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Formation professionnelle
Ressources Humaines
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Bâtiment en génie civil
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SIGMAPHI

**Rue des Frères Montgolfier – ZI du Prat
56000 VANNES**

**Written by :
D. JOST**

Attention to M. PORHIEL

V/Réf : CF002723

Saint Herblain, le 13/11/15

N/Réf : 15N123 - 15350943

DELIVERY ORDER

SUBJECT : Mechanical calculation report

Nbre	Référence du document	Désignation - Observation
1	15N123 - 15350943	Mechanical calculation report Of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA- 702-001-Rev D Following ASME B31.3 - 2012

Ingénieur au service " Calculs "

Donatien JOST



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 Assistance Technique
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 56000 VANNES**

Attention to M. PORHIEL

V/Réf : CF002723

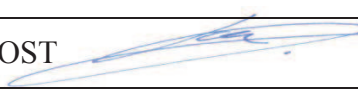

N/Réf : 15N123 - 15350943

CALCULATION DEPARTMENT

CALCULATION REPORT

***Of piping elements on assembly drawings 318711-JLA-703-001-Rev D
 and 318711-JLA-702-001-Rev D***

Following ASME B31.3 - 2012

C					
B					
A	13/11/15	D. JOST		G. BALIDAS	
Rév.	Date	Name	Signature	Name	Signature
		Written by		Checked up by	



SIGMAPHI

Calculation report of piping elements on
assembly drawings 318711-JLA-703-001-Rev D
and 318711-JLA-702-001-Rev D

V / Reference :	CF002723					
N / Reference :	15N123 - 15350943					
Date :	13/11/2015					
Page :	Rév.	A				

REVISION RECORD

REV	DATE	PAGE / PARAGRAPHE CONCERNED	REVISION DECRIPION
A	13/11/15	All	First edition

<i>Pages</i>	<i>Révision Index</i>		
0	A		
à			
6	A		
APPENDIX A			
A0 à A2	A		



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Calculation report of piping elements on
assembly drawings 318711-JLA-703-001-Rev D
and 318711-JLA-702-001-Rev D

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Page :	Rév.	A				

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APPENDIX A – Drawings

	SIGMAPHI Calculation report of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D	V / Reference : CF002723					
		N / Reference : 15N123 - 15350943					
		Date : 13/11/2015					
Page :	Rév.	A					

1. OBJECT

The goal of this calculation note is to review the mechanical strength under static pressure of piping elements of :

- the helium vessel following assembly drawing 318711-JLA-703-001 Rev D,
- the anti-radiation screen following assembly drawing 318711-JLA-702-001 Rev D.


The design is done according to ASME B31.3 - 2012.

2. REFERENCES

2.1. Drawings

- For the helium vessel piping elements
 - 318711-JLA-703-001 Rev D (Assembly drawing)
 - 318711-JLA-703-006 Rév D (Detail drawing of feeding pipe)
 - 318711-JLA-703-008 Rév C (Detail drawing of helium pipes)
 - 318711-JLA-703-009 Rév B (Detail drawing of pipe reduction)
 - 318711-JLA-703-016 Rév C (Detail drawing of below for Ø33.7 pipe)
 - 318711-JLA-703-017 Rév B (Detail drawing of half pipe)
- For the anti-radiation screen piping elements
 - 318711-JLA-702-001 Rev D (Assembly drawing)
 - 318711-JLA-702-013 Rev D (Detail drawing of N2 feeding)
 - 318711-JLA-702-014 Rev D (Detail drawing of N2 outlet)
 - 318711-JLA-702-019 Rev B (Detail drawing of junction pipe)
 - 318711-JLA-702-034 Rev C (Detail drawing of below for N2 pipes)
 - 318711-JLA-702-035 Rev C (Detail drawing of below for Ø33.7 pipe)

Above listed drawings are jointed in appendix A.

	SIGMAPHI Calculation report of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D	V / Reference : CF002723					
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2.2. Codes standards used

- ASME B31.3 - 2012
- ASME B16.9

2.3. Calculation software

- Excel calculation sheets are used for analytical calculations under static pressure.

3. DESIGN SPECIFICATION

3.1. Calculation conditions

- Corrosion allowance : 0 mm
- Welding joint efficiency : 1
- Nominal stress : According to ASME B31.3 - 2012 (see §3.5)
- Fluid: liquid and/or gaseous nitrogen
 - Calculations with : Density of 1
- Operating temperature : -196°C (77K)
 - Calculations at : 20°C (conservative)
- Operating pressure : Internal pressure of 6 bar and external pressure of 1 bar
 - Calculations with : Internal pressure of 7 bar
- Hydraulic test conditions:
 - Pressure : Internal pressure of 10 bar
 - Temperature : 20°C
- Internal/external pressures (for operating & strength test conditions) : See §3.2 & 3.3)
- Wind : Not applicable
- Earthquake : Not applicable
- Fatigue : Not applicable
- Loads and moments : Not applicable

Nota : Calculation conditions are similar to those of calculation report 15N122.



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Calculation report of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D

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3.2. Materials and allowable stresses

Yield strength, tensile strength and allowable stresses are issued from ASME B31.3 - 2012.

