

# EXCEL HYDRO-PNEUMATICS PVT. LTD.

HYDRAULICS, PNEUMATICS  
INSTRUMENTATION  
VALVES AND FITTINGS

51, First Floor, Raja Industrial Estate, P. K. Road  
Mulund (W), Mumbai - 400 080 India  
Ph : 2568 3291, 5597 4532, 2560 6089  
FAX: 91-22-2564-5538 E-mail: excel@bom2.vsnl.net.in  
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International Standards  
Certifications  
Lic. No. QAC/R91/0240

Client :- ICF

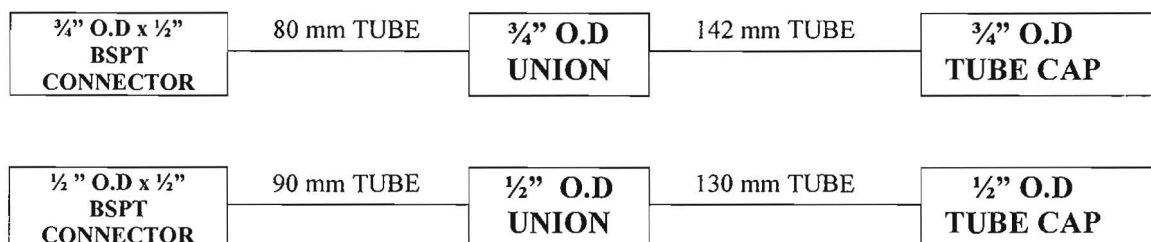
Starting Date :- 11-02-2006-16.00 Hrs.

### FITTINGS USED :-

The following items of ASTM A108( Body & Nut ) with FRONT AND BACK FERRULES of SS316 were used for loop

1. MALE CONNECTOR 3/4" O.D X 1/2" BSPT
2. 3/4" O.D UNION
3. 3/4" O.D TUBE CAP
4. MALE CONNECTOR 1/2" O.D X 1/2" BSPT
5. 1/2" O.D UNION
6. 1/2" O.D TUBE CAP

### LOOP :-

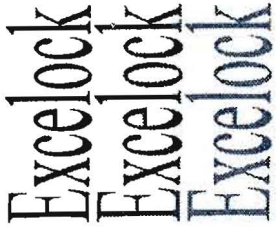


### HYDROSTATIC PRESSURE TEST :-

The Loop was subjected to Hydraulic Test  
Testing Fluid : **WATER**  
Testing Pressure : **100 Kg/cm<sup>2</sup>**  
Duration :- **5 Minutes**  
Indicating Medium : **Soap Solution**  
Observation :- **No Leak was Found.**

### PNEUMATIC TETSING :-

The Loop after Hydraulic Test, was subjected to  
Pneumatic Test  
Testing Gas :- **OXYGEN**  
Testing Pressure :- **40 Kg/cm<sup>2</sup>**  
Duration :- **5 Minutes**  
Indicating Medium : **Immersed in Water Tub**  
Observation :- **No Leak was Found.**



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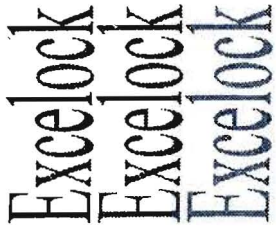


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**HYDRAULIC IMPULSE CUM VIBRATION TEST** :- After the pneumatic Test , the Loop was subjected to Hydraulic Pressure Impulse cum Vibration test  
Testing Medium : Oil  
Testing Pressure : 0 – 100 Kg/cm<sup>2</sup>  
Vibration Amplitude : 5mm

## READINGS TABULATION

<b>DATE</b>	<b>TIME In Hrs.</b>	<b>IMPULSE COUNTER READING</b>	<b>VIBRATION COUNTER READING</b>
11-02-06	16.20	0	0
11-02-06	17.20	2460	68000
11-02-06	18.20	4740	136000
11-02-06	19.20	6640	204040
11-02-06	20.20	8692	272440
11-02-06	21.20	10972	341560
11-02-06	22.20	13252	411760
11-02-06	23.15	14125	478360
12-02-06	00.15	16306	549640
12-02-06	01.15	18532	620920
12-02-06	02.15	20775	691120
12-02-06	03.15	23552	762400
12-02-06	04.15	25215	832600
12-02-06	05.15	27414	902800
12-02-06	06.15	29621	974080
12-02-06	07.15	31833	1045360
12-02-06	07.55	32958	1088128
12-02-06	11.30	35023	1158320
12-02-06	12.30	36895	1228540
12-02-06	13.30	39004	1298720
12-02-06	14.30	41275	1368560
12-02-06	15.30	43518	1439120
12-02-06	16.30	45749	1510400
12-02-06	17.30	47500	1582400



