300		7631706481	7631716481	7631857521	230			7683370311	
250	x	150		7631703591	7631713591	7631852731	500	x	350		7631706791	7631716791	7631857761	255			7683370321	
250	x	200		7631703691	7631713691	7631852951	500	x	400		7631707091	7631717091	7631858001	305			7683370331	
300	x	50	7679063641				500	x	450		7631707391	7631717391	7631858241	355			7683370341	
300	x	80	7679063881				600	x	50	7679063741				405			7683370351	
300	x	100	7679064021				600	x	80	7679063981				455			7683370361	
300	x	150		7631703871	7631713871	7631853121	600	x	100	7679064071								
300	x	200		7631703991	7631713991	7631853321	600	x	150	7679067081								
300	x	250		7631704091	7631714091	7631853541	600	x	200	7679067261								
350	x	50	7679063661				600	x	250	7679067421								
350	x	80	7679063901				600	x	300				7631858721					
350	x	100	7679064031				600	x	350				7631858961					
350	x	150	7679066981	7631704171	7631714171		600	x	400		7631708891	7631718891	7631859201					
350	x	200		7631704261	7631714261	7631853941	600	x	450		7631709191	7631719191	7631859441					
350	x	250		7631704401	7631714401	7631854191	600	x	500		7631709491	7631719491	7631859681					
350	x	300		7631704501	7631714501	7631854451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

Thermowell

Length MESC number

230	7683370311
255	7683370321
305	7683370331
355	7683370341
405	7683370351
455	7683370361

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB
750	x	50	7678025071				1050	x	50	7678468131			
750	x	80	7678025201				1050	x	80	7678468261			
750	x	100	7678025331				1050	x	100	7678468391			
750	x	150	7678462461				1050	x	150	7678469521			
750	x	200	7678462591				1050	x	200	7678469651			
750	x	250	7678462721				1050	x	250	7678469781			
750	x	300	7678462831				1050	x	300	7678469851			
750	x	350	7678462861				1050	x	350	7678469891			
750	x	400				7629900751	1050	x	400	7678469921			
750	x	450				7629900951	1050	x	450	7678469951			
750	x	500				7629901151	1050	x	500	7678469981			
750	x	600		7629531351	7629731351	7629901351	1050	x	600				7629905011
900	x	50	7678465101				1050	x	750				7629905611
900	x	80	7678465231				1050	x	900		7629536211	7629736211	7629906211
900	x	100	7678465361				1200	x	50	7678771161			
900	x	150	7678466491				1200	x	80	7678771291			
900	x	200	7678466621				1200	x	100	7678771421			
900	x	250	7678466751				1200	x	150	7678772551			
900	x	300	7678466841				1200	x	200	7678772681			
900	x	350	7678466881				1200	x	250	7678772811			
900	x	400	7678466911				1200	x	300	7678772861			
900	x	450				7629902531	1200	x	350	7678772901			
900	x	500				7629902731	1200	x	400	7678772931			
900	x	600				7629902931	1200	x	450	7678772961			
900	x	750		7629533531	7629733531	7629903531	1200	x	500	7678772991			
							1200	x	600				7629907671
							1200	x	750				7629908271
							1200	x	900				7629908871
							1200	x	1050		7629539471	7629739471	7629909471

BOLTING

Boltset standard flange					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 110	8138613301	
20	4	3/4	x 120	8138613321	
25	4	7/8	x 130	8138614031	
40	4	1	x 140	8138614691	
50	8	7/8	x 150	8138614061	
80	8	7/8	x 150	8138614061	
100	8	1 1/8	x 180	8138615331	
150	12	1 1/8	x 200	8138615251	
200	12	1 3/8	x 230	8138616441	
250	16	1 3/8	x 240	8138616461	
300	20	1 3/8	x 260	8138616491	
350	20	1 1/2	x 280	8138616931	
400	20	1 5/8	x 290	8138617241	
450	20	1 7/8	x 330	8138617861	
500	20	2	x 400	8138618241	
600	20	2 1/2	x 500	8138837011	
750	20	3	x 570	8138838481	
900	20	3 1/2	x 660	8138839271	
1050	24	3 1/2	x 730	8138839341	
1200	24	4	x 820	8138839811	

Boltset meter run					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 150	8138613371	
20	4	3/4	x 150	8138613371	
25	4	7/8	x 150	8138614061	
40	4	1	x 160	8138614721	

Boltset orifice flange					
DN	nr	inch	x mm	MESC number	
50	8	7/8	x 160	8138614071	
80	8	7/8	x 160	8138614071	
100	8	1 1/8	x 190	8138615351	
150	12	1 1/8	x 210	8138615381	
200	12	1 3/8	x 250	8138616471	
250	16	1 3/8	x 260	8138616491	
300	20	1 3/8	x 290	8138616541	
350	20	1 1/2	x 310	8138616981	
400	20	1 5/8	x 330	8138617301	
450	20	1 7/8	x 370	8138617921	
500	20	2	x 450	8138618311	
600	20	2 1/2	x 560	8138837071	

Boltset blind/spacer					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 120	8138613321	
20	4	3/4	x 130	8138613341	
25	4	7/8	x 140	8138614041	
40	4	1	x 160	8138614721	
50	8	7/8	x 170	8138614091	
80	8	7/8	x 170	8138614091	
100	8	1 1/8	x 200	8138615251	
150	12	1 1/8	x 230	8138615411	
200	12	1 3/8	x 270	8138616411	
250	16	1 3/8	x 290	8138616541	
300	20	1 3/8	x 320	8138616591	
350	20	1 1/2	x 340	8138617021	
400	20	1 5/8	x 360	8138617361	
450	20	1 7/8	x 410	8138617961	
500	20	2	x 490	8138618371	
600	20	2 1/2	x 610	8138837121	
750	20	3	x 690	8138838601	
900	20	3 1/2	x 800	8138839401	
1050	24	3 1/2	x 890	8138839481	
1200	24	4	x 1000	8138839901	

ASSEMBLIES

Drain/vent point DN 15 Fig.I DN15 - 15		
Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799021
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138613301

Drain/vent point DN 20 Fig.I DN20 - 40		
Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799041
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 20 Fig.H DN50 - 50		
Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 25 Fig.H DN80 - 300		
Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138614031

Drain/vent point DN 40 Fig.H DN350 - 1200		
Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138614691

Meter run connection DN 15 Fig.OH DN15 - 40		
Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Orifice connection DN 15 Fig.OI DN50 - 600		
Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799021
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Pressure instrument DN 15 Fig.OJ DN15 - 25		
Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430050181
Welding neck flange	1	7662799021
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Pressure instrument DN 15 Fig.OH DN40 - 1200		
Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Temperature instrum DN 40 Fig.NS DN80 - 100		
Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138614711

Temperature instrum DN 40 Fig.NL DN150 - 1200		
Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138614711

CLASS 91011

Design limits

	Temperature (°C)								
	0	50	100	150	200	250	300	350	400
Pressure (Bar ga)									
DN 15- 600	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	104.2
DN 750-1200	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	100.7

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1
- Design limits DN750 and larger limited by maximum allowable pressure acc. ASME B31.3
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piping class design meets full vacuum at ambient temperature condition
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120
750	40.0
900	48.0
1050	56.0
1200	64.0

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
1200	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
1050	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
900	C	C	C	C	E	E	E	E	E	E	E	E	E	B	B	B
750	C	C	C	C	E	E	E	E	E	E	E	E	B	B	B	A
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
400	C	C	C	C	E	E	E	E	E	B	B	B	A			
350	C	C	C	C	E	E	E	E	B	B	B	A				
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel		Plant
Class no.	91011	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	E	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION
(For full material description see relevant MES C buying description.)

Pipe

PIPE	Pipe	DN 15-250	ASTM A106-B
PIPE	Pipe	DN 300-600	ASTM A333-6
PIPE	Pipe	DN 750-1200	ASTM A671-CC65 cl 22
PISM	Pipe (API 5L-B sml)	DN 15-250	API 5L-B (sml)

Flanges

BLFL	Blind flange	DN 15-1200	ASTM A105
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPFL	Spade	DN 750-1200	ASTM A516-70
SPRT	Spacer ring	DN 15-1200	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-1200	ASTM A105

Fittings

CAPB	Cap bw	DN 15-250	ASTM A234-WPB
CAPB	Cap bw	DN 300-1200	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-250	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 300-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 750-1200	ASTM A420-WPL6W
E90B	Elbow 90 deg bw	DN 15-250	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 300-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 750-1200	ASTM A420-WPL6W
TEEB	Tee equal bw	DN 15-250	ASTM A234-WPB
TEEB	Tee equal bw	DN 300-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 750-1200	ASTM A420-WPL6W

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-1200	ASTM A105
RECB	Reducer concentric bw	DN 20-250	ASTM A234-WPB
RECB	Reducer concentric bw	DN 300-600	ASTM A420-WPL6
RECB	Reducer concentric bw	DN 750-1200	ASTM A420-WPL6W
REEB	Reducer eccentric bw	DN 20-250	ASTM A234-WPB
REEB	Reducer eccentric bw	DN 300-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 750-1200	ASTM A420-WPL6W
TEEB	Tee reducing bw	DN 20-250	ASTM A234-WPB
TEEB	Tee reducing bw	DN 300-600	ASTM A420-WPL6
TEEB	Tee reducing bw	DN 750-1200	ASTM A420-WPL6W

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-1200	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-1050	Body: ASTM A216-WCB/WCC Trim: AISI 410
CHVF	Check valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GAVF	Gate valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GLVF	Globe valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 50-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKMG	Gasket metal groove	DN 750-1200	AISI 316, graphite, SS centring ring
GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 50-600	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7/A194-2H

PIPING COMPONENTS

Item description	MESC	Nominal pipe size																			
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600	750	900	1050	1200
Pipe																					
Pipe	743005	0181	0281	0381	0581	0711	1091	1571	2231	2631	3031										
Pipe	743010																	4071	5391	6081	6681
Pipe	743017																				
Pipe (API 5L-B sml)	741312	0181	0281	0381	0581	0711	1091	1571	2231	2631	3031	1241	1371	1461	1821	2181	2501				
Flanges																					
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261	3281	3301	3321	3341	3361	3381	3401	3421				
Blind flange	767012																	2561	2621	2681	2741
Spacer ring	768816	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521				
Spacer ring	768875																	3331	3361	3391	3421
Spade	768813	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521				
Spade	768895																	3331	3361	3391	3421
Spectacle blind	768803	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401										
Welding neck flange	766279	9021	9041	9061	9081	9101	8321	8341	8661	8681	8701	8721	8741	8761	8781	8801	8841				
Welding neck flange	767085																	5651	6411	7171	7931
Fittings																					
Cap bw	763019	0181	0241	0301	0381	0581	0781	0981	1201	1411	1621										
Cap bw	763115																	6811	7471	8171	8921
Cap bw	763118																				
Elbow 45 deg bw	763038	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121										
Elbow 45 deg bw	763138																				
Elbow 45 deg bw	763144																	6421	7081	7781	8531
Elbow 90 deg bw	763040	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121										
Elbow 90 deg bw	763139																				
Elbow 90 deg bw	763146																	6441	7081	7781	8531
Tee equal bw	763084	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121										
Tee equal bw	763184																				
Tee equal bw	763190																	6421	7081	7781	8531
Valves																					
Butterfly valve triple ex flgd	774130									1651	1661	1671	1681	1691	1701	1711	1731	1761	1791	1821	1841
Check valve dual plate flgd	776711											1671	1681	1691	1701	1711	1731	1761	1791	1821	
Check valve flgd	771005	5031	5041	5051	5071																
Check valve flgd	771020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Gate valve flgd	772004	5031	5041	5051	5071																
Gate valve flgd	772020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Globe valve flgd	773005	5031	5041	5051	5071																
Globe valve flgd	773020					2081	1601	1621	1641												
Miscellaneous																					
Gasket metal groove	854172																	1481	1541	1601	1661
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921				
Meter run	766596	2821	2841	2861	2881																
Orifice flange set	766295					3011	2081	2091	2341	2351	2361	2371	2381	2391	2401	2411	2421				