Element	Material	Standard	Température	Units: MPa				
				R _P	R _m	σ _R	f _{operating}	f _{test}
Seamless/ Welded tubes/pipes	304L	ASME SA312	20°C	172	483	/	115	155
Plates & sheets	304L	ASME SA240	20°C	172	483	/	115	155
Fittings (elbows, Reducers, tees) following B16.9	304L	ASME SA403	20°C	172	483	/	115	155

3.3. List of piping elements to be calculated

The following elements will be calculated (indicated below in function of related drawing) :

	Tube	Welded pipe	Pipe bend	Branch connection	Schedule	Material
Helium vessel piping elements						
318711-JLA-703-006 Rév D (Detail drawing of feeding pipe)	Ø21,3x3,7		Ø21,3x3,7 R53 and R38 (neutral)		80S	SA312 grade 304L
318711-JLA-703-008 Rév C (Detail drawing of helium pipes)						
318711-JLA-703-009 Rév B (Detail drawing of pipe reduction)						
318711-JLA-703-016 Rév C (Detail drawing of below for Ø33.7 pipe)	Ø33,7x4.55				90S	SA312 grade 304L
318711-JLA-703-017 Rév B (Detail drawing of half pipe)		Ø88,9x3,05				SA240 grade 304L
Anti-radiation screen piping elements						
318711-JLA-702-013 Rev D (Detail drawing of N2 feeding)	Ø21,3x3,7		Ø21,3x3,7 R53, R38 and R363,2 (neutral)		80S	SA312 grade 304L
318711-JLA-702-014 Rev D (Detail drawing of N2 outlet)	Ø21,3x3,7		Ø21,3x3,7 R38 (neutral)	Ø21,3 / Ø21,3 (3,7x3,7)	80S	SA312 grade 304L
318711-JLA-702-019 Rev B (Detail drawing of junction pipe)	Ø21,3x3,7		Ø21,3x3,7 R53 (neutral)		80S	SA312 grade 304L
318711-JLA-702-034 Rev C (Detail drawing of below for N2 pipes)	Ø26,9x3,9					
318711-JLA-702-035 Rev C (Detail drawing of below for Ø33.7 pipe)	Ø33,7x4.55					



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Calculation report of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D

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Helium vessel piping elements	Fittings following ASME B16.9			Schedule	Material
	Elbow	Reducer	Tee		
318711-JLA-703-006 Rév D (Detail drawing of feeding pipe)	Ø21,3x3,7			80S	SA403 grade 304L
318711-JLA-703-008 Rév C (Detail drawing of helium pipes)	Ø60,3x3,9			40S	SA403 grade 304L
318711-JLA-703-009 Rév B (Detail drawing of pipe reduction)		Ø33,4 / Ø21,3 (4.55x3,73)		équivalent 80S	SA403 grade 304L
318711-JLA-703-016 Rév C (Detail drawing of below for Ø33.7 pipe)					
318711-JLA-703-017 Rév B (Detail drawing of half pipe)					

Anti-radiation screen piping elements	Fittings following ASME B16.9			Schedule	Material
	Elbow	Reducer	Tee		
318711-JLA-702-013 Rev D (Detail drawing of N2 feeding)	Ø21,3x3,7		Ø21,3 / Ø21,3 (3,7x3,7)	80S	SA403 grade 304L
318711-JLA-702-014 Rev D (Detail drawing of N2 outlet)					
318711-JLA-702-019 Rev B (Detail drawing of junction pipe)					
318711-JLA-702-034 Rev C (Detail drawing of below for N2 pipes)					
318711-JLA-702-035 Rev C (Detail drawing of below for Ø33.7 pipe)					

3.4. Calculation methodology

All fittings are purchased following ASME B16.9. The allowable pressure ratings for fittings designed following ASME B16.9 may be calculated as for seamless pipe of equivalent material.

- As a result, tubes and fittings (elbows, reducers, tees) of same diameter, thickness and material are justified with the same calculation (straight pipe calculation following ASME B31.3 - §304.1.2)
- Pipe bends are justified by a specific calculation (following ASME B31.3 - § 304.2.1).
- Branch connections are also justified by a specific calculation (following ASME B31.3 - § 304.3.1).

4. RESULTS

The following coefficients are taken in account in the following calculations :

- Quality factor for seamless tubes and fittings : $E = 1$ for seamless tubes & fittings
- Weld joint strength reduction factor : $W = 1$ at 20°C
- Coefficient $Y = 0,4$ for austenitic steel at 20°C



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Calculation report of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D

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4.3. Branch connection calculation

Branch connections are justified by a specific calculation (following ASME B31.3 - § 304.3.1).

OPENING REINFORCEMENT

item :

OPE : 7,0 bar | 20°C
TEST : 10,0 bar | 20°C

			Header 304L	Branch 304L
Material				
Outside diameter	D	mm	21,3	21,3
Nominal thickness		mm	3,7	3,7
Quality factor	E		1	1
Mill tolerance (12,5%)		mm	0,46	0,46
Corrosion allowance	c	mm	0,00	0,00
Weld joint strength reduction factor	W		1	1
Coefficient	Y		0,4	0,4

Reinforcement of branch connections according to ASME B31.3 §304.3.3

			OPE	TEST
Internal design pressure	P	MPa	0,7	1
Outside diameter of header	Dh	mm	21,3	21,3
Actual thickness of header	Th	mm	3,24	3,24
Allowable stress of header	Sh	MPa	115	155
Required thickness of header	th	mm	0,07	0,07
Outside diameter of branch	Db	mm	21,3	21,3
Actual thickness of branch	Tb	mm	3,24	3,24
Allowable stress of branch	Sb	MPa	115	155
Required thickness of branch	tb	mm	0,07	0,07
Angle between axes of branch and header	β	°	90	90
Design inside diameter of branch	d1	mm	14,83	14,83
Half width of reinforcement zone	d2	mm	14,83	14,83
Minimum thickness of reinforcing pad	Tr	mm	0,00	0,00
Width of reinforcing pad	Lr	mm	0,00	0,00
Allowable stress of reinforcing pad	Sr	MPa	0,00	0,00
Height of reinforcement	L4	mm	8,09	8,09
Required reinforcement area	$A1 = th \cdot d1(2 - \sin\beta)$	mm ²	0,96	1,02
Area available in the header	$A2 = (2 \cdot d2 - d1)(Th - th)$	mm ²	47,03	46,97
Area available in the branch	$A3 = 2 \cdot L4(Tb - tb) / \sin\beta$	mm ²	51,35	51,29
Area available in added reinforcement	$A4 = 2 \cdot Tr \cdot \min(Lr; d2 - Db/2)$	mm ²	0,00	0,00
Ratio of allowable stress branch/header	$R3 = Sb / Sh$		1,00	1,00
Ratio of allowable stress pad/header	$R4 = Sr / Sh$		0,00	0,00
Available area for reinforcement	$A2 + A3 \cdot R3 + A4 \cdot R4$	mm ²	98,39	98,26