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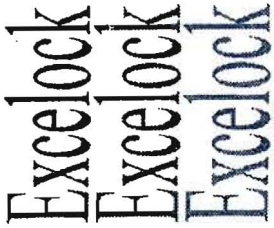
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13-02-06	11.30	49365	1651520
13-02-06	12.30	51500	1721360
13-02-06	13.30	53780	1791560
13-02-06	14.30	56350	1862120
13-02-06	15.30	58315	1933400
13-02-06	16.30	60720	2005400
13-02-06	17.30	62622	2078840
13-02-06	18.30	64905	2151560
13-02-06	19.30	67211	2226440
13-02-06	20.30	69250	2300240
13-02-06	21.30	71763	2374040
13-02-06	22.30	74031	2447480
13-02-06	23.30	76254	2521280
14-02-06	00.30	78485	2596160
14-02-06	1.30	80718	2671760
14-02-06	2.30	82952	2747360
14-02-06	3.30	85185	2823680
14-02-06	4.30	87430	2901080
14-02-06	5.30	89641	2977400
14-02-06	6.30	91848	3053000
14-02-06	7.30	94048	3127880
14-02-06	8.00	94998	3165320
14-02-06	11.30	95037	3239120
14-02-06	12.30	97105	3312920
14-02-06	13.30	99395	3386360
14-02-06	14.30	101916	3459800
14-02-06	15.30	103810	3533600
14-02-06	16.30	106990	3606320
14-02-06	17.30	108506	3679760
14-02-06	18.30	110769	3752480
14-02-06	19.30	113013	3826280
14-02-06	20.30	115125	3901160
14-02-06	21.30	117788	3976760
14-02-06	22.30	119994	4053080
14-02-06	23.30	122212	4130480
15-02-06	00.30	124452	4206080
15-02-06	1.30	126659	4282400
15-02-06	2.30	128891	4357280
15-02-06	3.30	131751	4431080
15-02-06	4.30	133750	4504880



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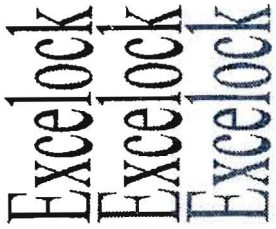
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15-02-06	5.30	135912	4578320
15-02-06	6.30	137750	4652120
15-02-06	7.30	139144	4725560
15-02-06	11.00	140913	4798280
15-02-06	12.00	143108	4870280
15-02-06	13.00	145425	4942280
15-02-06	14.00	147520	5015000
15-02-06	15.00	149729	5087720
15-02-06	16.00	151966	5159720
15-02-06	17.00	154198	5231000
15-02-06	18.00	156573	5302320
15-02-06	19.00	158680	5374240
15-02-06	20.00	161231	5447000
15-02-06	21.00	163436	5518280
15-02-06	22.00	166094	5590190
15-02-06	23.00	168326	5663000
16-02-06	00.00	170520	5734410
16-02-06	1.00	172742	5804840
16-02-06	2.00	175001	5875400
16-02-06	3.00	177101	5946660
16-02-06	4.00	179411	6018540
16-02-06	5.00	181797	6091360
16-02-06	6.00	184034	6165160
16-02-06	7.00	186165	6238600
16-02-06	8.00	188133	6312040
16-02-06	11.30	190294	6384760
16-02-06	12.30	192459	6456530
16-02-06	13.30	194735	6528740
16-02-06	14.30	197054	6601480
16-02-06	15.30	199702	6673670
16-02-06	16.30	201613	6746200
16-02-06	17.30	203595	6819570
16-02-06	18.30	206002	6891640
16-02-06	20.00	208875	6998560
16-02-06	21.00	210992	7069840
16-02-06	22.00	213459	7141110
16-02-06	23.00	215232	7213120
17-02-06	00.00	217760	7285840
17-02-06	1.00	219987	7358560
17-02-06	2.00	222260	7431290