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630721371	7630731371	7630890351	400	x	50	7679023681				15	40	- 40	7680373611	7680310361
25	x	15		7630721471	7630731471	7630890451	400	x	80	7679023921				15	50	- 50	7680373631	7680310371
25	x	20		7630721571	7630731571	7630890551	400	x	100	7679024141				15	80	- 200	7680373641	7680310381
40	x	15		7630721671	7630731671		400	x	150	7679027001				15	250	- 1200	7680373651	7680310391
40	x	20		7630721771	7630731771	7630890751	400	x	200	7679027181	7631704571	7631714571		20	50	- 50	7680373661	7680310401
40	x	25		7630721871	7630731871	7630890851	400	x	250		7631704661	7631714661	7631855091	20	80	- 100	7680373671	7680310411
50	x	20		7630721941	7630731941		400	x	300		7631704761	7631714761	7631855351	20	150	- 300	7680373691	7680310431
50	x	25		7630721971	7630731971	7630891061	400	x	350		7631704901	7631714901	7631855601	20	350	- 1200	7680373711	7680310441
50	x	40		7630722071	7630732071	7630891151	450	x	50	7679023701				25	80	- 80	7680373731	7680310451
80	x	40		7630722271	7630732271		450	x	80	7679023941				25	100	- 100	7680373751	7680310461
80	x	50		7630722371	7630732371	7630891331	450	x	100	7679024161				25	150	- 250	7680373761	7680310471
100	x	40		7630722511	7630732511		450	x	150	7679027021				25	300	- 1200	7680373771	7680310491
100	x	50		7630722671	7630732671	7630891541	450	x	200	7679027201				40	80	- 80	7680373791	7680310511
100	x	80		7630722771	7630732771	7630891661	450	x	250		7631705281	7631715281	7631856081	40	100	- 100	7680373801	7680310521
150	x	50	7679023581				450	x	300		7631705581	7631715581	7631856321	40	150	- 150	7680373821	7680310531
150	x	80		7630722991	7630732991	7630891841	450	x	350		7631705891	7631715891	7631856561	40	200	- 300	7680373831	7680310551
150	x	100		7630723101	7630733101	7630891981	450	x	400		7631706191	7631716191	7631856801	40	350	- 600	7680373851	7680310571
200	x	50	7679023601				500	x	50	7679023721				40	750	- 1200	7680373861	7680310151
200	x	80	7679023841				500	x	80	7679023961								
200	x	100		7630723191	7630733191	7630892181	500	x	100	7679024181								
200	x	150		7630723391	7630733391	7630892271	500	x	150	7679027041								
250	x	50	7679023621				500	x	200	7679027221								
250	x	80	7679023861				500	x	250	7679027381								
250	x	100		7629463521	7629613521	7630892641	500	x	300		7631706481	7631716481	7631857521	230			7683370311	
250	x	150		7630723591	7630733591	7630892731	500	x	350		7631706791	7631716791	7631857761	255			7683370321	
250	x	200		7630723691	7630733691	7630892951	500	x	400		7631707091	7631717091	7631858001	305			7683370331	
300	x	50	7679023641				500	x	450		7631707391	7631717391	7631858241	355			7683370341	
300	x	80	7679023881				600	x	50	7679023741				405			7683370351	
300	x	100	7679024101				600	x	80	7679023981				455			7683370361	
300	x	150		7631703871	7631713871	7631853121	600	x	100	7679024221								
300	x	200		7631703991	7631713991	7631853321	600	x	150	7679027081								
300	x	250		7631704091	7631714091	7631853541	600	x	200	7679027261								
350	x	50	7679023661				600	x	250	7679027421								
350	x	80	7679023901				600	x	300				7631858721					
350	x	100	7679024121				600	x	350				7631858961					
350	x	150	7679026981	7631704171	7631714171		600	x	400		7631708891	7631718891	7631859201					
350	x	200		7631704261	7631714261	7631853941	600	x	450		7631709191	7631719191	7631859441					
350	x	250		7631704401	7631714401	7631854191	600	x	500		7631709491	7631719491	7631859681					
350	x	300		7631704501	7631714501	7631854451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

Thermowell

Length MESC number

230	7683370311
255	7683370321
305	7683370331
355	7683370341
405	7683370351
455	7683370361

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB
750	x	50	7678085071				1050	x	50	7678093131			
750	x	80	7678085201				1050	x	80	7678093261			
750	x	100	7678085331				1050	x	100	7678093391			
750	x	150	7678064461				1050	x	150	7678094521			
750	x	200	7678064591				1050	x	200	7678094651			
750	x	250	7678064721				1050	x	250	7678094781			
750	x	300	7678064841				1050	x	300	7678094841			
750	x	350	7678064861				1050	x	350	7678094881			
750	x	400				7629900751	1050	x	400	7678094911			
750	x	450				7629900951	1050	x	450	7678094941			
750	x	500				7629901151	1050	x	500	7678094971			
750	x	600		7629531351	7629731351	7629901351	1050	x	600				7629905011
900	x	50	7678090101				1050	x	750				7629905611
900	x	80	7678090231				1050	x	900		7629536211	7629736211	7629906211
900	x	100	7678090361				1200	x	50	7678097161			
900	x	150	7678065491				1200	x	80	7678097291			
900	x	200	7678065621				1200	x	100	7678097421			
900	x	250	7678065751				1200	x	150	7678098551			
900	x	300	7678065841				1200	x	200	7678098681			
900	x	350	7678065861				1200	x	250	7678098811			
900	x	400	7678065881				1200	x	300	7678098841			
900	x	450				7629902531	1200	x	350	7678098881			
900	x	500				7629902731	1200	x	400	7678098911			
900	x	600				7629902931	1200	x	450	7678098941			
900	x	750		7629533531	7629733531	7629903531	1200	x	500	7678098971			
							1200	x	600				7629907671
							1200	x	750				7629908271
							1200	x	900				7629908871
							1200	x	1050		7629539471	7629739471	7629909471

BOLTING**Boltset standard flange**

DN	nr	inch	x mm	MESC number
15	4	3/4	x 110	8138613301
20	4	3/4	x 120	8138613321
25	4	7/8	x 130	8138614031
40	4	1	x 140	8138614691
50	8	7/8	x 150	8138614061
80	8	7/8	x 150	8138614061
100	8	1 1/8	x 180	8138615331
150	12	1 1/8	x 200	8138615251
200	12	1 3/8	x 230	8138616441
250	16	1 3/8	x 240	8138616461
300	20	1 3/8	x 260	8138616491
350	20	1 1/2	x 280	8138616931
400	20	1 5/8	x 290	8138617241
450	20	1 7/8	x 330	8138617861
500	20	2	x 400	8138618241
600	20	2 1/2	x 500	8138837011
750	20	3	x 570	8138838481
900	20	3 1/2	x 660	8138839271
1050	24	3 1/2	x 730	8138839341
1200	24	4	x 820	8138839811

Boltset meter run

DN	nr	inch	x mm	MESC number
15	4	3/4	x 150	8138613371
20	4	3/4	x 150	8138613371
25	4	7/8	x 150	8138614061
40	4	1	x 160	8138614721

Boltset orifice flange

DN	nr	inch	x mm	MESC number
50	8	7/8	x 160	8138614071
80	8	7/8	x 160	8138614071
100	8	1 1/8	x 190	8138615351
150	12	1 1/8	x 210	8138615381
200	12	1 3/8	x 250	8138616471
250	16	1 3/8	x 260	8138616491
300	20	1 3/8	x 290	8138616541
350	20	1 1/2	x 310	8138616981
400	20	1 5/8	x 330	8138617301
450	20	1 7/8	x 370	8138617921
500	20	2	x 450	8138618311
600	20	2 1/2	x 560	8138837071

Boltset blind/spacer

DN	nr	inch	x mm	MESC number
15	4	3/4	x 120	8138613321
20	4	3/4	x 130	8138613341
25	4	7/8	x 140	8138614041
40	4	1	x 160	8138614721
50	8	7/8	x 170	8138614091
80	8	7/8	x 170	8138614091
100	8	1 1/8	x 200	8138615251
150	12	1 1/8	x 230	8138615411
200	12	1 3/8	x 270	8138616411
250	16	1 3/8	x 290	8138616541
300	20	1 3/8	x 320	8138616591
350	20	1 1/2	x 340	8138617021
400	20	1 5/8	x 360	8138617361
450	20	1 7/8	x 410	8138617961
500	20	2	x 490	8138618371
600	20	2 1/2	x 610	8138837121
750	20	3	x 690	8138838601
900	20	3 1/2	x 800	8138839401
1050	24	3 1/2	x 890	8138839481
1200	24	4	x 1000	8138839901

ASSEMBLIES**Drain/vent point DN 15 Fig.I DN15 - 15**

Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799021
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138613301

Drain/vent point DN 20 Fig.I DN20 - 40

Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799041
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 20 Fig.H DN50 - 50

Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 25 Fig.H DN80 - 300

Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138614031

Drain/vent point DN 40 Fig.H DN350 - 1200

Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138614691

Meter run connection DN 15 Fig.OH DN15 - 40

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Orifice connection DN 15 Fig.OI DN50 - 600

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799021
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Pressure instrument DN 15 Fig.OJ DN15 - 25

Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430050181
Welding neck flange	1	7662799021
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Pressure instrument DN 15 Fig.OH DN40 - 1200

Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Temperature instrum DN 40 Fig.NS DN80 - 100

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138614711

Temperature instrum DN 40 Fig.NL DN150 - 1200

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138614711

CLASS 91013-20

Design limits

	Temperature (°C)									
	-20	0	50	100	150	200	250	300	350	400
Pressure (Bar ga)										
DN 15- 600	153.2	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	104.2

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Welds, attachment welds and cold formed piping parts shall be post-weld heat treated; see PTS 30.10.60.18 and PTS 31.38.01.31.
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	B	A
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
400	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	A				
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel M-Sour PWHT		Plant
Class no.	91013-20	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	O	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION
(For full material description see relevant MESG buying description.)