Reinforcement is allowable



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**Calculation report of piping elements on
assembly drawings 318711-JLA-703-001-Rev D
and 318711-JLA-702-001-Rev D**

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Date :		13/11/2015			
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CONCLUSION

This calculation report shows that the design of all piping elements on drawings listed in paragraph §2.1 are compliant to ASME B31.3 - 2012 rules for design conditions defined in paragraph §3.1.

Remark :

- Pipes and fittings shall be purchased with respect of material grades (304L) and standards (ASME B16.9 for fittings) indicated in paragraphs 3.2 and 3.3.

* * *



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Calculation of piping elements on assembly drawings 318711-JLA-703-001-Rev D and 318711-JLA-702-001-Rev D

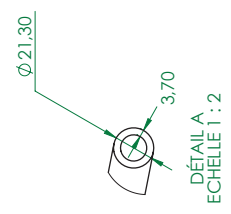
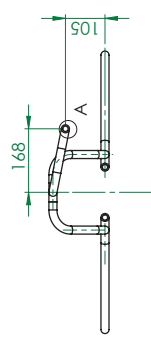
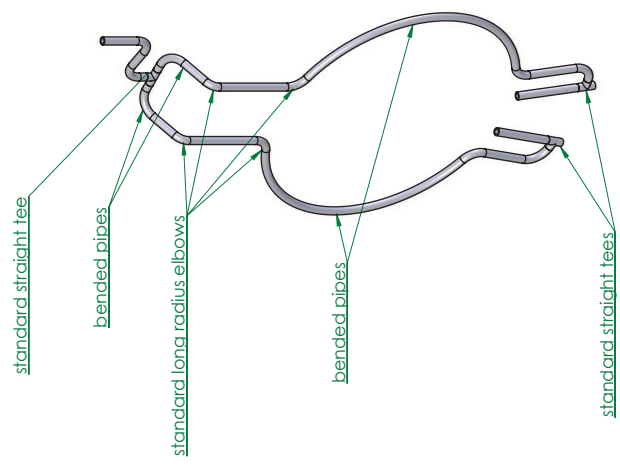
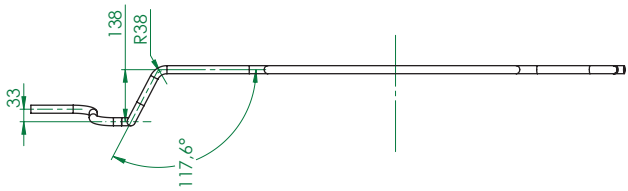
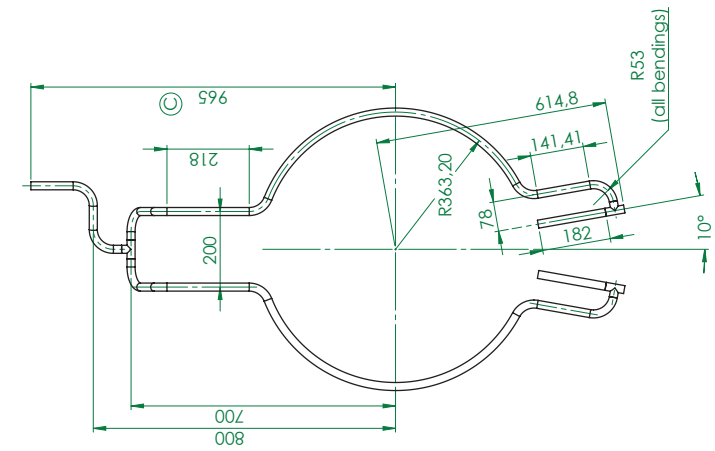
V / Reference :	CF002723					
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Date :	13/11/2015					
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ANNEXE A

Drawings

ZONE		REV.	DESCRIPTION	DATE	AUTHOR
A		A	CREATION	02/07/2013	M. DELBECCO
B		B	change of diameter and flow new design of beams	31/03/2015	MD
C		C	changed height due to modification of beams	27/09/2015	MD
D		D	added information added precision on 304L norm + added missing dimension (tube Ø)	22/10/2015	

REVISIONS	
11	
12	



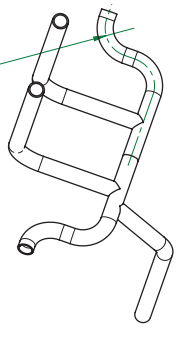
All pipes and fittings are schedule 80S

SIGMAPHI Rue des Frères Montgallier F-56000 Vannes		Name	M. DELBECCO	Date	23/10/2015
Tel: 02 97 01 06 01 Fax: 02 97 01 06 07 Email: Contact@sigmaphi.fr		Drawing		Checked	
		Approved			
		MATERIAL:	SA312 (pipes) or SA403 - 304L		
		Dimensions:	ISO 2768 vL (very large)		
		Tol Gen:			
		Supplier:	6.73 Kg		
		Weight:			
		File name:	318711-JLA-702-013		
702-Antiradiation-Screen					
N2 feeding					
DWG NO:	318711-JLA-702-013	REV:	D		
This drawing may not be used without explicit licence or authorization express (date of file: 17 march 1997)					

