CRYOGENIC TEST PROCEDURE AT -196ºC
ACCORDING TO THE TECHNICAL SPECIFICATION FMC FE117_000_rev8_fr

AUDIT COMPANY: — DATE: 22/07/11

DOC. REF Nr: CRYO TEST_03_11 DRAWING Nr: _____

VALVE FIG.: 515 BORE: 3"

SEAT MATERIAL: TFM-1600 RATING: ANSI 150 LBS.

BODY: MATERIAL / EAT Nr: CF8M / RTZ TEMPERATURE: -196°C

CONNECTOR: MATERIAL / EAT Nr: A316 / 99574

1. GENERAL CONDITIONS:

- The valve must have passed successfully the standard JC tests.
- The valve must be thoroughly cleaned and degreased.
- To install one thermocouples in the bore of the valve (internal)
- The fluid used to detect leakage is helium.

2. TEST PROCEDURE:

COOLING PROCESS AT -196ºC

- During the cooling time let helium circulate inside the valve at 0.5 Bar (to avoid ice formation inside)
- The test can be started when the temperature of the valve is -190ºC.

WORKING PROCESS TEST AT -196ºC

- Close the valve and relieve the downstream pressure.
- Pressurize for the upstream at test pressure (22 bar).
- Open and close the valve, measure and record the valve opening and closing torques.

OPENING TORQUE (mKg)	CLOSING TORQUE (mKg)
20	25

LEAKAGE TEST AT -196ºC

- Leave the valve half open and relieve pressure in the circuit.
- Close the valve and pressurize at test pressure (22 bar)

TEST PRESSURE	MAXIMUM LEAKAGE ALLOWED	DETECTED LEAKAGE
22 bar	45 ml / min. (15 ml x inch)	0 ml/min

WARMING-UP PROCESS

- After having completed the tests, leave the valve half-open and de-pressurize the whole circuit.
- Disconnect the valve form the circuit.
- Leave the valve to warm-up up to ambient temperature.
- Make a visual inspection without disassembling the valve.