Pipe

PIPE	Pipe	DN 15-150	ASTM A106-B
PIPE	Pipe	DN 200-600	ASTM A333-6

Flanges

BLFL	Blind flange	DN 15-150	ASTM A105
BLFL	Blind flange	DN 200-600	ASTM A350-LF2
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPRT	Spacer ring	DN 15-600	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-350	ASTM A105
WNFL	Welding neck flange	DN 400-600	ASTM A350-LF2

Fittings

CAPB	Cap bw	DN 15-150	ASTM A234-WPB
CAPB	Cap bw	DN 200-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-150	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 200-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 15-150	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 200-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 15-150	ASTM A234-WPB
TEEB	Tee equal bw	DN 200-600	ASTM A420-WPL6

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-150	ASTM A105
BROB	Branch outlet bw	DN 200-600	ASTM A350-LF2
RECB	Reducer concentric bw	DN 20-150	ASTM A234-WPB
RECB	Reducer concentric bw	DN 200-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 20-150	ASTM A234-WPB
REEB	Reducer eccentric bw	DN 200-600	ASTM A420-WPL6
TERB	Tee reducing bw	DN 20-150	ASTM A234-WPB
TERB	Tee reducing bw	DN 200-600	ASTM A420-WPL6

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-600	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-600	Body: ASTM A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 15-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 200-600	ASTM A350-LF2
ORFS	Orifice flange set	DN 50-150	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7/A194-2H



PIPING COMPONENTS

Item description	MESC	Nominal pipe size															
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
Pipe																	
Pipe	743005	0181	0281	0381	0581	0711	1091	1571	2231								
Pipe	743017									1001	1121	1241	1371	1461	1821	2181	2501
Flanges																	
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261								
Blind flange	766212									6281	6301	6321	6341	6361	6381	6401	6421
Spacer ring	768816	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441				
Spacer ring	768817													6361	6381	6401	6441
Spade	768813	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441				
Spade	768860													0721	0731	0741	0751
Spectacle blind	768803	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401						
Welding neck flange	766279	9021	9041	9061	9081	9101	8321	8341	8661	8681	8701	8721	8741				
Welding neck flange	766286													4261	4281	4301	4341
Fittings																	
Cap bw	763019	0181	0241	0301	0381	0581	0781	0981	1201								
Cap bw	763118									2911	3121	3351	3551	3751	3911	4011	4121
Elbow 45 deg bw	763038	5681	5741	5801	5881	6081	6281	6481	6701								
Elbow 45 deg bw	763138									2911	3121	3351	3551	3751	3911	4011	4121
Elbow 90 deg bw	763040	5681	5741	5801	5881	6081	6281	6481	6701								
Elbow 90 deg bw	763139									2911	3121	3351	3551	3751	3921	4021	4131
Tee equal bw	763084	5681	5741	5801	5881	6081	6281	6481	6701								
Tee equal bw	763184									2911	3121	3351	3551	3751	3931	4031	4131
Valves																	
Butterfly valve triple ex flgd	774131									1651	1661	1671	1681	1691	1701	1711	1731
Check valve dual plate flgd	776716											1671	1681	1691	1701	1711	1731
Check valve flgd	771005	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Gate valve flgd	772004	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Globe valve flgd	773005	5031	5041	5051	5071	2081	1601	1621	1641								
Miscellaneous																	
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921
Meterrun	766596	2821	2841	2861	2881												
Orifice flange set	766296					4011	2501	2511	2221	6541	6551	6561	6571	6581	6591	6601	6611

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630721371	7630731371	7630890351	400	x	50	7679063681				15	40	- 40	7680373611	7680310361
25	x	15		7630721471	7630731471	7630890451	400	x	80	7679063921				15	50	- 50	7680373631	7680310371
25	x	20		7630721571	7630731571	7630890551	400	x	100	7679064041				15	80	- 200	7680373641	7680310381
40	x	15		7630721671	7630731671		400	x	150	7679067001				15	250	- 600	7680373651	7680310391
40	x	20		7630721771	7630731771	7630890751	400	x	200	7679067181	7631704571	7631714571		20	50	- 50	7680373661	7680310401
40	x	25		7630721871	7630731871	7630890851	400	x	250		7631704661	7631714661	7631855091	20	80	- 100	7680373671	7680310411
50	x	20		7630721941	7630731941		400	x	300		7631704761	7631714761	7631855351	20	150	- 300	7680373691	7680310431
50	x	25		7630721971	7630731971	7630891061	400	x	350		7631704901	7631714901	7631855601	20	350	- 600	7680373711	7680310441
50	x	40		7630722071	7630732071	7630891151	450	x	50	7679063701				25	80	- 80	7680373731	7680310451
80	x	40		7630722271	7630732271		450	x	80	7679063941				25	100	- 100	7680373751	7680310461
80	x	50		7630722371	7630732371	7630891331	450	x	100	7679064051				25	150	- 250	7680373761	7680310471
100	x	40		7630722511	7630732511		450	x	150	7679067021				25	300	- 600	7680373771	7680310491
100	x	50		7630722671	7630732671	7630891541	450	x	200	7679067201				40	80	- 80	7680373791	7680310511
100	x	80		7630722771	7630732771	7630891661	450	x	250		7631705281	7631715281	7631856081	40	100	- 100	7680373801	7680310521
150	x	50	7679023581				450	x	300		7631705581	7631715581	7631856321	40	150	- 150	7680373821	7680310531
150	x	80		7630722991	7630732991	7630891841	450	x	350		7631705891	7631715891	7631856561	40	200	- 300	7680373831	7680310551
150	x	100		7630723101	7630733101	7630891981	450	x	400		7631706191	7631716191	7631856801	40	350	- 600	7680373851	7680310571
200	x	50	7679063601				500	x	50	7679063721				Thermowell Length MESC number				
200	x	80	7679063841				500	x	80	7679063961								
200	x	100		7629443291	7629593291	7631852181	500	x	100	7679064061				230			7683370311	
200	x	150		7631703391	7631713391	7631852271	500	x	150	7679067041				255			7683370321	
250	x	50	7679063621				500	x	200	7679067221				305			7683370331	
250	x	80	7679063861				500	x	250	7679067381				355			7683370341	
250	x	100		7629443521	7629593521	7631852651	500	x	300		7631706481	7631716481	7631857521	405			7683370351	
250	x	150		7631703591	7631713591	7631852731	500	x	350		7631706791	7631716791	7631857761	455			7683370361	
250	x	200		7631703691	7631713691	7631852951	500	x	400		7631707091	7631717091	7631858001					
300	x	50	7679063641				500	x	450		7631707391	7631717391	7631858241					
300	x	80	7679063881				600	x	50	7679063741								
300	x	100	7679064021				600	x	80	7679063981								
300	x	150		7631703871	7631713871	7631853121	600	x	100	7679064071								
300	x	200		7631703991	7631713991	7631853321	600	x	150	7679067081								
300	x	250		7631704091	7631714091	7631853541	600	x	200	7679067261								
350	x	50	7679063661				600	x	250	7679067421								
350	x	80	7679063901				600	x	300				7631858721					
350	x	100	7679064031				600	x	350				7631858961					
350	x	150	7679066981	7631704171	7631714171		600	x	400		7631708891	7631718891	7631859201					
350	x	200		7631704261	7631714261	7631853941	600	x	450		7631709191	7631719191	7631859441					
350	x	250		7631704401	7631714401	7631854191	600	x	500		7631709491	7631719491	7631859681					
350	x	300		7631704501	7631714501	7631854451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

BOLTING

Boltset standard flange					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 110	8138613301	
20	4	3/4	x 120	8138613321	
25	4	7/8	x 130	8138614031	
40	4	1	x 140	8138614691	
50	8	7/8	x 150	8138614061	
80	8	7/8	x 150	8138614061	
100	8	1 1/8	x 180	8138615331	
150	12	1 1/8	x 200	8138615251	
200	12	1 3/8	x 230	8138616441	
250	16	1 3/8	x 240	8138616461	
300	20	1 3/8	x 260	8138616491	
350	20	1 1/2	x 280	8138616931	
400	20	1 5/8	x 290	8138617241	
450	20	1 7/8	x 330	8138617861	
500	20	2	x 400	8138618241	
600	20	2 1/2	x 500	8138837011	

Boltset meter run					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 150	8138613371	
20	4	3/4	x 150	8138613371	
25	4	7/8	x 150	8138614061	
40	4	1	x 160	8138614721	

Boltset orifice flange					
DN	nr	inch	x mm	MESC number	
50	8	7/8	x 160	8138614071	
80	8	7/8	x 160	8138614071	
100	8	1 1/8	x 190	8138615351	
150	12	1 1/8	x 210	8138615381	
200	12	1 3/8	x 250	8138616471	
250	16	1 3/8	x 260	8138616491	
300	20	1 3/8	x 290	8138616541	
350	20	1 1/2	x 310	8138616981	
400	20	1 5/8	x 330	8138617301	
450	20	1 7/8	x 370	8138617921	
500	20	2	x 450	8138618311	
600	20	2 1/2	x 560	8138837071	

Boltset blind/spacer					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 120	8138613321	
20	4	3/4	x 130	8138613341	
25	4	7/8	x 140	8138614041	
40	4	1	x 160	8138614721	
50	8	7/8	x 170	8138614091	
80	8	7/8	x 170	8138614091	
100	8	1 1/8	x 200	8138615251	
150	12	1 1/8	x 230	8138615411	
200	12	1 3/8	x 270	8138616411	
250	16	1 3/8	x 290	8138616541	
300	20	1 3/8	x 320	8138616591	
350	20	1 1/2	x 340	8138617021	
400	20	1 5/8	x 360	8138617361	
450	20	1 7/8	x 410	8138617961	
500	20	2	x 490	8138618371	
600	20	2 1/2	x 610	8138837121	

ASSEMBLIES

Drain/vent point DN 15 Fig.I DN15 - 15		
Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799021
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138613301

Drain/vent point DN 20 Fig.I DN20 - 40		
Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799041
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 20 Fig.H DN50 - 50		
Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 25 Fig.H DN80 - 300		
Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138614031

Drain/vent point DN 40 Fig.H DN350 - 600		
Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138614691

Meter run connection DN 15 Fig.OH DN15 - 40		
Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Orifice connection DN 15 Fig.OI DN50 - 600		
Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799021
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Pressure instrument DN 15 Fig.OJ DN15 - 25		
Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430050181
Welding neck flange	1	7662799021
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Pressure instrument DN 15 Fig.OH DN40 - 600		
Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Temperature instrum DN 40 Fig.NS DN80 - 100		
Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138614711

Temperature instrum DN 40 Fig.NL DN150 - 600		
Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138614711

CLASS 91013

Design limits

	Temperature (°C)									
	0	50	100	150	200	250	300	350	400	
Pressure (Bar ga)										
DN 15- 600	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	104.2	

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Welds, attachment welds and cold formed piping parts shall be post-weld heat treated; see PTS 30.10.60.18 and PTS 31.38.01.31.
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	B	A
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
400	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	A				
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel M-Sour PWHT		Plant
Class no.	91013	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	O	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION
(For full material description see relevant MES C buying description.)