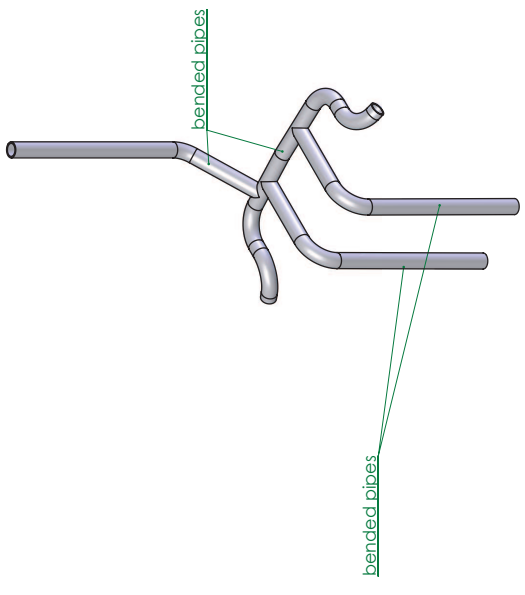
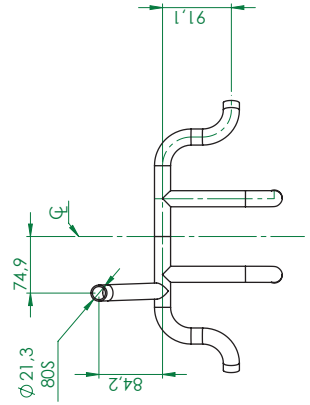
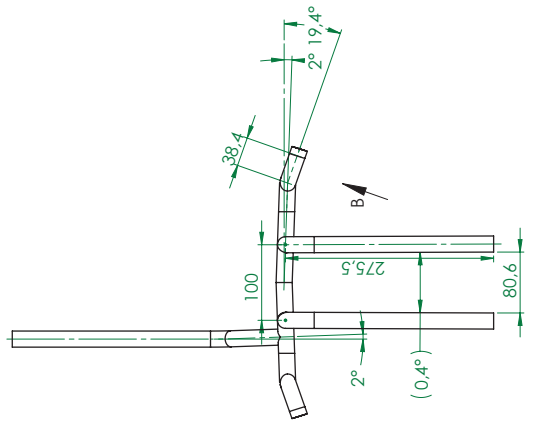
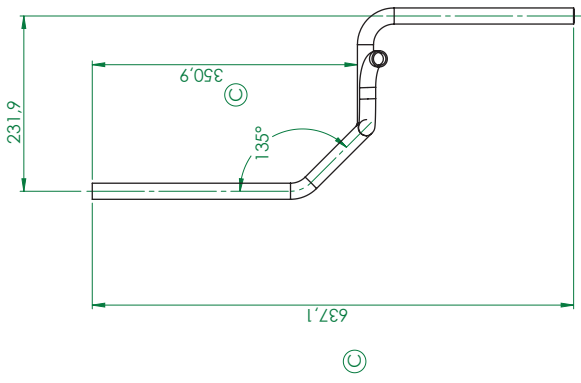
For Manufacturing

ZONE	REV	DESCRIPTION	DATE	AUTHOR
A		CREATION	02/07/2013	M. DELBECQ
B		changes of dimensions due to revision of standards	27/07/2015	MD
C		change of height due to evaluation of height	27/07/2015	MD
D		change of precision on 304L norm	27/10/2015	MD

R38
for all bending radius



VUE B

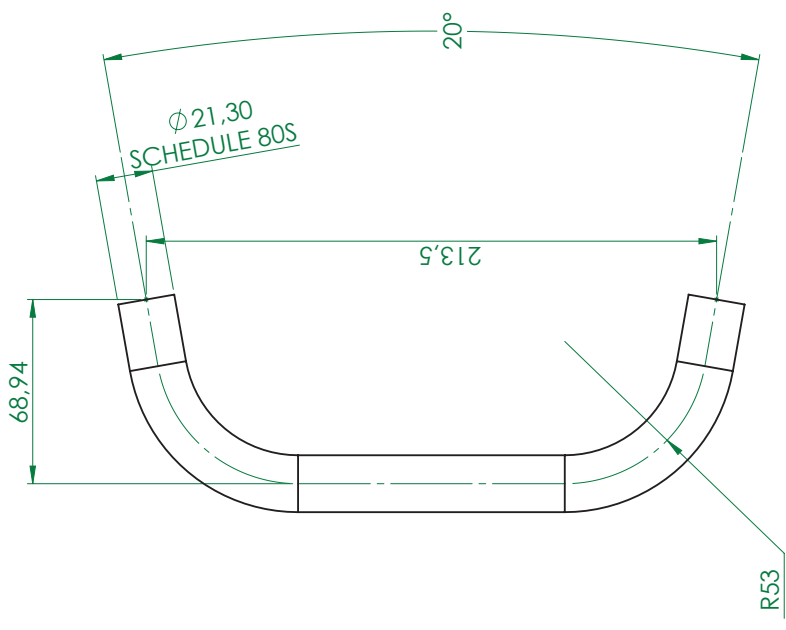
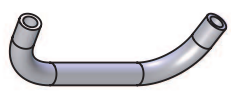
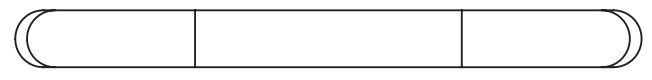



All pipes and fittings are schedule 80S

		Name	M. DELBECQ	Date	23/10/2015
Rue des Frères Montgaller F-56000 Vannes		Drawing	M. DELBECQ	Checked	
Tel: 02 97 20 08 00 Fax: 02 97 20 08 01 EMAIL: Contact@sigmaphi.fr		Approved			
		MATERIAL	SAS12 - 304L		
		Dimensions:			
		Tol Gen:	ISO 2768 vL (very large)		
		Supplier:			
		Weight:	1,58 Kg		
		File name:	318711-JLA-702-014		
702-Antiradiation-Screen					
N2 outlet					
DWG NO: 318711-JLA-702-014		Rev: D			
This drawing may not be used without special licence or authorisation express (date of file: 17 march 1997)		SCALE: 1:1 A2			