REALIZED: TONI AGUILERA
R&D Department

CHECKED: JOSÉ TEJEDOR
Technical Manager

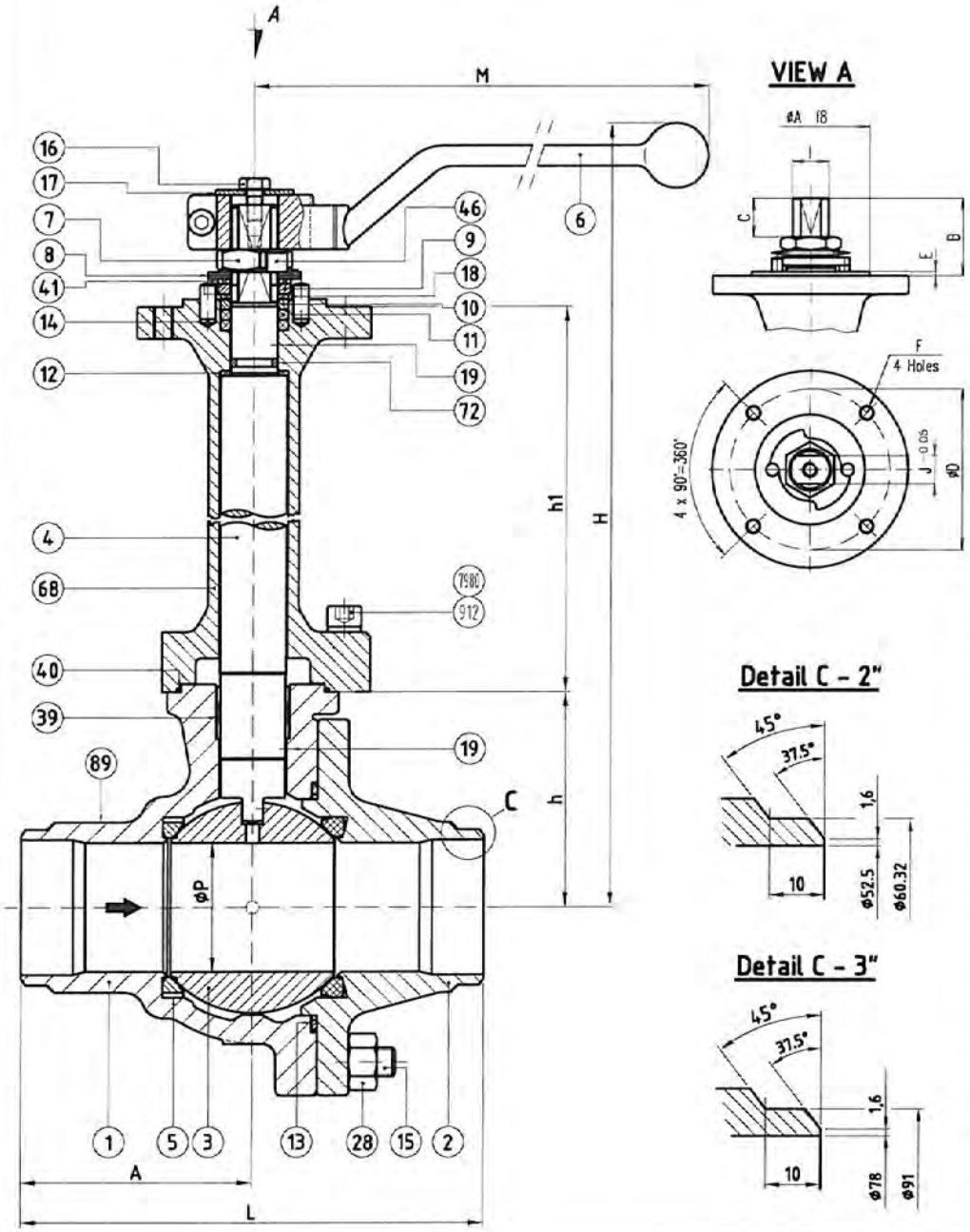
7270

DN	L	A	ØP	h1	h	H	M	Sch.
2"	178	89	50	254	83.5	409	213	40
3"	203	101.5	80	254	111	460	445	40

NOTE 1

DN 2" 17-4 PH
DN 3" AISI 304

DN	BALL VALVE. FREE STEM DIMENSIONS								WEIGHT (Kg)	QUANTITY	ITEM
	ØA	B	C	ØD	E	F	I	J			
2"	55	39.5	17,6	70	3	M8	M18x1.5	13	11	-	-
3"	70	44,5	19	102	3	M10	M25x1.5	18	23.5	-	-



(*) RECOMMENDED SPARE PARTS

POS.	QUAN.	DENOMINATION	MATERIAL	DRAWING N°
	2	PLASTIC CAP	PLASTIC	
7980	4	WASHER	AISI 316	
912	4	BOLT	A 193 Gr. B8M	
89	1	IDENTIFICATION PLATE	STAINLESS STEEL	
72	1	"O" RING	FKM	*
68	1	EXTENSION SHELL	A 351 Gr. CF8M	
46	1	LOCKING WASHER	AISI 304	*
41	1	SPACER	AISI 304	
40	1	GASKET	GRAPHITE	*
39	1	STEM BUSHING	AISI-316 WITH INSIDE IN PTFE	*
28	---	NUT	A 194 Gr. 8M	
19	2	ANTISTATIC DEVICE	STAINLESS STEEL	
18	1	THRUST WASHER	PTFE + 50% S.S.	*
17	1	WASHER	AISI 304	
16	1	BOLT	DIN-933 A2	
15	---	STUD	A 193 Gr. B8M	
14	2	STOP PIN	STAINLESS STEEL	
13	1	BODY CONNECTOR SEAL	AISI 316L + GRAPHITE	*
12	1	STEM THRUST SEAL	PTFE + 50% S.S.	*
11	2	GLAND PACKING	GRAPHITE	*
10	1	GLAND	AISI 316	
9	1	STOP PLATE	NOTE 1	
8	2	DISK SPRING	INCONEL 718	
7	1	GLAND NUT	AISI 303	
6	1	WRENCH	A 216 Gr. WCB	
5	1	SEAT RING	TFM	*
4	1	STEM	NITRONIC 50	
3	1	BALL	A 351 Gr. CF8M	
2	1	BODY CONNECTOR	AISI 316L	
1	1	BODY	A 351 Gr. CF8M	

Rev.	Modification	Date	Nam.	Approv.
1	3 Positions	05-11	J.R.	
0	First issue	04-11	T.A.	