Pipe

PIPE	Pipe	DN 15-250	ASTM A106-B
PIPE	Pipe	DN 300-600	ASTM A333-6

Flanges

BLFL	Blind flange	DN 15-600	ASTM A105
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPRT	Spacer ring	DN 15-600	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-600	ASTM A105

Fittings

CAPB	Cap bw	DN 15-250	ASTM A234-WPB
CAPB	Cap bw	DN 300-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-250	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 300-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 15-250	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 300-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 15-250	ASTM A234-WPB
TEEB	Tee equal bw	DN 300-600	ASTM A420-WPL6

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-600	ASTM A105
RECB	Reducer concentric bw	DN 20-250	ASTM A234-WPB
RECB	Reducer concentric bw	DN 300-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 20-250	ASTM A234-WPB
REEB	Reducer eccentric bw	DN 300-600	ASTM A420-WPL6
TERB	Tee reducing bw	DN 20-250	ASTM A234-WPB
TERB	Tee reducing bw	DN 300-600	ASTM A420-WPL6

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-600	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-600	Body: ASTM A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 15-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 50-600	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7/A194-2H



PIPING COMPONENTS

Item description	MESC	Nominal pipe size															
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
Pipe																	
Pipe	743005	0181	0281	0381	0581	0711	1091	1571	2231	2631	3031						
Pipe	743017											1241	1371	1461	1821	2181	2501
Flanges																	
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261	3281	3301	3321	3341	3361	3381	3401	3421
Spacer ring	768816	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521
Spade	768813	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521
Spectacle blind	768803	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401						
Welding neck flange	766279	9021	9041	9061	9081	9101	8321	8341	8661	8681	8701	8721	8741	8761	8781	8801	8841
Fittings																	
Cap bw	763019	0181	0241	0301	0381	0581	0781	0981	1201	1411	1621						
Cap bw	763118											3351	3551	3751	3911	4011	4121
Elbow 45 deg bw	763038	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Elbow 45 deg bw	763138											3351	3551	3751	3911	4011	4121
Elbow 90 deg bw	763040	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Elbow 90 deg bw	763139											3351	3551	3751	3921	4021	4131
Tee equal bw	763084	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Tee equal bw	763184											3351	3551	3751	3931	4031	4131
Valves																	
Butterfly valve triple ex flgd	774131									1651	1661	1671	1681	1691	1701	1711	1731
Check valve dual plate flgd	776716											1671	1681	1691	1701	1711	1731
Check valve flgd	771005	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Gate valve flgd	772004	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Globe valve flgd	773005	5031	5041	5051	5071	2081	1601	1621	1641								
Miscellaneous																	
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921
Meterrun	766596	2821	2841	2861	2881												
Orifice flange set	766296					4011	2501	2511	2221	2231	2241	2251	2261	2271	2281	2291	2301

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630721371	7630731371	7630890351	400	x	50	7679023681				15	40	- 40	7680373611	7680310361
25	x	15		7630721471	7630731471	7630890451	400	x	80	7679023921				15	50	- 50	7680373631	7680310371
25	x	20		7630721571	7630731571	7630890551	400	x	100	7679024141				15	80	- 200	7680373641	7680310381
40	x	15		7630721671	7630731671		400	x	150	7679027001				15	250	- 600	7680373651	7680310391
40	x	20		7630721771	7630731771	7630890751	400	x	200	7679027181	7631704571	7631714571		20	50	- 50	7680373661	7680310401
40	x	25		7630721871	7630731871	7630890851	400	x	250		7631704661	7631714661	7631855091	20	80	- 100	7680373671	7680310411
50	x	20		7630721941	7630731941		400	x	300		7631704761	7631714761	7631855351	20	150	- 300	7680373691	7680310431
50	x	25		7630721971	7630731971	7630891061	400	x	350		7631704901	7631714901	7631855601	20	350	- 600	7680373711	7680310441
50	x	40		7630722071	7630732071	7630891151	450	x	50	7679023701				25	80	- 80	7680373731	7680310451
80	x	40		7630722271	7630732271		450	x	80	7679023941				25	100	- 100	7680373751	7680310461
80	x	50		7630722371	7630732371	7630891331	450	x	100	7679024161				25	150	- 250	7680373761	7680310471
100	x	40		7630722511	7630732511		450	x	150	7679027021				25	300	- 600	7680373771	7680310491
100	x	50		7630722671	7630732671	7630891541	450	x	200	7679027201				40	80	- 80	7680373791	7680310511
100	x	80		7630722771	7630732771	7630891661	450	x	250		7631705281	7631715281	7631856081	40	100	- 100	7680373801	7680310521
150	x	50	7679023581				450	x	300		7631705581	7631715581	7631856321	40	150	- 150	7680373821	7680310531
150	x	80		7630722991	7630732991	7630891841	450	x	350		7631705891	7631715891	7631856561	40	200	- 300	7680373831	7680310551
150	x	100		7630723101	7630733101	7630891981	450	x	400		7631706191	7631716191	7631856801	40	350	- 600	7680373851	7680310571
200	x	50	7679023601				500	x	50	7679023721				Thermowell Length MESC number				
200	x	80	7679023841				500	x	80	7679023961								
200	x	100		7630723191	7630733191	7630892181	500	x	100	7679024181				230			7683370311	
200	x	150		7630723391	7630733391	7630892271	500	x	150	7679027041				255			7683370321	
250	x	50	7679023621				500	x	200	7679027221				305			7683370331	
250	x	80	7679023861				500	x	250	7679027381				355			7683370341	
250	x	100		7629463521	7629613521	7630892641	500	x	300		7631706481	7631716481	7631857521	405			7683370351	
250	x	150		7630723591	7630733591	7630892731	500	x	350		7631706791	7631716791	7631857761	455			7683370361	
250	x	200		7630723691	7630733691	7630892951	500	x	400		7631707091	7631717091	7631858001					
300	x	50	7679023641				500	x	450		7631707391	7631717391	7631858241					
300	x	80	7679023881				600	x	50	7679023741								
300	x	100	7679024101				600	x	80	7679023981								
300	x	150		7631703871	7631713871	7631853121	600	x	100	7679024221								
300	x	200		7631703991	7631713991	7631853321	600	x	150	7679027081								
300	x	250		7631704091	7631714091	7631853541	600	x	200	7679027261								
350	x	50	7679023661				600	x	250	7679027421								
350	x	80	7679023901				600	x	300				7631858721					
350	x	100	7679024121				600	x	350				7631858961					
350	x	150	7679026981	7631704171	7631714171		600	x	400		7631708891	7631718891	7631859201					
350	x	200		7631704261	7631714261	7631853941	600	x	450		7631709191	7631719191	7631859441					
350	x	250		7631704401	7631714401	7631854191	600	x	500		7631709491	7631719491	7631859681					
350	x	300		7631704501	7631714501	7631854451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

BOLTING**Boltset standard flange**

DN	nr	inch	x mm	MESC number
15	4	3/4	x 110	8138613301
20	4	3/4	x 120	8138613321
25	4	7/8	x 130	8138614031
40	4	1	x 140	8138614691
50	8	7/8	x 150	8138614061
80	8	7/8	x 150	8138614061
100	8	1 1/8	x 180	8138615331
150	12	1 1/8	x 200	8138615251
200	12	1 3/8	x 230	8138616441
250	16	1 3/8	x 240	8138616461
300	20	1 3/8	x 260	8138616491
350	20	1 1/2	x 280	8138616931
400	20	1 5/8	x 290	8138617241
450	20	1 7/8	x 330	8138617861
500	20	2	x 400	8138618241
600	20	2 1/2	x 500	8138837011

Boltset meter run

DN	nr	inch	x mm	MESC number
15	4	3/4	x 150	8138613371
20	4	3/4	x 150	8138613371
25	4	7/8	x 150	8138614061
40	4	1	x 160	8138614721

Boltset orifice flange

DN	nr	inch	x mm	MESC number
50	8	7/8	x 160	8138614071
80	8	7/8	x 160	8138614071
100	8	1 1/8	x 190	8138615351
150	12	1 1/8	x 210	8138615381
200	12	1 3/8	x 250	8138616471
250	16	1 3/8	x 260	8138616491
300	20	1 3/8	x 290	8138616541
350	20	1 1/2	x 310	8138616981
400	20	1 5/8	x 330	8138617301
450	20	1 7/8	x 370	8138617921
500	20	2	x 450	8138618311
600	20	2 1/2	x 560	8138837071

Boltset blind/spacer

DN	nr	inch	x mm	MESC number
15	4	3/4	x 120	8138613321
20	4	3/4	x 130	8138613341
25	4	7/8	x 140	8138614041
40	4	1	x 160	8138614721
50	8	7/8	x 170	8138614091
80	8	7/8	x 170	8138614091
100	8	1 1/8	x 200	8138615251
150	12	1 1/8	x 230	8138615411
200	12	1 3/8	x 270	8138616411
250	16	1 3/8	x 290	8138616541
300	20	1 3/8	x 320	8138616591
350	20	1 1/2	x 340	8138617021
400	20	1 5/8	x 360	8138617361
450	20	1 7/8	x 410	8138617961
500	20	2	x 490	8138618371
600	20	2 1/2	x 610	8138837121

ASSEMBLIES**Drain/vent point DN 15 Fig.I DN15 - 15**

Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799021
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138613301

Drain/vent point DN 20 Fig.I DN20 - 40

Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799041
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 20 Fig.H DN50 - 50

Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 25 Fig.H DN80 - 300

Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138614031

Drain/vent point DN 40 Fig.H DN350 - 600

Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138614691

Meter run connection DN 15 Fig.OH DN15 - 40

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Orifice connection DN 15 Fig.OI DN50 - 600

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799021
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Pressure instrument DN 15 Fig.OJ DN15 - 25

Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430050181
Welding neck flange	1	7662799021
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Pressure instrument DN 15 Fig.OH DN40 - 600

Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Temperature instrum DN 40 Fig.NS DN80 - 100

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138614711

Temperature instrum DN 40 Fig.NL DN150 - 600

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138614711



CLASS 91015

Design limits

	Temperature (°C)								
	0	50	100	150	200	250	300	350	400
Pressure (Bar ga)									
DN 15- 600	142.7	142.7	139.8	135.2	131.4	125.8	119.5	112.7	104.2

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1, and limited by allowable stress of bolting material
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	B	A
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
400	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	A				
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel H-Sour		Plant
Class no.	91015	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	E	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION

(For full material description see relevant MES C buying description.)