For Manufacturing

ZONE		REVISIONS	
REV.	DESCRIPTION	DATE	AUTHOR
A	CREATION	08/07/2013	M. DELBECQ
B	added precision on 304L norm	23/10/2015	MD



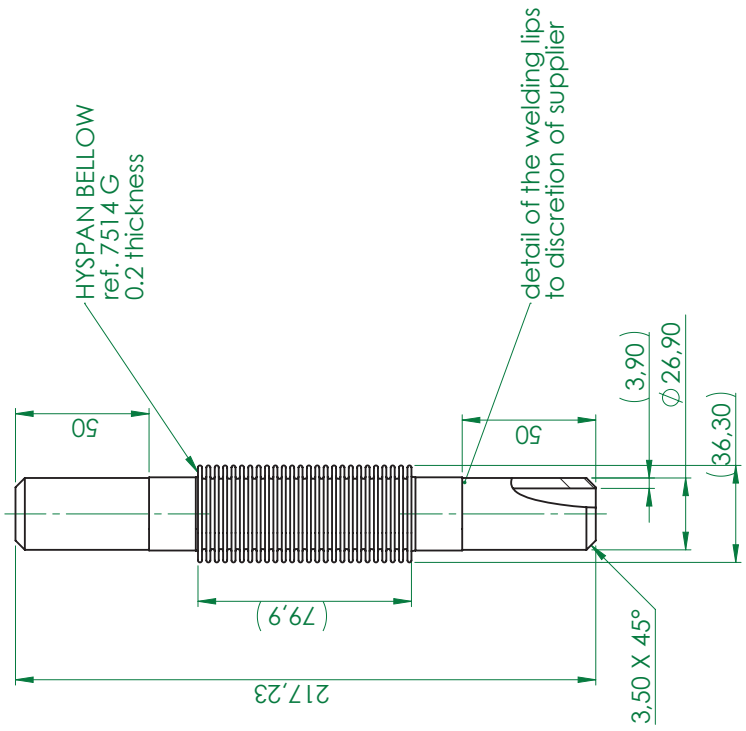
 Zi du port Rue des Forges Monjolifier F-36000 YANNES Tel(33) 02 97 01 08 80 Fax (33)02 97 01 08 81 EMAIL Contact@sifmaphi.fr	Drawing	Name	Date
	Checked	M. DELBECQ	23/10/2015
	Approved		
MATERIAL: SA312 - 304L		Tol Gen ±1	
Roughness :		Supplier:	
702-Antiradiation-Screen		Weight: 0,48 Kg	
junction pipe		File name:318711-JLA-702-019	
DWG NO. 318711-JLA-702-019		Rev: B	

For Manufacturing



ZONE		REV.	DESCRIPTION	DATE	AUTHOR
A		A	CREATION	20/09/2013	M. DELBECQ
B		B	updated to use same ref than dipole	27/08/2015	MD
C		C	added precision on 304L norm	23/10/2015	MD

For Manufacturing



BELLOW DETAILS		SIFMAPHI		Name		Date	
HYPSPAN REFERENCE	7514G	 ZI du port Rue des Forges Monjolier F-36000 Yarnes Tel:(33) 02 97 01 08 80 Fax: (33)02 97 01 08 81 EMAIL Contact@sifmaphi.fr		Drawing	M. DELBECQ	23/10/2015	
content	liquid or gaseous nitrogen			Checked		Approved	
min. temperature	77K			MATERIAL: SA312 - 304L			
design pressure	6 atm absolute			Roughness:			
inner diameter	26.67			Tel Gen			
max. axial deflection	10.1			Supplier:			
max. lateral deflection	6			Weight:			
convoluted length	79.9			ISO 2768 cl (large)			
helium leak test	10-9mbar.l/s stable during 8h			0.35 Kg			
material	304L			File name:318711-JLA-702-034			
construction code	ASME B 31.3			Rev: C			

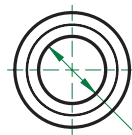
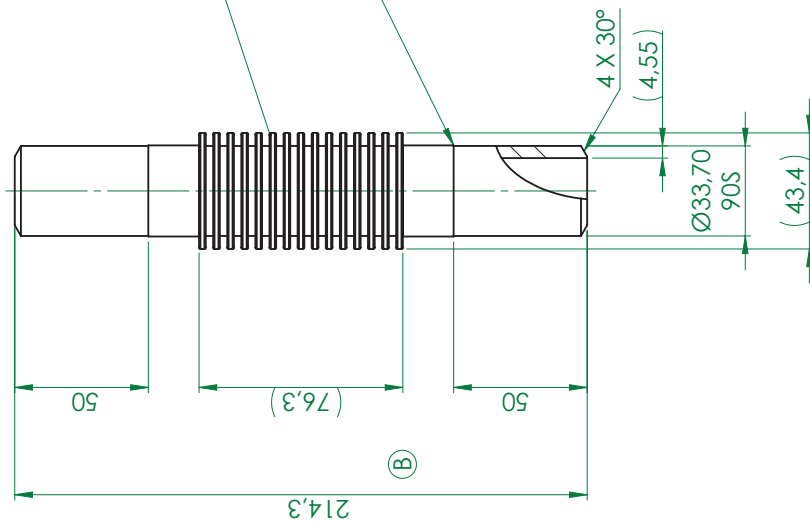


ZONE		REV.	DESCRIPTION	DATE	AUTHOR
A		A	CREATION	08/02/2011	M. Delbecq
B		B	changed length (to get same reference than dipole)	27/08/2015	MD
C		C	added precision on 304L norm	23/10/2015	MD

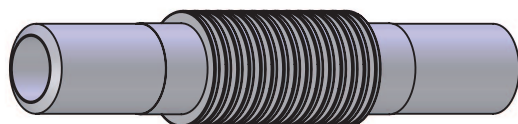
For Manufacturing


HYPAN BELLOW
ref. 7519G
(0.20 thickness)

detail of the welding lips
to discretion of supplier



Ø 24,60 min.