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17-02-06	3.00	224455	7503280
17-02-06	4.00	226675	7576720
17-02-06	5.00	228958	7650160
17-02-06	6.00	231193	7722880
17-02-06	7.00	233460	7795600
17-02-06	8.00	235673	7867550
17-02-06	11.30	237816	7938880
17-02-06	12.30	240314	8010610
17-02-06	13.30	242021	8082740
17-02-06	14.30	244364	8154520
17-02-06	15.30	246462	8227240
17-02-06	16.30	248733	8299960
17-02-06	17.30	251006	8372680
17-02-06	18.30	253173	8446120
17-02-06	19.30	255405	8519930
17-02-06	20.30	257671	8593720
17-02-06	21.30	260030	8668600
17-02-06	22.30	262187	8744340
17-02-06	23.30	264391	8819800
18-02-06	00.00	265504	8857590
18-02-06	1.00	267650	8933250
18-02-06	2.00	269923	9008130
18-02-06	3.00	272069	9081920
18-02-06	4.00	274291	9155760
18-02-06	5.00	276605	9230640
18-02-06	6.00	278805	9304080
18-02-06	7.00	281045	9378960
18-02-06	8.00	283057	9451680
18-02-06	11.30	285500	9522960
18-02-06	12.30	287245	9594580
18-02-06	13.30	289840	9666600
18-02-06	14.30	292130	9738620
18-02-06	15.30	294421	9811340
18-02-06	16.30	295770	9884780
18-02-06	17.30	297925	9958560
18-02-06	18.30	300120	10033440
18-02-06	19.30	302195	10109040
18-02-06	20.30	304470	10184660
18-02-06	21.30	306778	10259540
18-02-06	22.30	308976	10330020

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18-02-06	23.30	311188	1408300
19-02-06	00.30	313379	10482120
19-02-06	1.30	315589	10557000
19-02-06	2.30	317779	10631880
19-02-06	3.30	319039	10707460
19-02-06	4.30	321259	10783070
19-02-06	5.30	323449	10858720
19-02-06	6.30	326609	10933600
19-02-06	7.30	328826	11008480
19-02-06	10.30	329947	11080520
19-02-06	11.30	332134	11153200
19-02-06	12.30	334285	11225220
19-02-06	13.30	336511	11296500
19-02-06	14.30	338812	11368560
19-02-06	15.30	340935	11441280
19-02-06	16.30	343215	11515080
19-02-06	17.30	345342	11587800
19-02-06	18.30	347579	11661240
20-02-06	10.30	348700	11697240
20-02-06	11.30	350851	11769960
20-02-06	12.30	353017	11842680
20-02-06	13.30	355174	11916120
20-02-06	14.30	357490	11989920
20-02-06	15.30	359663	12063360
20-02-06	16.30	361805	12137150
20-02-06	17.30	364145	12210980
20-02-06	18.30	366243	12284740
20-02-06	19.30	368378	12360360
20-02-06	20.30	374898	12436670
20-02-06	21.30	376843	12513000
20-02-06	22.30	378265	12590440
20-02-06	23.30	379876	12667800
21-02-06	00.30	381293	12745220
21-02-06	1.30	382209	12822660
21-02-06	2.30	384295	12900100
21-02-06	3.30	386471	12976420
21-02-06	4.30	388901	13052740
21-02-06	5.30	390890	13130160
21-02-06	6.30	393592	13206480
21-02-06	7.30	395149	13282100

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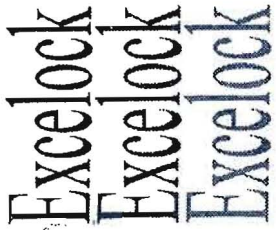
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21-02-06	11.00	397419	13354120
21-02-06	12.00	399629	13425400
21-02-06	13.00	401723	13497080
21-02-06	14.00	403827	13569080
21-02-06	15.00	405951	13641800
21-02-06	16.00	408027	13714520
21-02-06	17.00	410337	13787960
21-02-06	18.00	412966	13961760
21-02-06	19.00	415085	13935200
21-02-06	19.30	416431	13972100
21-02-06	20.30	418850	14047700
21-02-06	21.30	420292	14124020
21-02-06	22.30	423032	14201440
21-02-06	23.30	425171	14278860
22-02-06	00.30	427315	14356270
22-02-06	1.30	429455	14433690
22-02-06	2.30	431701	14511110
22-02-06	3.30	432232	14588500
22-02-06	4.30	433000	14664820
22-02-06	5.30	434914	14742230
22-02-06	6.30	437214	14818550
22-02-06	7.30	439465	14894160
22-02-06	11.00	441597	14966180
22-02-06	12.00	443787	15038900
22-02-06	13.00	445916	15111620
22-02-06	14.00	448146	15185060
22-02-06	15.00	450354	15258890
22-02-06	16.00	452614	15333770
22-02-06	17.00	454814	15407550
22-02-06	18.00	454881	15482430
22-02-06	19.00	457123	15557310
22-02-06	20.00	459210	15632190
22-02-06	21.00	461445	15707800
22-02-06	22.00	463732	15784120
22-02-06	23.00	465855	15861540
23-02-06	00.00	468007	15938960
23-02-06	1.00	470293	16016350
23-02-06	2.00	472390	16093770
23-02-06	3.00	474650	16171180
23-02-06	4.00	476882	16248590