Dimensions: mm.	Drawn	20-04-11	T. Aguilera	JC Ball Valves
Weight:	Checked	20-04-11	J. Rubio	
	Appr. Eng.			
Substitutes: 7270 Rev.0	Scale:			
Substitutes by:				

JC Fábrica de válvulas, s.a.
08830 Sant Boi de Llobregat (Spain)
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e mail technical@jc-ballvalves.com

GENERAL DIMENSIONS
FIG. 515 I.I.TFM. DN2" & 3" CLASS 150 BW FB
CRYOGENIC SERVICE

Ref.:
Drawing n°.: 7270 (1)

CRYOGENIC TEST PROCEDURE AT -196ºC
ACCORDING TO THE TECHNICAL SPECIFICATION FMC FE117_000_rev8_fr

AUDIT COMPANY: _____ DATE: 26/07/11

DOC. REF Nr: CRYO TEST_04_11 DRAWING Nr: _____

VALVE FIG.: 515 BORE: 2"

SEAT MATERIAL: TFM -1600 RATING: ANSI 150 Lbs.

BODY: MATERIAL / EAT Nr: CF8M / RTZ TEMPERATURE: -196ºC

CONNECTOR: MATERIAL / EAT Nr: A316 / 99548

1. GENERAL CONDITIONS:

- The valve must have passed successfully the standard JC tests.
- The valve must be thoroughly cleaned and degreased.
- To install one thermocouples in the bore of the valve (internal)
- The fluid used to detect leakage is helium.

2. TEST PROCEDURE:

COOLING PROCESS AT -196ºC

- During the cooling time let helium circulate inside the valve at 0.5 Bar (to avoid ice formation inside)
- The test can be started when the temperature of the valve is -190ºC.

WORKING PROCESS TEST AT -196ºC

- Close the valve and relieve the downstream pressure.
- Pressurize for the upstream at test pressure (22 bar).
- Open and close the valve, measure and record the valve opening and closing torques.

OPENING TORQUE (mKg)	CLOSING TORQUE (mKg)
7	7,5

LEAKAGE TEST AT -196ºC

- Leave the valve half open and relieve pressure in the circuit.
- Close the valve and pressurize at test pressure (22 bar)

TEST PRESSURE	MAXIMUM LEAKAGE ALLOWED	DETECTED LEAKAGE
22 bar	30 ml / min. (15 ml x inch)	0 ml/min

WARMING-UP PROCESS

- After having completed the tests, leave the valve half-open and de-pressurize the whole circuit.
- Disconnect the valve form the circuit.
- Leave the valve to warm-up up to ambient temperature.
- Make a visual inspection without disassembling the valve.

REALIZED: TONI AGUILERA
R&D Department

CHECKED: JOSÉ TEJEDOR
Technical Manager

7270

DN	L	A	ØP	h1	h	H	M	Sch.
2"	178	89	50	254	83.5	409	213	40
3"	203	101.5	80	254	111	460	445	40

NOTE 1

DN 2" 17-4 PH
DN 3" AISI 304

DN	BALL VALVE. FREE STEM DIMENSIONS								WEIGHT (Kg)	QUANTITY	ITEM
	ØA	B	C	ØD	E	F	I	J			
2"	55	39.5	17,6	70	3	M8	M18x1.5	13	11	-	-
3"	70	44,5	19	102	3	M10	M25x1.5	18	23.5	-	-