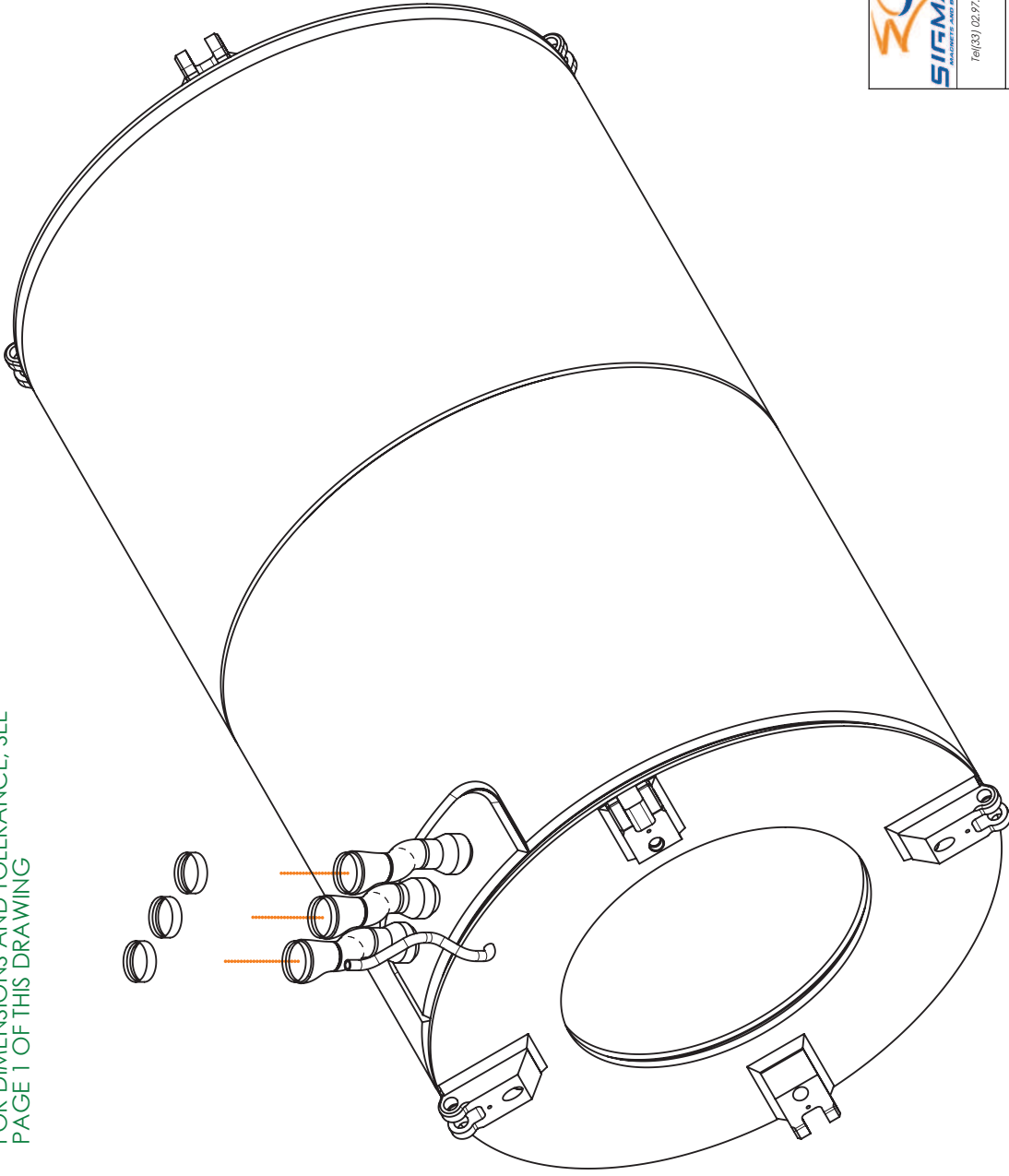
 ZI du port Rue des Fées/Mongollier F-36000 Vannes Tel(33) 02 97 01 08 80 Fax (33)02 97 01 08 81 EMAIL Contact@sifmaphi.fr		Name	M. Delbecq	Date	23/10/2015
702-Antiradiation-Screen Bellow for Ø33.7 pipe		Drawing		Checked	
		Approved			
		MATERIAL:	SA312 - 304L		
		Traité:			
		Roughness:			
		Tol Gen	ISO 2768 cl (large)		
		Supplier:			
		Weight:	0.88 Kg		
		File name:	318711-JLA-702-035		
DWG NO: 318711-JLA-702-035 Rev: C					

BELLOW DETAILS	
HYPAN REFERENCE	7519G
content	liquid or gaseous nitrogen
min. temperature	77K
design pressure	6 atm absolute
inner diameter	33.32
max. axial deflection	10.1
max. lateral deflection	6
convoluted length	76.28
helium leak test	10-9mbar.l/s stable during 8h
material	304L
construction code	ASME B 31.3

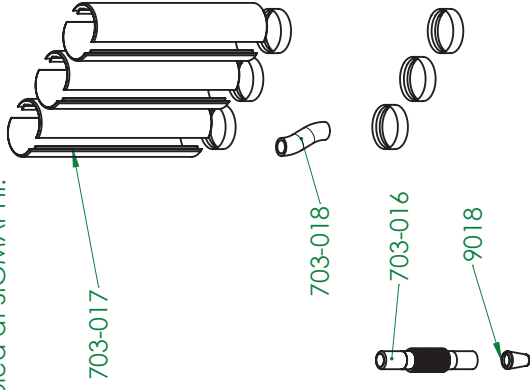
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A		ISSUE			
B		REVISION			
C		REVISION			
D		REVISION			