Pipe

PIPE	Pipe	DN 15-250	ASTM A106-B
PIPE	Pipe	DN 300-600	ASTM A333-6

Flanges

BLFL	Blind flange	DN 15-600	ASTM A105
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPRT	Spacer ring	DN 15-600	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-600	ASTM A105

Fittings

CAPB	Cap bw	DN 15-250	ASTM A234-WPB
CAPB	Cap bw	DN 300-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-250	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 300-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 15-250	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 300-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 15-250	ASTM A234-WPB
TEEB	Tee equal bw	DN 300-600	ASTM A420-WPL6

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-600	ASTM A105
RECB	Reducer concentric bw	DN 20-250	ASTM A234-WPB
RECB	Reducer concentric bw	DN 300-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 20-250	ASTM A234-WPB
REEB	Reducer eccentric bw	DN 300-600	ASTM A420-WPL6
TERB	Tee reducing bw	DN 20-250	ASTM A234-WPB
TERB	Tee reducing bw	DN 300-600	ASTM A420-WPL6

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-600	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-600	Body: ASTM A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 15-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 15-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 50-600	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7M/A194-2HM



PIPING COMPONENTS

Item description	MESC	Nominal pipe size															
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
Pipe																	
Pipe	743003	0181	0281	0381	0581	0711	1091	1571	2231	2631	3031						
Pipe	743016											1241	1371	1461	1801	2201	2501
Flanges																	
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261	3281	3301	3321	3341	3361	3381	3401	3421
Spacer ring	768846	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521
Spade	768842	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521
Spectacle blind	768837	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401						
Welding neck flange	766279	9021	9041	9061	9081	9101	8321	8341	8661	8681	8701	8721	8741	8761	8781	8801	8841
Fittings																	
Cap bw	763017	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Cap bw	763117											3351	3551	3751	3911	4011	4121
Elbow 45 deg bw	763034	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Elbow 45 deg bw	763134											3351	3551	3751	3901	4001	4101
Elbow 90 deg bw	763042	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Elbow 90 deg bw	763143											3351	3551	3751	3901	4001	4101
Tee equal bw	763081	5681	5741	5801	5881	6081	6281	6481	6701	6911	7121						
Tee equal bw	763180											3351	3551	3751	3901	4001	4101
Valves																	
Butterfly valve triple ex flgd	774131									1651	1661	1671	1681	1691	1701	1711	1731
Check valve dual plate flgd	776716											1671	1681	1691	1701	1711	1731
Check valve flgd	771005	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Gate valve flgd	772004	5031	5041	5051	5071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Globe valve flgd	773005	5031	5041	5051	5071	2081	1601	1621	1641								
Miscellaneous																	
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921
Meterrun	766596	2821	2841	2861	2881												
Orifice flange set	766295					3011	2081	2091	2341	2351	2361	2371	2381	2391	2401	2411	2421

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630661371	7630671371	7630880351	400	x	50	7679023681				15	40	- 40	7680373611	7680310361
25	x	15		7630661471	7630671471	7630880451	400	x	80	7679023921				15	50	- 50	7680373631	7680310371
25	x	20		7630661571	7630671571	7630880551	400	x	100	7679024141				15	80	- 200	7680373641	7680310381
40	x	15		7630661671	7630671671		400	x	150	7679027001				15	250	- 600	7680373651	7680310391
40	x	20		7630661771	7630671771	7630880751	400	x	200	7679027181	7631664571	7631754571		20	50	- 50	7680373661	7680310401
40	x	25		7630661871	7630671871	7630880851	400	x	250		7631664661	7631754661	7631885091	20	80	- 100	7680373671	7680310411
50	x	20		7630661941	7630671941		400	x	300		7631664761	7631754761	7631885351	20	150	- 300	7680373691	7680310431
50	x	25		7630661971	7630671971	7630881061	400	x	350		7631664901	7631754901	7631885601	20	350	- 600	7680373711	7680310441
50	x	40		7630662071	7630672071	7630881151	450	x	50	7679023701				25	80	- 80	7680373731	7680310451
80	x	40		7630662271	7630672271		450	x	80	7679023941				25	100	- 100	7680373751	7680310461
80	x	50		7630662371	7630672371	7630881331	450	x	100	7679024161				25	150	- 250	7680373761	7680310471
100	x	40		7630662511	7630672511		450	x	150	7679027021				25	300	- 600	7680373771	7680310491
100	x	50		7630662671	7630672671	7630881541	450	x	200	7679027201				40	80	- 80	7680373791	7680310511
100	x	80		7630662771	7630672771	7630881661	450	x	250		7631665281	7631755281	7631886081	40	100	- 100	7680373801	7680310521
150	x	50	7679023581				450	x	300		7631665581	7631755581	7631886321	40	150	- 150	7680373821	7680310531
150	x	80		7630662991	7630672991	7630881841	450	x	350		7631665891	7631755891	7631886561	40	200	- 300	7680373831	7680310551
150	x	100		7630663101	7630673101	7630881981	450	x	400		7631666191	7631756191	7631886801	40	350	- 600	7680373851	7680310571
200	x	50	7679023601				500	x	50	7679023721				Thermowell Length MESC number				
200	x	80	7679023841				500	x	80	7679023961								
200	x	100		7630663191	7630673191	7630882181	500	x	100	7679024181				230			7683370311	
200	x	150		7630663391	7630673391	7630882271	500	x	150	7679027041				255			7683370321	
250	x	50	7679023621				500	x	200	7679027221				305			7683370331	
250	x	80	7679023861				500	x	250	7679027381				355			7683370341	
250	x	100		7629473521	7629623521	7630882651	500	x	300		7631666481	7631756481	7631887521	405			7683370351	
250	x	150		7630663591	7630673591	7630882731	500	x	350		7631666791	7631756791	7631887761	455			7683370361	
250	x	200		7630663691	7630673691	7630882951	500	x	400		7631667091	7631757091	7631888001					
300	x	50	7679023641				500	x	450		7631667391	7631757391	7631888241					
300	x	80	7679023881				600	x	50	7679023741								
300	x	100	7679024101				600	x	80	7679023981								
300	x	150		7631663871	7631753871	7631883121	600	x	100	7679024221								
300	x	200		7631663991	7631753991	7631883321	600	x	150	7679027081								
300	x	250		7631664091	7631754091	7631883541	600	x	200	7679027261								
350	x	50	7679023661				600	x	250	7679027421								
350	x	80	7679023901				600	x	300				7631888721					
350	x	100	7679024121				600	x	350				7631888961					
350	x	150	7679026981	7631664171	7631754171		600	x	400		7631668891	7631758891	7631889201					
350	x	200		7631664261	7631754261	7631883941	600	x	450		7631669191	7631759191	7631889441					
350	x	250		7631664401	7631754401	7631884191	600	x	500		7631669591	7631759491	7631889681					
350	x	300		7631664501	7631754501	7631884451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

BOLTING**Boltset standard flange**

DN	nr	inch	x mm	MESC number
15	4	3/4	x 110	8138663301
20	4	3/4	x 120	8138663321
25	4	7/8	x 130	8138664031
40	4	1	x 140	8138664691
50	8	7/8	x 150	8138664061
80	8	7/8	x 150	8138664061
100	8	1 1/8	x 180	8138665331
150	12	1 1/8	x 200	8138665251
200	12	1 3/8	x 230	8138666441
250	16	1 3/8	x 240	8138666461
300	20	1 3/8	x 260	8138666491
350	20	1 1/2	x 280	8138666931
400	20	1 5/8	x 290	8138667241
450	20	1 7/8	x 330	8138667861
500	20	2	x 400	8138668241
600	20	2 1/2	x 500	8138867011

Boltset meter run

DN	nr	inch	x mm	MESC number
15	4	3/4	x 150	8138663371
20	4	3/4	x 150	8138663371
25	4	7/8	x 150	8138664061
40	4	1	x 160	8138664721

Boltset orifice flange

DN	nr	inch	x mm	MESC number
50	8	7/8	x 160	8138664071
80	8	7/8	x 160	8138664071
100	8	1 1/8	x 190	8138665351
150	12	1 1/8	x 210	8138665381
200	12	1 3/8	x 250	8138666471
250	16	1 3/8	x 260	8138666491
300	20	1 3/8	x 290	8138666541
350	20	1 1/2	x 310	8138666981
400	20	1 5/8	x 330	8138667301
450	20	1 7/8	x 370	8138667921
500	20	2	x 450	8138668311
600	20	2 1/2	x 560	8138867071

Boltset blind/spacer

DN	nr	inch	x mm	MESC number
15	4	3/4	x 120	8138663321
20	4	3/4	x 130	8138663341
25	4	7/8	x 140	8138664041
40	4	1	x 160	8138664721
50	8	7/8	x 170	8138664091
80	8	7/8	x 170	8138664091
100	8	1 1/8	x 200	8138665251
150	12	1 1/8	x 230	8138665411
200	12	1 3/8	x 270	8138666621
250	16	1 3/8	x 290	8138666541
300	20	1 3/8	x 320	8138666591
350	20	1 1/2	x 340	8138667021
400	20	1 5/8	x 360	8138667361
450	20	1 7/8	x 410	8138667991
500	20	2	x 490	8138668381
600	20	2 1/2	x 610	8138867121

ASSEMBLIES**Drain/vent point DN 15 Fig.I DN15 - 15**

Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799021
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138663301

Drain/vent point DN 20 Fig.I DN20 - 40

Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799041
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138663321

Drain/vent point DN 20 Fig.H DN50 - 50

Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138663321

Drain/vent point DN 25 Fig.H DN80 - 300

Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138664031

Drain/vent point DN 40 Fig.H DN350 - 600

Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138664691

Meter run connection DN 15 Fig.OH DN15 - 40

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138663301
Studbolt with nuts	8	8138663301

Orifice connection DN 15 Fig.OI DN50 - 600

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799021
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138663301
Studbolt with nuts	8	8138663301

Pressure instrument DN 15 Fig.OJ DN15 - 25

Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430030181
Welding neck flange	1	7662799021
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138663301
Studbolt with nuts	4	8138663301

Pressure instrument DN 15 Fig.OH DN40 - 600

Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138663301
Studbolt with nuts	4	8138663301

Temperature instrum DN 40 Fig.NS DN80 - 100

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138664711

Temperature instrum DN 40 Fig.NL DN150 - 600

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138664711

CLASS 91015-KS

Design limits

	Temperature (°C)								
	-20	0	50	100	150	200	250	300	340
Pressure (Bar ga)									
DN 15- 600	142.7	142.7	142.7	139.8	135.2	131.4	125.8	119.5	114.1

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1, and limited by allowable stress of bolting material
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	80
20	80
25	80
40	80
50	80
80	80
100	80
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	B	A
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
400	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	A				
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel F-Gr H-Sour		Plant
Class no.	91015-KS	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	1 mm	Principal
Revision letter	O	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION
(For full material description see relevant MES C buying description.)