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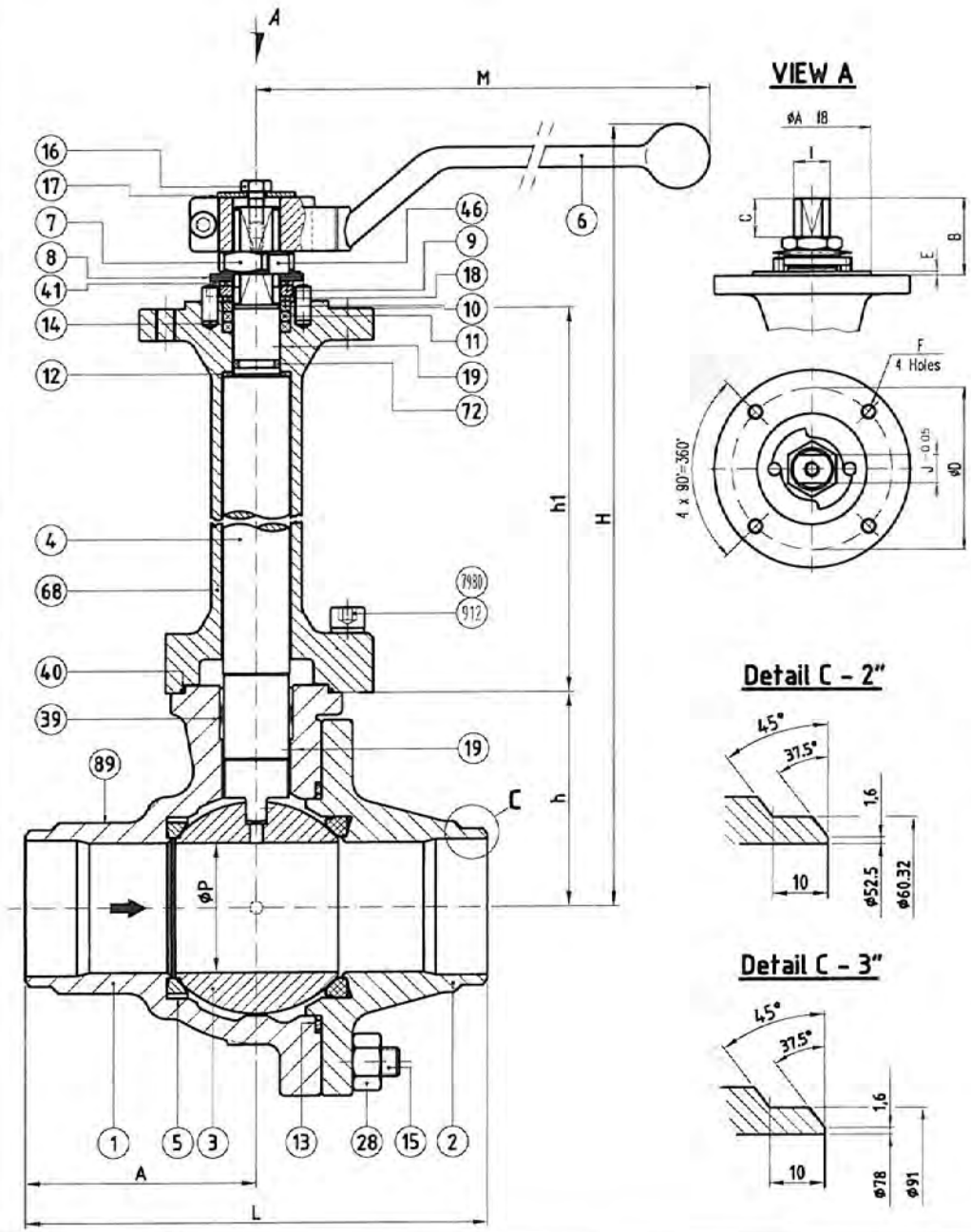

VIEW A

Detail C - 2"

Detail C - 3"

(*) RECOMMENDED SPARE PARTS

POS.	QUAN.	DENOMINATION	MATERIAL	DRAWING Nº.
	2	PLASTIC CAP	PLASTIC	
7980	4	WASHER	AISI 316	
912	4	BOLT	A 193 Gr. B8M	
89	1	IDENTIFICATION PLATE	STAINLESS STEEL	
72	1	"O" RING	FKM	*
68	1	EXTENSION SHELL	A 351 Gr. CF8M	
46	1	LOCKING WASHER	AISI 304	*
41	1	SPACER	AISI 304	
40	1	GASKET	GRAPHITE	*
39	1	STEM BUSHING	AISI-316 WITH INSIDE IN PTFE	*
28	--	NUT	A 194 Gr. 8M	
19	2	ANTISTATIC DEVICE	STAINLESS STEEL	
18	1	THRUST WASHER	PTFE + 50% S.S.	*
17	1	WASHER	AISI 304	
16	1	BOLT	DIN-933 A2	
15	--	STUD	A 193 Gr. B8M	
14	2	STOP PIN	STAINLESS STEEL	
13	1	BODY CONNECTOR SEAL	AISI 316L + GRAPHITE	*
12	1	STEM THRUST SEAL	PTFE + 50% S.S.	*
11	2	GLAND PACKING	GRAPHITE	*
10	1	GLAND	AISI 316	
9	1	STOP PLATE	NOTE 1	
8	2	DISK SPRING	INCONEL 718	
7	1	GLAND NUT	AISI 303	
6	1	WRENCH	A 216 Gr. WCB	
5	1	SEAT RING	TFM	*
4	1	STEM	NITRONIC 50	
3	1	BALL	A 351 Gr. CF8M	
2	1	BODY CONNECTOR	AISI 316L	
1	1	BODY	A 351 Gr. CF8M	