REF.	DESIGNATION	QUANTITE	UNITE	REVISION	DATE	BY	CHKD.
1	703-011	1	PIECE				
2	9019	1	PIECE				
3	703-008	1	PIECE				
4	703-018	1	PIECE				
5	703-012	1	PIECE				
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7	703-016	1	PIECE				
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STATE OF DELIVERY RECEIVED AT SIGMAPHI:
 (collared coil inside)
 FOR DIMENSIONS AND TOLERANCE, SEE
 PAGE 1 OF THIS DRAWING



Batch of parts to be assembled at SIGMAPHI:



Zi du prof
 Rue des Fées Mongollier
 F-36000 Vannes

Tel(33) 02 97 01 08 80 Fax (33)02 97 01 08 81 EMAIL Contact@sigmaphi.fr

QPOLE

HELIUM VESSEL

DWG NO.

318711-JLA-703-001

Rev:

D

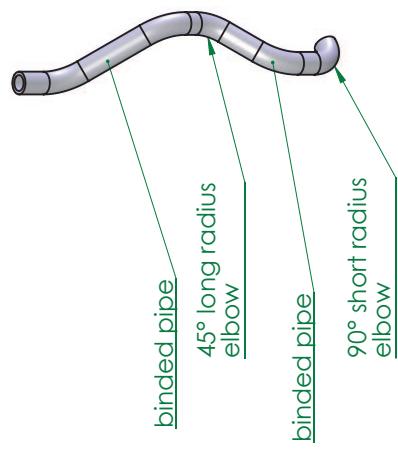
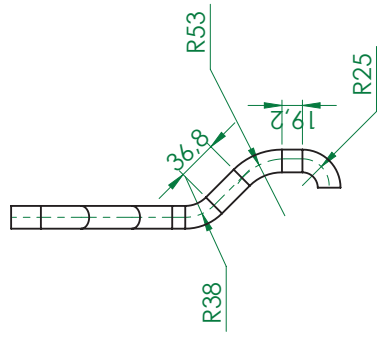
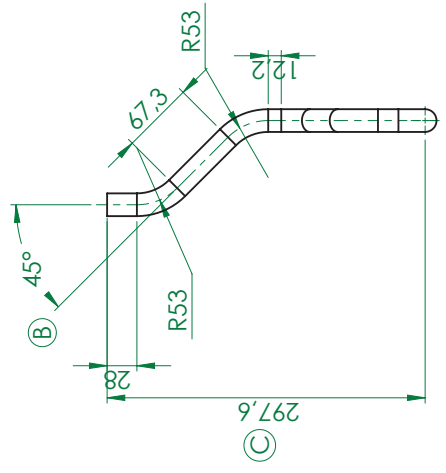
Drawing	M. DELBECQ	Name	M. DELBECQ	Date	22/10/2015
Checked					
Approved					
MATERIAL:	See assembly				
Trait:					
Roughness:					
Tol Gen	SEE NOTE				
Supplier:					
Weight:	2159,74 Kg				
File name:318711-JLA-703-001					

This drawing may not be used without special license or authorisation express
 (Annex 11, article 1, 1987)

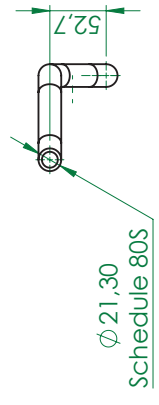
ZONE		REV.	DESCRIPTION	DATE	AUTHOR
A		A	CREATION	28/06/2013	M. DELBECC
B		B	changed height due to elevation of CCR	03/04/2015	MD
C		C	changed height due to modification of bellow	27/08/2015	MD
D		D	added precision on 304L norm	22/10/2015	MD

For Manufacturing

Porchie



NOTE:
 - All dimensions in mm.
 - Content liquid helium at 4K.
 - Design pressure: 7atm absolute from 4K to 300K (inner pressure).
 - Design and manufacturing according to AMSE BPV.
 - Helium leakage test: 10^-9 mbar.l/s
 - All pipes and fittings are schedule 80S



Name		Date
Drawing	M. DELBECC	22/10/2015
Checked		
Approved		
MATERIAL: SA312 (pipes) or SA403 - 304L		
Treat:		
Roughness:		
Tol Gen: ±1		
Supplier:		
Weight: 0.51 Kg		
File name: 318711-JLA-703-006		
703-Helium-Vessel		
FEEDING		
DWG NO. 318711-JLA-703-006		Rev: D



Tel(33) 02.97.01.08.80 Fax (33)02.97.01.08.81 EMAIL Contact@sifmaphi.fr

ZONE		REVISIONS	
REV. A	DESCRIPTION	DATE	AUTHOR
B	CREATION	28/06/2013	M. DELBECQ
C	evolution of height	08/04/2015	MD
	added precision on 304L norm	22/10/2015	MD

For Manufacturing



NOTE:

- All dimensions in mm.
- Content liquid helium at 4K.
- Design pressure: 7atm absolute from 4K to 300K (inner pressure).
- Design and manufacturing according to AMSE BPV.
- Helium leakage test: 10⁻⁹ mbar.l/s

standard ANSI
45° long radius elbows

Name		Date
Drawing	M. DELBECQ	22/10/2015
Checked		
Approved		

SIFMAPHI
 ZI du prof
 Rue des Fées Mongollier
 F-36000 Vannes
 Tel(33) 02 97 01 08 80 Fax (33)02 97 01 08 81 EMAIL Contact@sifmaphi.fr