Pipe

PIPE	Pipe	DN 15-600	ASTM A333-6
------	------	-----------	-------------

Flanges

BLFL	Blind flange	DN 15-600	ASTM A350-LF2
LJFL	Lap joint flange	---	ASTM A350-LF2
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPRT	Spacer ring	DN 15-600	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-600	ASTM A350-LF2

Fittings

CAPB	Cap bw	DN 15-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 15-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 15-600	ASTM A420-WPL6

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A350-LF2
BNIP	Branch fitting plain	DN 15-40	ASTM A350-LF2
BROB	Branch outlet bw	DN 150-600	ASTM A350-LF2
RECB	Reducer concentric bw	DN 20-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 20-600	ASTM A420-WPL6
TERB	Tee reducing bw	DN 20-600	ASTM A420-WPL6

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-600	Body: ASTM A352-LCC Trim: LTCS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-600	Body: ASTM A352-LCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 15-600	Body: ASTM A350-LF2/A352-LCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 15-600	Body: ASTM A350-LF2/A352-LCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 15-150	Body: ASTM A350-LF2/A352-LCC Trim: AISI 316, Stellite 6

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A350-LF2
ORFS	Orifice flange set	DN 50-600	ASTM A350-LF2
STBT	Studbolt with nuts	---	ASTM A193-B7M/A194-2HM



PIPING COMPONENTS

Item description	Nominal pipe size																
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
Pipe																	
Pipe	743016	0211	0291	0371	0531	0611	0691	0771	0871	1001	1121	1241	1371	1461	1801	2201	2501
Flanges																	
Blind flange	766212	6581	6621	6661	6681	6701	6221	6241	6261	6281	6301	6321	6341	6361	6381	6401	6421
Spacer ring	768847	6081	6121	6161	6181	6201	6221	6241	6261	6281	6301	6321	6341	6361	6381	6401	6441
Spade	768861	0601	0611	0621	0631	0641	0651	0661	0671	0681	0691	0701	0711	0721	0731	0741	0751
Spectacle blind	768835	5081	5121	5161	5181	5201	5221	5241	5261	5281	5301						
Welding neck flange	766286	5521	5541	5561	5581	5601	3621	3641	4161	4181	4201	4221	4241	4261	4281	4301	4341
Fittings																	
Cap bw	763117	1681	1741	1801	1881	2101	2301	2481	2701	2911	3121	3351	3551	3751	3911	4011	4121
Elbow 45 deg bw	763134	1681	1741	1801	1881	2101	2301	2481	2701	2911	3121	3351	3551	3751	3901	4001	4101
Elbow 90 deg bw	763143	1681	1741	1801	1881	2101	2301	2481	2701	2911	3121	3351	3551	3751	3901	4001	4101
Tee equal bw	763180	1681	1741	1801	1881	2101	2301	2481	2701	2911	3121	3351	3551	3751	3901	4001	4101
Valves																	
Butterfly valve triple ex flgd	774147									4651	4661	4671	4681	4691	4701	4711	4731
Check valve dual plate flgd	776720											1671	1681	1691	1701	1711	1731
Check valve flgd	771033	8031	8041	8051	8071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Gate valve flgd	772037	2031	2041	2051	2071	2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731
Globe valve flgd	773037	2031	2041	2051	2071	2081	1601	1621	1641								
Miscellaneous																	
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921
Meterrun	766596	3321	3341	3361	3381												
Orifice flange set	766297					3031	2031	2041	2271	2281	2291	2301	2311	2321	2331	2341	2351

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7631661371	7631751371	7631880351	400	x	50	7679063681				15	40	- 40	7680378611	7680315021
25	x	15		7631661471	7631751471	7631880451	400	x	80	7679063921				15	50	- 50	7680378631	7680315031
25	x	20		7631661571	7631751571	7631880551	400	x	100	7679064041				15	80	- 200	7680378641	7680315041
40	x	15		7631661671	7631751671		400	x	150	7679067001				15	250	- 600	7680378651	7680315051
40	x	20		7631661771	7631751771	7631880751	400	x	200	7679067181	7631664571	7631754571		20	50	- 50	7680378661	7680315061
40	x	25		7631661871	7631751871	7631880851	400	x	250		7631664661	7631754661	7631885091	20	80	- 100	7680378671	7680315071
50	x	20		7631661941	7631751941		400	x	300		7631664761	7631754761	7631885351	20	150	- 300	7680378691	7680315081
50	x	25		7631661971	7631751971	7631881061	400	x	350		7631664901	7631754901	7631885601	20	350	- 600	7680378711	7680315091
50	x	40		7631662071	7631752071	7631881151	450	x	50	7679063701				25	80	- 80	7680378731	7680315111
80	x	40		7631662271	7631752271		450	x	80	7679063941				25	100	- 100	7680378751	7680315121
80	x	50		7631662371	7631752371	7631881331	450	x	100	7679064051				25	150	- 250	7680378761	7680315131
100	x	40		7631662511	7631752511		450	x	150	7679067021				25	300	- 600	7680378771	7680315141
100	x	50		7631662671	7631752671	7631881541	450	x	200	7679067201				40	80	- 80	7680378791	7680315161
100	x	80		7631662771	7631752771	7631881661	450	x	250		7631665281	7631755281	7631886081	40	100	- 100	7680378801	7680315171
150	x	50	7679063581				450	x	300		7631665581	7631755581	7631886321	40	150	- 150	7680378821	7680315181
150	x	80		7631662991	7631752991	7631881841	450	x	350		7631665891	7631755891	7631886561	40	200	- 300	7680378831	7680315191
150	x	100		7631663101	7631753101	7631881981	450	x	400		7631666191	7631756191	7631886801	40	350	- 600	7680378851	7680315201
200	x	50	7679063601				500	x	50	7679063721				Thermowell Length MESC number				
200	x	80	7679063841				500	x	80	7679063961								
200	x	100		7629453231	7629603231	7631882181	500	x	100	7679064061				230			7683370311	
200	x	150		7631663391	7631753391	7631882271	500	x	150	7679067041				255			7683370321	
250	x	50	7679063621				500	x	200	7679067221				305			7683370331	
250	x	80	7679063861				500	x	250	7679067381				355			7683370341	
250	x	100		7629453521	7629603521	7631882651	500	x	300		7631666481	7631756481	7631887521	405			7683370351	
250	x	150		7631663591	7631753591	7631882731	500	x	350		7631666791	7631756791	7631887761	455			7683370361	
250	x	200		7631663691	7631753691	7631882951	500	x	400		7631667091	7631757091	7631888001					
300	x	50	7679063641				500	x	450		7631667391	7631757391	7631888241					
300	x	80	7679063881				600	x	50	7679063741								
300	x	100	7679064021				600	x	80	7679063981								
300	x	150		7631663871	7631753871	7631883121	600	x	100	7679064071								
300	x	200		7631663991	7631753991	7631883321	600	x	150	7679067081								
300	x	250		7631664091	7631754091	7631883541	600	x	200	7679067261								
350	x	50	7679063661				600	x	250	7679067421								
350	x	80	7679063901				600	x	300								7631888721	
350	x	100	7679064031				600	x	350								7631888961	
350	x	150	7679066981	7631664171	7631754171		600	x	400		7631668891	7631758891	7631889201					
350	x	200		7631664261	7631754261	7631883941	600	x	450		7631669191	7631759191	7631889441					
350	x	250		7631664401	7631754401	7631884191	600	x	500		7631669591	7631759491	7631889681					
350	x	300		7631664501	7631754501	7631884451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

BOLTING

Boltset standard flange					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 110	8138663301	
20	4	3/4	x 120	8138663321	
25	4	7/8	x 130	8138664031	
40	4	1	x 140	8138664691	
50	8	7/8	x 150	8138664061	
80	8	7/8	x 150	8138664061	
100	8	1 1/8	x 180	8138665331	
150	12	1 1/8	x 200	8138665251	
200	12	1 3/8	x 230	8138666441	
250	16	1 3/8	x 240	8138666461	
300	20	1 3/8	x 260	8138666491	
350	20	1 1/2	x 280	8138666931	
400	20	1 5/8	x 290	8138667241	
450	20	1 7/8	x 330	8138667861	
500	20	2	x 400	8138668241	
600	20	2 1/2	x 500	8138867011	

Boltset meter run					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 150	8138663371	
20	4	3/4	x 150	8138663371	
25	4	7/8	x 150	8138664061	
40	4	1	x 160	8138664721	

Boltset orifice flange					
DN	nr	inch	x mm	MESC number	
50	8	7/8	x 160	8138664071	
80	8	7/8	x 160	8138664071	
100	8	1 1/8	x 190	8138665351	
150	12	1 1/8	x 210	8138665381	
200	12	1 3/8	x 250	8138666471	
250	16	1 3/8	x 260	8138666491	
300	20	1 3/8	x 290	8138666541	
350	20	1 1/2	x 310	8138666981	
400	20	1 5/8	x 330	8138667301	
450	20	1 7/8	x 370	8138667921	
500	20	2	x 450	8138668311	
600	20	2 1/2	x 560	8138867071	

Boltset blind/spacer					
DN	nr	inch	x mm	MESC number	
15	4	3/4	x 120	8138663321	
20	4	3/4	x 130	8138663341	
25	4	7/8	x 140	8138664041	
40	4	1	x 160	8138664721	
50	8	7/8	x 170	8138664091	
80	8	7/8	x 170	8138664091	
100	8	1 1/8	x 200	8138665251	
150	12	1 1/8	x 230	8138665411	
200	12	1 3/8	x 270	8138666621	
250	16	1 3/8	x 290	8138666541	
300	20	1 3/8	x 320	8138666591	
350	20	1 1/2	x 340	8138667021	
400	20	1 5/8	x 360	8138667361	
450	20	1 7/8	x 410	8138667991	
500	20	2	x 490	8138668381	
600	20	2 1/2	x 610	8138867121	

ASSEMBLIES

Drain/vent point DN 15 Fig.I DN15 - 15		
Branch: according to branch table		
Blind flange	1	7662126581
Welding neck flange	1	7662865521
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138663301

Drain/vent point DN 20 Fig.I DN20 - 40		
Branch: according to branch table		
Blind flange	1	7662126621
Welding neck flange	1	7662865541
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138663321

Drain/vent point DN 20 Fig.H DN50 - 50		
Branch: branch nipple flanged		
Blind flange	1	7662126621
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138663321

Drain/vent point DN 25 Fig.H DN80 - 300		
Branch: branch nipple flanged		
Blind flange	1	7662126661
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138664031

Drain/vent point DN 40 Fig.H DN350 - 600		
Branch: branch nipple flanged		
Blind flange	1	7662126681
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138664691

Meter run connection DN 15 Fig.OH DN15 - 40		
Branch: not applicable		
Lap joint flange	2	7662208281
Gasket spiral wound	4	8541362041
Gate valve flgd	2	7720372031
Studbolt with nuts	8	8138663301
Studbolt with nuts	8	8138663301

Orifice connection DN 15 Fig.OI DN50 - 600		
Branch: not applicable		
Lap joint flange	2	7662208281
Welding neck flange	2	7662865521
Gasket spiral wound	4	8541362041
Gate valve flgd	2	7720372031
Studbolt with nuts	8	8138663301
Studbolt with nuts	8	8138663301

Pressure instrument DN 15 Fig.OJ DN15 - 25		
Branch: according to branch table		
Lap joint flange	1	7662208281
Pipe	1	7430160211
Welding neck flange	1	7662865521
Gasket spiral wound	2	8541362041
Gate valve flgd	1	7720372031
Studbolt with nuts	4	8138663301
Studbolt with nuts	4	8138663301

Pressure instrument DN 15 Fig.OH DN40 - 600		
Branch: branch nipple flanged		
Lap joint flange	1	7662208281
Gasket spiral wound	2	8541362041
Gate valve flgd	1	7720372031
Studbolt with nuts	4	8138663301
Studbolt with nuts	4	8138663301

Temperature instrum DN 40 Fig.NS DN80 - 100		
Branch: branch nipple flanged		
Lap joint flange	1	7662209381
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138664711

Temperature instrum DN 40 Fig.NL DN150 - 600		
Branch: branch nipple flanged		
Lap joint flange	1	7662209381
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138664711

CLASS 91031

Design limits

	Temperature (°C)								
	0	50	100	150	200	250	300	350	400
Pressure (Bar ga)									
DN 15- 600	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	103.4
DN 750-1200	153.2	150.4	139.8	135.2	131.4	125.8	119.5	112.7	101.3

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1 and ASME B31.3 allowable internal pressure
- Design limits DN750 and larger limited by maximum allowable pressure acc. ASME B31.3
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piping class design meets full vacuum at ambient temperature condition
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	160
20	160
25	160
40	160
50	160
80	160
100	120
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120
750	44.0
900	50.0
1050	58.0
1200	66.0

Branch connections 90 degrees

Run size	Branch Size															
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600
1200	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
1050	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B
900	C	C	C	C	E	E	E	E	E	E	E	E	E	B	B	B
750	C	C	C	C	E	E	E	E	E	E	E	E	B	B	B	A
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
450	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A	
400	C	C	C	C	E	E	E	E	E	E	B	B	B	A		
350	C	C	C	C	E	E	E	E	B	B	B	B	A			
300	C	C	C	C	E	E	E	B	B	B	A					
250	C	C	C	C	E	E	B	B	B	A						
200	C	C	C	C	E	E	B	B	A							
150	C	C	C	C	E	B	B	A								
100	C	C	C	C	B	B	A									
80	C	C	C	C	B	A										
50	C	C	B	B	A											
40	C	B	B	A												
25	B	B	A													
20	B	A														
15	A															

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel		Plant
Class no.	91031	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	3 mm	Principal
Revision letter	D	Contr. job no.
Revision date	08/2005	Project no.