Rev.	Modification	Date	Nam.	Approv.
1	J Positions	05-11	J.R	
0	First issue	04-11	T.A.	

Dimensions: mm.	Drawn	20-04-11	T. Aguilera	JC Ball Valves
Weight:	Checked	20-04-11	J. Rubio	
	Appr. Eng.			
Substitutes: 7270 Rev.0	Scale:			
Substitutes by:				

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Tel. + (34) 936 54 86 86 // Fax + (34) 936 86 87
e mail: technical@jc-ballvalves.com

GENERAL DIMENSIONS
FIG. 515 I.I.TFM. DN2" & 3" CLASS 150 BW FB
CRYOGENIC SERVICE

Ref.:
Drawing nº.: 7270 △1

CRYOGENIC TEST PROCEDURE AT -196ºC
ACCORDING TO THE TECHNICAL SPECIFICATION FMC FE117_000_rev8_fr

AUDIT COMPANY: –

DATE: 6/09/2011

DOC. REF Nr: CRYO TEST_05_11

DRAWING Nr: _____

VALVE FIG.: 530

BORE: 1"

SEAT MATERIAL: TFM-1600

RATING: ANSI 300 Lbs.

BODY: MATERIAL / EAT Nr: CF8M / 1E70

TEMPERATURE: -196ºC

CONNECTOR: MATERIAL / EAT Nr: CF8M / 1E70

1. GENERAL CONDITIONS:

- The valve must have passed successfully the standard JC tests.
- The valve must be thoroughly cleaned and degreased.
- To install one thermocouples in the bore of the valve (internal)
- The fluid used to detect leakage is helium.

2. TEST PROCEDURE:

COOLING PROCESS AT -196ºC

- During the cooling time let helium circulate inside the valve at 0.5 Bar (to avoid ice formation inside)
- The test can be started when the temperature of the valve is -190ºC.

WORKING PROCESS TEST AT -196ºC

- Close the valve and relieve the downstream pressure.
- Pressurize for the upstream at test pressure (56 bar).
- Open and close the valve, measure and record the valve opening and closing torques.

OPENING TORQUE (mKg)	CLOSING TORQUE (mKg)
4,5	5,5

LEAKAGE TEST AT -196ºC

- Leave the valve half open and relieve pressure in the circuit.
- Close the valve and pressurize at test pressure (56 bar)

TEST PRESSURE	MAXIMUM LEAKAGE ALLOWED	DETECTED LEAKAGE
56 bar	15 ml / min.	0 ml/min

(15 ml x inch)

WARMING-UP PROCESS

- After having completed the tests, leave the valve half-open and de-pressurize the whole circuit.
- Disconnect the valve form the circuit.
- Leave the valve to warm-up up to ambient temperature.
- Make a visual inspection without disassembling the valve.