703-Helium-Vessel

HELIUM PIPES

DWG NO. **318711-JLA-703-008**

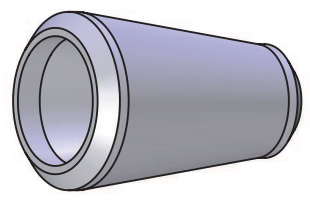
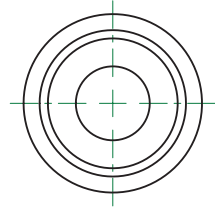
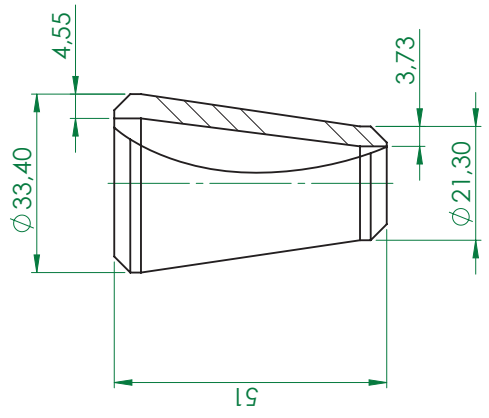
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Rev: **C**

This drawing may not be used without special license or authorisation express (Gen. of Dec. 11, March 1987)

ZONE		REVISIONS	
REV.	DESCRIPTION	DATE	AUTHOR
A	CREATION	08/07/2013	M. DELBECQ
B	added precision on 304L norm + thickness	22/10/2015	MD

For Manufacturing

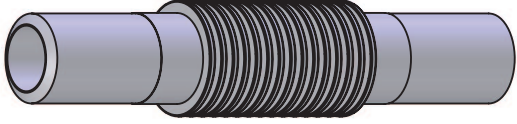
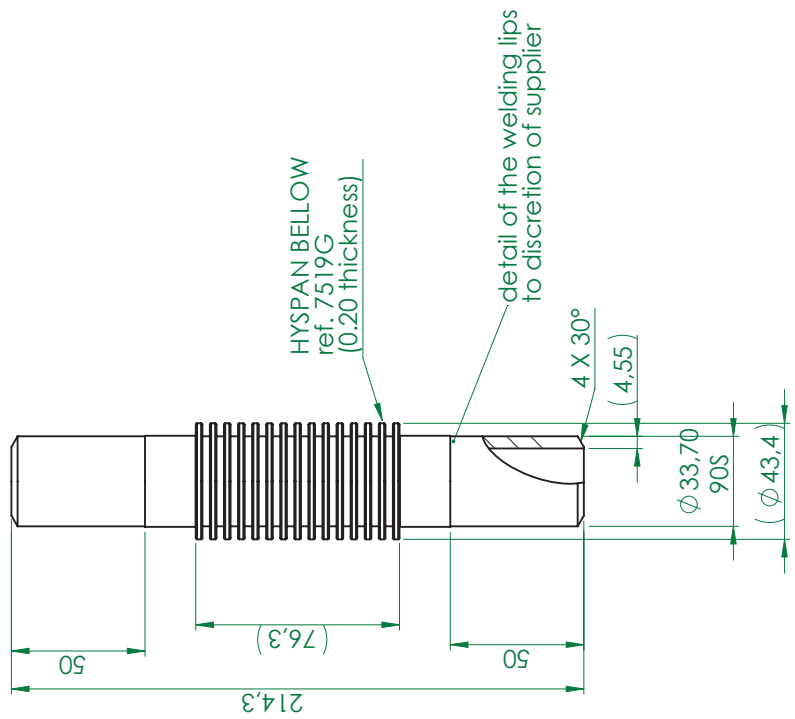


<p>Zi du prof Rue des Forges Monjolifier F-36000 Yarnes Tel(33) 02 97 01 08 80 Fax (33)02 97 01 08 81 EMAIL Contact@sifmaphi.fr</p>	Name		Date
	Drawing	M. DELBECQ	22/10/2015
	Checked		
	Approved		
MATERIAL: SA312 (pipes) or SA403 - 304L		Treat:	
Roughness:		Total Gen: ±1	
Supplier:		Weight: 0.12 Kg	
File name:318711-JLA-703-009			
<p>703-Helium-Vessel</p> <p>PIPE REDUCTION</p>			
DWG NO. 318711-JLA-703-009		Rev: B	
<p>This drawing may not be used without special traces or authorisation express (Gen. of Proc. 11/04/01/1987)</p>			

ZONE	REV.	DESCRIPTION	DATE	AUTHOR
	A	CREATION	08/02/2011	M. Delbecq
	B	changed length (to get same reference than dipole)	27/08/2015	MD
	C	added precision on 304L norm	22/10/2015	MD

For Manufacturing

Porchie!



REVISIONS		Name	Date
Drawing	M. Delbecq	22/10/2015	
Checked			
Approved			
MATERIAL: SA312 - 304L			
Treat:			
Roughness:			
Tol Gen: ± 1			
Supplier:			
Weight: 0.88 Kg			
File name: 318711-JLA-703-016			
 ZI du port Rue des Fées/Mongollier F-36000 Vannes Tel: (33) 02 97 01 08 80 Fax: (33) 02 97 01 08 81 EMAIL: Contact@sifmaphi.fr			
703-Helium-vessel			
Bellow for Ø33.7 pipe			
DWG NO. 318711-JLA-703-016		Rev: C	
This drawing may not be used without special license or authorisation express (see article 11 paragraph 1, 1997)			

BELLOW DETAILS	7519G
HYPSPAN REFERENCE	7519G
content	liquid or gaseous helium
min. temperature	4K
design pressure	6 atm absolute
inner diameter	33.32
max. axial deflection	10.1
max. lateral deflection	6
convoluted length	76.28
helium leak test	10-9mbar.l/s stable during 8h
construction code	ASME B 31.3