COMPONENT MATERIAL DESCRIPTION
(For full material description see relevant MESG buying description.)

Pipe

PIPE	Pipe	DN 15-250	ASTM A106-B
PIPE	Pipe	DN 300-600	ASTM A333-6
PIPE	Pipe	DN 750-1200	ASTM A671-CC65 cl 22

Flanges

BLFL	Blind flange	DN 15-1200	ASTM A105
LJFL	Lap joint flange	---	ASTM A105
SBFL	Spectacle blind	DN 15-250	ASTM A516-60/65/70
SPFL	Spade	DN 15-600	ASTM A516-60/65/70
SPFL	Spade	DN 750-1200	ASTM A516-70
SPRT	Spacer ring	DN 15-1200	ASTM A516-60/65/70
WNFL	Welding neck flange	DN 15-1200	ASTM A105

Fittings

CAPB	Cap bw	DN 15-250	ASTM A234-WPB
CAPB	Cap bw	DN 300-1200	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 15-250	ASTM A234-WPB
E45B	Elbow 45 deg bw	DN 300-600	ASTM A420-WPL6
E45B	Elbow 45 deg bw	DN 750-1200	ASTM A420-WPL6W
E90B	Elbow 90 deg bw	DN 15-250	ASTM A234-WPB
E90B	Elbow 90 deg bw	DN 300-600	ASTM A420-WPL6
E90B	Elbow 90 deg bw	DN 750-1200	ASTM A420-WPL6W
TEEB	Tee equal bw	DN 15-250	ASTM A234-WPB
TEEB	Tee equal bw	DN 300-600	ASTM A420-WPL6
TEEB	Tee equal bw	DN 750-1200	ASTM A420-WPL6W

Reducing fittings

BNIF	Branch fitting flgd	DN 15-40	ASTM A105
BNIP	Branch fitting plain	DN 15-40	ASTM A105
BROB	Branch outlet bw	DN 150-1200	ASTM A105
RECB	Reducer concentric bw	DN 20-250	ASTM A234-WPB
RECB	Reducer concentric bw	DN 300-600	ASTM A420-WPL6
RECB	Reducer concentric bw	DN 750-1200	ASTM A420-WPL6W
REEB	Reducer eccentric bw	DN 20-250	ASTM A234-WPB
REEB	Reducer eccentric bw	DN 300-600	ASTM A420-WPL6
REEB	Reducer eccentric bw	DN 750-1200	ASTM A420-WPL6W
TRFB	Tee reducing bw	DN 20-250	ASTM A234-WPB
TRFB	Tee reducing bw	DN 300-600	ASTM A420-WPL6
TRFB	Tee reducing bw	DN 750-1200	ASTM A420-WPL6W

Valves

BUTF	Butterfly valve triple ex flgd	DN 200-1200	Body: ASTM A216-WCB/WCC Trim: CS, Alloy 625, Stellite
CHDF	Check valve dual plate flgd	DN 300-1050	Body: ASTM A216-WCB/WCC Trim: AISI 410
CHVF	Check valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
CHVF	Check valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GAVF	Gate valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GAVF	Gate valve flgd	DN 50-600	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410
GLVF	Globe valve flgd	DN 15-40	Body: ASTM A105/A216-WCB/WCC Trim: AISI 316, Stellite 6
GLVF	Globe valve flgd	DN 50-150	Body: ASTM A105/A216-WCB/WCC Trim: AISI 410

Instruments

TWND	Thermowell	DN 40-40	AISI 316
TWNL	Thermowell L=255mm	---	AISI 316
TWNS	Thermowell L=230mm	---	AISI 316

Miscellaneous

GKMG	Gasket metal groove	DN 750-1200	AISI 316, graphite, SS centring ring
GKSW	Gasket spiral wound	DN 15-600	AISI 316, graphite filled CS centring-/SS inner ring
MTRR	Meterrun	DN 15-40	AISI 316 LJ end flanges: ASTM A105
ORFS	Orifice flange set	DN 50-600	ASTM A105
STBT	Studbolt with nuts	---	ASTM A193-B7/A194-2H



PIPING COMPONENTS

Item description	MESC	Nominal pipe size																			
		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600	750	900	1050	1200
Pipe																					
Pipe	743005	0201	0301	0401	0601	0731	1131	1591	2231	2631	3031							4091	5401	6091	6691
Pipe	743010																				
Pipe	743017											1241	1371	1461	1821	2181	2501				
Flanges																					
Blind flange	766210	4081	4121	4161	4181	4201	3221	3241	3261	3281	3301	3321	3341	3361	3381	3401	3421				
Blind flange	767012																	2561	2621	2681	2741
Spacer ring	768816	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521				
Spacer ring	768875																	3331	3361	3391	3421
Spade	768813	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401	1421	1441	1461	1481	1501	1521				
Spade	768895																	3331	3361	3391	3421
Spectacle blind	768803	1221	1241	1261	1281	1301	1321	1341	1361	1381	1401										
Welding neck flange	766279	9621	9641	9661	9681	9701	8861	8641	8661	8681	8701	8721	8741	8761	8781	8801	8841				
Welding neck flange	767085																	5671	6421	7181	7941
Fittings																					
Cap bw	763019	0221	0281	0321	0421	0621	0821	1001	1201	1411	1621										
Cap bw	763115																	6831	7481	8181	8931
Cap bw	763118											3351	3551	3751	3911	4011	4121				
Elbow 45 deg bw	763038	5721	5781	5821	5921	6121	6321	6501	6701	6911	7121										
Elbow 45 deg bw	763138											3351	3551	3751	3911	4011	4121				
Elbow 45 deg bw	763144																	6441	7091	7791	8541
Elbow 90 deg bw	763040	5721	5781	5821	5921	6121	6321	6501	6701	6911	7121										
Elbow 90 deg bw	763139											3351	3551	3751	3921	4021	4131				
Elbow 90 deg bw	763146																	6461	7091	7791	8541
Tee equal bw	763084	5721	5781	5821	5921	6121	6321	6501	6701	6911	7121										
Tee equal bw	763184											3351	3551	3751	3931	4031	4131				
Tee equal bw	763190																	6441	7091	7791	8541
Valves																					
Butterfly valve triple ex flgd	774130									1651	1661	1671	1681	1691	1701	1711	1731	1761	1791	1821	1841
Check valve dual plate flgd	776711											1671	1681	1691	1701	1711	1731	1761	1791	1821	
Check valve flgd	771005	5031	5041	5051	5071																
Check valve flgd	771020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Gate valve flgd	772004	5031	5041	5051	5071																
Gate valve flgd	772020					2081	1601	1621	1641	1651	1661	1671	1681	1691	1701	1711	1731				
Globe valve flgd	773005	5031	5041	5051	5071																
Globe valve flgd	773020					2081	1601	1621	1641												
Miscellaneous																					
Gasket metal groove	854172																	1481	1541	1601	1661
Gasket spiral wound	854136	2041	2061	2081	2121	2141	1681	1701	1741	1761	1781	1801	1821	1841	1861	1881	1921				
Meter run	766596	2821	2841	2861	2881																
Orifice flange set	766295					3261	2431	2331	2341	2351	2361	2371	2381	2391	2401	2411	2421				

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB	Branch	Run	pipe	BNIF	BNIP
20	x	15		7630721411	7630731411	7630890391	400	x	50	7679030071				15	40	- 1200	7680373211	7680310161
25	x	15		7630721511	7630731511	7630890491	400	x	80	7679030201				20	50	- 50	7680373221	7680310171
25	x	20		7630721611	7630731611	7630890591	400	x	100	7679026801				20	80	- 150	7680373241	7680310191
40	x	15		7630721711	7630731711		400	x	150	7679027001				20	200	- 1200	7680373271	7680310211
40	x	20		7630721811	7630731811	7630890791	400	x	200	7679027181	7631704571	7631714571		25	80	- 250	7680373281	7680310221
40	x	25		7630721911	7630731911	7630890891	400	x	250		7631704661	7631714661	7631855091	25	300	- 1200	7680373291	7680310231
50	x	20		7630721951	7630731951		400	x	300		7631704761	7631714761	7631855351	40	80	- 80	7680373321	7680310251
50	x	25		7630722011	7630732011	7630891071	400	x	350		7631704901	7631714901	7631855601	40	100	- 200	7680373331	7680310271
50	x	40		7630722111	7630732111	7630891161	450	x	50	7679030081				40	250	- 500	7680373341	7680310291
80	x	40		7630722311	7630732311		450	x	80	7679030211				40	600	- 1200	7680373351	7680310301
80	x	50		7630722411	7630732411	7630891341	450	x	100	7679026821				Thermowell Length MESC number				
100	x	40		7630722551	7630732561		450	x	150	7679027021								
100	x	50		7630722701	7630732701	7630891611	450	x	200	7679027201				230			7683370311	
100	x	80		7630722801	7630732801	7630891731	450	x	250		7631705281	7631715281	7631856081	255			7683370321	
150	x	50	7679030021				450	x	300		7631705581	7631715581	7631856321	305			7683370331	
150	x	80		7630723001	7630733001	7630891851	450	x	350		7631705891	7631715891	7631856561	355			7683370341	
150	x	100		7630723091	7630733091	7630891911	450	x	400		7631706191	7631716191	7631856801	405			7683370351	
200	x	50	7679030031				500	x	50	7679030091				455			7683370361	
200	x	80	7679030161				500	x	80	7679030221								
200	x	100		7630723291	7630733291	7630892071	500	x	100	7679026841								
200	x	150		7630723391	7630733391	7630892271	500	x	150	7679027041								
250	x	50	7679030041				500	x	200	7679027221								
250	x	80	7679030171				500	x	250	7679027381								
250	x	100		7630723471	7630733471	7630892551	500	x	300		7631706481	7631716481	7631857521					
250	x	150		7630723591	7630733591	7630892731	500	x	350		7631706791	7631716791	7631857761					
250	x	200		7630723691	7630733691	7630892951	500	x	400		7631707091	7631717091	7631858001					
300	x	50	7679030051				500	x	450		7631707391	7631717391	7631858241					
300	x	80	7679030181				600	x	50	7679030111								
300	x	100	7679026761				600	x	80	7679030241								
300	x	150		7631703871	7631713871	7631853121	600	x	100	7679026881								
300	x	200		7631703991	7631713991	7631853321	600	x	150	7679027081								
300	x	250		7631704091	7631714091	7631853541	600	x	200	7679027261								
350	x	50	7679030061				600	x	250	7679027421								
350	x	80	7679030191				600	x	300				7631858721					
350	x	100	7679026781				600	x	350				7631858961					
350	x	150	7679026981	7631704171	7631714171		600	x	400		7631708891	7631718891	7631859201					
350	x	200		7631704261	7631714261	7631853941	600	x	450		7631709191	7631719191	7631859441					
350	x	250		7631704401	7631714401	7631854191	600	x	500		7631709491	7631719491	7631859681					
350	x	300		7631704501	7631714501	7631854451												