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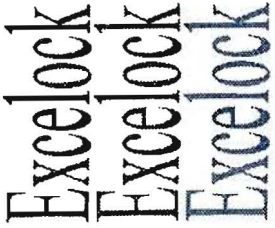
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23-02-06	5.00	479089	16326000
23-02-06	6.00	481277	16403440
23-02-06	7.00	483468	16480830
23-02-06	8.00	485676	16558220
23-02-06	11.30	487887	16629500
23-02-06	12.30	490085	16701610
23-02-06	13.30	492295	16774330
23-02-06	14.30	494482	16847050
23-02-06	15.30	496680	16920490
23-02-06	16.30	498880	16994280
23-02-06	17.30	501090	17068100
23-02-06	18.30	501103	17141940
23-02-06	19.30	501852	17216820
23-02-06	20.30		17292420
23-02-06	21.30		17368740
23-02-06	22.30		17445060
23-02-06	23.30		17522450
24-02-06	00.30		17599870
24-02-06	1.30		17677310
24-02-06	2.30		17754730
24-02-06	3.30		17832190
24-02-06	4.30		17909600
24-02-06	5.30		17986980
24-02-06	6.30		18064430
24-02-06	7.30		18140020
24-02-06	8.00		18178720
24-02-06	11.30		18255040
24-02-06	12.30		18332460
24-02-06	13.30		18409880
24-02-06	14.30		18486200
24-02-06	15.30		18563600
24-02-06	16.30		18639920
24-02-06	17.30		18717360
24-02-06	18.30		18794730
24-02-06	19.30		18872140
24-02-06	20.30		18949580
24-02-06	21.30		19027000
24-02-06	22.30		19104400
24-02-06	23.30		19181870
25-02-06	00.30		19259310



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25-02-06	1.30		19336750
25-02-06	2.30		19414220
25-02-06	3.30		19491640
25-02-06	4.30		19569080
25-02-06	5.30		19646420
25-02-06	6.30		19723880
25-02-06	7.30		19801300
25-02-06	8.00		19840000
25-02-06	11.30		19916320
25-02-06	12.30		19992640
25-02-06	12.45		20011720

**TEMPERATURE CYCLING TEST** :- Before the completion of pressure Impulse cum Vibration test , the Loop was simultaneously subjected to Temperature cycling test and the readings are tabulated below,

**CYCLE – 1** Date :- 24-02-06

<b>HEATING</b>	
TIME	TEMP(°C)
18.00	32
18.05	60
18.10	98
18.15	134
18.20	158
18.25	180
18.30	201

<b>SOAKING</b>	
TIME	TEMP(°C)
18.30	201
18.35	198
18.40	203
18.45	204
18.50	201
18.55	197
19.00	206

<b>COOLING</b>	
TIME	TEMP(°C)
19.00	206
19.05	181
19.10	165
19.15	139
19.20	101
19.25	66
19.30	42

**CYCLE – II**

<i>HEATING</i>	
TIME	TEMP(°C)
19.30	39
19.35	68
19.40	92
19.45	128
19.50	155
19.55	174
20.00	201

<i>SOAKING</i>	
TIME	TEMP(°C)
20.00	201
20.05	206
20.10	202
20.15	201
20.20	199
20.25	196
20.30	193

<i>COOLING</i>	
TIME	TEMP(°C)
20.30	193
20.35	168
20.40	133
20.45	107
20.50	91
20.55	67
21.00	43

**CYCLE – III** Date :- 25-02-06

<i>HEATING</i>	
TIME	TEMP(°C)
10.30	28
10.35	58
10.40	95
10.45	138
10.50	159
10.55	171
11.00	200

<i>SOAKING</i>	
TIME	TEMP(°C)
11.00	200
11.05	197
11.10	193
11.15	198
11.20	192
11.25	195
11.30	203

<i>COOLING</i>	
TIME	TEMP(°C)
11.30	203
11.35	162
11.40	132
11.45	106
11.50	87
11.55	63
12.00	41

After the completion of Temperature cycling test , the Loop was subjected to Hydrostatic Pressure test of **100 Kg/cm<sup>2</sup>** for **5 Mins.**

Observation :- **No Leak Found**

**VACCUM TEST** :- After the completion of Pressure Impulse cum Vibration and Temperature cycling test , the Loop was subjected to Vaccum test  
Pressure of **723mm of Hg** for **30 Mins.**

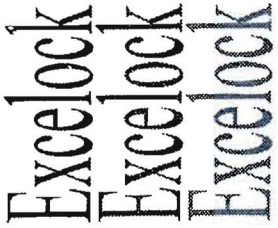
723mm of Hg – 13.30 Hrs.

719mm of Hg – 13.45 Hrs.

719mm of Hg – 14.00 Hrs.

Observation :- **The drop in Vaccum Pressure, as per the Firm contention could have been due to Leakage in the Manifold.**

**For the next cycle of 30 Minutes , test was conducted with new Manifold and observed no Leakage (or) drop in Vaccum Pressure**



# EXCEL HYDRO-PNEUMATICS PVT. LTD.

HYDRAULICS, PNEUMATICS  
INSTRUMENTATION  
VALVES AND FITTINGS

51, First Floor, Raja Industrial Estate, P. K. Road  
Mulund (W), Mumbai - 400 080 India  
Ph : 2568 3291, 5597 4532, 2560 6089  
FAX: 91-22-2564-5538 E-mail: excel@bom2.vsnl.net.in  
Visit us at : [www.excelhydro.com](http://www.excelhydro.com)



International Standards  
Certifications  
Lic. No. QAC/R91/0240

**MAKE AND BREAK TEST** :- After the completion of all the above tests , the loop was subjected to Make and Break Test . The fittings were assembled and dismantled for 25 times. After this , the loop was subjected to Hydrostatic pressure of **110 Kg/cm<sup>2</sup> for 5 Mins.** For 1<sup>st</sup> CYCLE  
**116 Kg/cm<sup>2</sup> for 5 Mins.** For 2<sup>nd</sup> CYCLE  
Observation :- **No Leak Found**

**The Fittings which were subjected to Type Test are marked as Ex-ICF-TT-16 & Ex-ICF-TT-17 and kept for future reference at Firm's premises.**

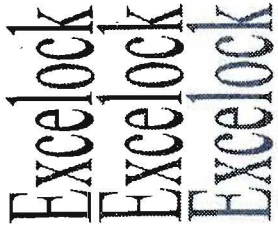
**VISUAL DIMENSIOANAL CHECK** :- Following fittings were inspected before swaging with Gauges & Calipers for Dimensional accuracy and visually for surface defects as per drgs. approved by ICF.

- 1) Drg. No. **Ex0304**  
Description :- **UNION ELBOW 1" O.D**

	<b>T</b> Tube O.D	<b>D</b> Min Bore	<b>L</b> Body Length	<b>F</b> Pad Thick	<b>G</b> Nut Hex.	<b>NL</b> Nut Length
Specified Dimension	1"±0.2	20	36±1.0	36±0.8	38±0.8	20.5
Observed Dimension	25.6mm	20.1	37	36.4	37.9	20.5

- 2) Drg. No. **Ex0305**  
Description :- **STRAIGHT UNION 1 1/2" O.D**

	<b>T</b> Tube O.D	<b>D</b> Min Bore	<b>L</b> Body Length	<b>F</b> Body Hex.	<b>G</b> Nut Hex.	<b>NL</b> Nut Length
Specified Dimension	1 1/2"±0.2	30	53.6±1.0	55±0.8	55±0.8	26



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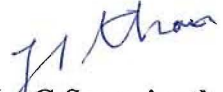
Observed Dimension	38.4mm	34	53.4	54.4	54.4	26
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3) Drg. No. **Ex-389**

Description :- **FEMALE TEE 1/2" BSPT (FxF)**

	<b>P</b> BSPT Female	<b>D</b> Min Bore	<b>L</b> Body Length	<b>L1</b> Body Length	<b>L2</b> Thread Length	<b>F</b> Body Hex.
Specified Dimension	1/2"	12	60±1.0	30±1.0	19±1.0	27±0.8
Observed Dimension	Checked with Thread Plug Gauge	13.7	61	30.5	19	26.8

Remarks :- All Dimension were found within the specified tolerance range for Sl. No. 1 to 3

  
(Mr. G. Swaminathan)  
For M/s EXCEL HYDRRO PNEUMATICS Pvt. Ltd.

  
(Mr. J. Robinson)

  
(Mr. V. R. Venkataraman, S.S.E/Designs)  
For INTEGRAL COACH FACTORY , Chennai.

  
(Mr. J. Martin , S.S.E/Inspection)