Comp.name Description

BNIF	Branch fitting flgd
BNIP	Branch fitting plain
BROB	Branch outlet bw
RECB	Reducer concentric bw
REEB	Reducer eccentric bw
TERB	Tee reducing bw

REDUCING/PIPING COMPONENTS

Run	x	Br	BROB	RECB	REEB	TERB	Run	x	Br	BROB	RECB	REEB	TERB
750	x	50	7678088071				1050	x	50	7678096131			
750	x	80	7678088201				1050	x	80	7678096261			
750	x	100	7678087331				1050	x	100	7678095391			
750	x	150	7678087461				1050	x	150	7678095521			
750	x	200	7678087591				1050	x	200	7678095651			
750	x	250	7678087721				1050	x	250	7678095781			
750	x	300	7678087841				1050	x	300	7678095841			
750	x	350	7678087881				1050	x	350	7678095881			
750	x	400				7629900771	1050	x	400	7678095911			
750	x	450				7629900971	1050	x	450	7678095941			
750	x	500				7629901171	1050	x	500	7678095971			
750	x	600		7629531371	7629731371	7629901371	1050	x	600				7629905021
900	x	50	7678092101				1050	x	750				7629905621
900	x	80	7678092231				1050	x	900		7629536221	7629736221	7629906221
900	x	100	7678091361				1200	x	50	7678060161			
900	x	150	7678091491				1200	x	80	7678060291			
900	x	200	7678091621				1200	x	100	7678099421			
900	x	250	7678091751				1200	x	150	7678099551			
900	x	300	7678091841				1200	x	200	7678099681			
900	x	350	7678091881				1200	x	250	7678099811			
900	x	400	7678091921				1200	x	300	7678099841			
900	x	450				7629902541	1200	x	350	7678099881			
900	x	500				7629902741	1200	x	400	7678099911			
900	x	600				7629902941	1200	x	450	7678099941			
900	x	750		7629533541	7629733541	7629903541	1200	x	500	7678099971			
							1200	x	600				7629907681
							1200	x	750				7629908281
							1200	x	900				7629908881
							1200	x	1050		7629539481	7629739481	7629909481

BOLTING**Boltset standard flange**

DN	nr	inch	x mm	MESC number
15	4	3/4	x 110	8138613301
20	4	3/4	x 120	8138613321
25	4	7/8	x 130	8138614031
40	4	1	x 140	8138614691
50	8	7/8	x 150	8138614061
80	8	7/8	x 150	8138614061
100	8	1 1/8	x 180	8138615331
150	12	1 1/8	x 200	8138615251
200	12	1 3/8	x 230	8138616441
250	16	1 3/8	x 240	8138616461
300	20	1 3/8	x 260	8138616491
350	20	1 1/2	x 280	8138616931
400	20	1 5/8	x 290	8138617241
450	20	1 7/8	x 330	8138617861
500	20	2	x 400	8138618241
600	20	2 1/2	x 500	8138837011
750	20	3	x 570	8138838481
900	20	3 1/2	x 660	8138839271
1050	24	3 1/2	x 730	8138839341
1200	24	4	x 820	8138839811

Boltset meter run

DN	nr	inch	x mm	MESC number
15	4	3/4	x 150	8138613371
20	4	3/4	x 150	8138613371
25	4	7/8	x 150	8138614061
40	4	1	x 160	8138614721

Boltset orifice flange

DN	nr	inch	x mm	MESC number
50	8	7/8	x 160	8138614071
80	8	7/8	x 160	8138614071
100	8	1 1/8	x 190	8138615351
150	12	1 1/8	x 210	8138615381
200	12	1 3/8	x 250	8138616471
250	16	1 3/8	x 260	8138616491
300	20	1 3/8	x 290	8138616541
350	20	1 1/2	x 310	8138616981
400	20	1 5/8	x 330	8138617301
450	20	1 7/8	x 370	8138617921
500	20	2	x 450	8138618311
600	20	2 1/2	x 560	8138837071

Boltset blind/spacer

DN	nr	inch	x mm	MESC number
15	4	3/4	x 120	8138613321
20	4	3/4	x 130	8138613341
25	4	7/8	x 140	8138614041
40	4	1	x 160	8138614721
50	8	7/8	x 170	8138614091
80	8	7/8	x 170	8138614091
100	8	1 1/8	x 200	8138615251
150	12	1 1/8	x 230	8138615411
200	12	1 3/8	x 270	8138616411
250	16	1 3/8	x 290	8138616541
300	20	1 3/8	x 320	8138616591
350	20	1 1/2	x 340	8138617021
400	20	1 5/8	x 360	8138617361
450	20	1 7/8	x 410	8138617961
500	20	2	x 490	8138618371
600	20	2 1/2	x 610	8138837121
750	20	3	x 690	8138838601
900	20	3 1/2	x 800	8138839401
1050	24	3 1/2	x 890	8138839481
1200	24	4	x 1000	8138839901

ASSEMBLIES**Drain/vent point DN 15 Fig.I DN15 - 15**

Branch: according to branch table		
Blind flange	1	7662104081
Welding neck flange	1	7662799621
Gasket spiral wound	1	8541362041
Studbolt with nuts	4	8138613301

Drain/vent point DN 20 Fig.I DN20 - 40

Branch: according to branch table		
Blind flange	1	7662104121
Welding neck flange	1	7662799641
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 20 Fig.H DN50 - 50

Branch: branch nipple flanged		
Blind flange	1	7662104121
Gasket spiral wound	1	8541362061
Studbolt with nuts	4	8138613321

Drain/vent point DN 25 Fig.H DN80 - 300

Branch: branch nipple flanged		
Blind flange	1	7662104161
Gasket spiral wound	1	8541362081
Studbolt with nuts	4	8138614031

Drain/vent point DN 40 Fig.H DN350 - 1200

Branch: branch nipple flanged		
Blind flange	1	7662104181
Gasket spiral wound	1	8541362121
Studbolt with nuts	4	8138614691

Meter run connection DN 15 Fig.OH DN15 - 40

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Orifice connection DN 15 Fig.OI DN50 - 600

Branch: not applicable		
Gate valve flgd	2	7720045031
Lap joint flange	2	7662205081
Welding neck flange	2	7662799621
Gasket spiral wound	4	8541362041
Studbolt with nuts	8	8138613301
Studbolt with nuts	8	8138613301

Pressure instrument DN 15 Fig.OJ DN15 - 25

Branch: according to branch table		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Pipe	1	7430050201
Welding neck flange	1	7662799621
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Pressure instrument DN 15 Fig.OH DN40 - 1200

Branch: branch nipple flanged		
Gate valve flgd	1	7720045031
Lap joint flange	1	7662205081
Gasket spiral wound	2	8541362041
Studbolt with nuts	4	8138613301
Studbolt with nuts	4	8138613301

Temperature instrum DN 40 Fig.NS DN80 - 100

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=230mm	1	7683370311
Studbolt with nuts	4	8138614711

Temperature instrum DN 40 Fig.NL DN150 - 1200

Branch: branch nipple flanged		
Lap joint flange	1	7662205181
Gasket spiral wound	1	8541362121
Thermowell L=255mm	1	7683370321
Studbolt with nuts	4	8138614711

CLASS 91031-KS

Design limits

	Temperature (°C)								
	-20	0	50	100	150	200	250	300	340
Pressure (Bar ga)									
DN 15-1200	153.2	153.2	150.4	139.8	135.2	131.4	125.8	119.5	114.1

Notes

- Design limits acc. to ASME B16.5 flange rating mat. grp 1.1 and ASME B31.3 allowable internal pressure
- Design limits DN750 and larger limited by maximum allowable pressure acc. ASME B31.3
- For bending of pipe see PTS 31.38.01.31.
- For basis of design see PTS 31.38.01.10.
- Piping class design meets full vacuum at ambient temperature condition
- Piston type check valves (DN 15-40) for horizontal mounting only
- The use of triple eccentric butterfly valves and dual plate check valves is considered most economical. Use gate valves and swing check valves only where fouling and abrasion are negatively affecting their functionality.

Table of schedules

DN	Schedule
15	160
20	160
25	160
40	160
50	160
80	160
100	120
150	120
200	120
250	120
300	120
350	120
400	120
450	120
500	120
600	120
750	44.0
900	50.0
1050	58.0
1200	66.0

Branch connections 90 degrees

Run size	Branch Size																			
	15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600	750	900	1050	1200
1200	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	B	B	B	B	A
1050	C	C	C	C	E	E	E	E	E	E	E	E	E	E	E	B	B	B	A	
900	C	C	C	C	E	E	E	E	E	E	E	E	E	E	B	B	B	A		
750	C	C	C	C	E	E	E	E	E	E	E	E	B	B	B	B	A			
600	C	C	C	C	E	E	E	E	E	E	B	B	B	B	B	A				
500	C	C	C	C	E	E	E	E	E	E	B	B	B	B	A					
450	C	C	C	C	E	E	E	E	E	B	B	B	B	B	A					
400	C	C	C	C	E	E	E	E	E	B	B	B	B	A						
350	C	C	C	C	E	E	E	E	E	B	B	B	A							
300	C	C	C	C	E	E	E	B	B	B	B	A								
250	C	C	C	C	E	E	B	B	B	A										
200	C	C	C	C	E	E	B	B	A											
150	C	C	C	C	E	B	B	A												
100	C	C	C	C	B	B	A													
80	C	C	C	C	B	A														
50	C	C	B	B	A															
40	C	B	B	A																
25	B	B	A																	
20	B	A																		
15	A																			

Code	Explanation of characters
A	Equal tee
B	Reducing tee
C	Branch fitting
E	Branch outlet

Carbon steel F-Gr		Plant
Class no.	91031-KS	Consignee
ASME rating	CLASS 900	Engineered by
Corrosion allowance	3 mm	Principal
Revision letter	O	Contr. job no.
Revision date	08/2005	Project no.