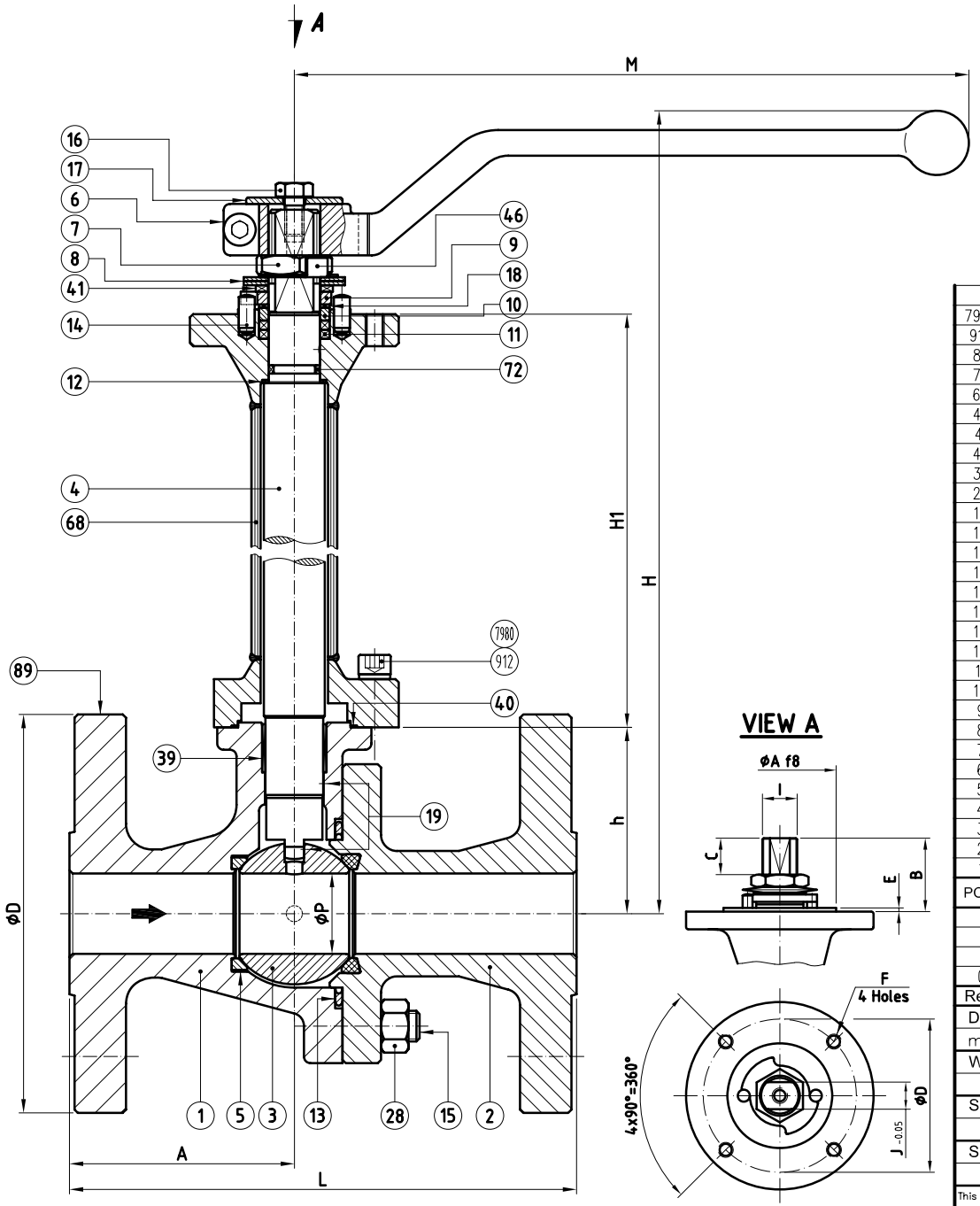
REALIZED: TONI AGUILERA
R&D Department

CHECKED: JOSÉ TEJEDOR
Technical Manager

7328

DN	L	A	ØD	ØP	h	H1	H	M
1"	165	70	124	25	58	200	322	210

DN	BALL VALVE. FREE STEM DIMENSIONS								WEIGHT (Kg)	QUANTITY	ITEM
	ØA	B	C	ØD	E	F	I	J			
1"	35	32.5	14.2	50	1.5	M6	M16 x 1.5	12	7	-	-



(*) RECOMMENDED SPARE PARTS

POS.	QUAN.	DENOMINATION	MATERIAL	DRAWING Nº.
	2	PLASTIC CAP	PLASTIC	
7980	4	WASHER	AISI 316	
912	4	BOLT	A 193 Gr. B8M	
89	1	IDENTIFICATION PLATE	STAINLESS ST.	
72	1	O' RING	FKM	*
68	1	EXTENSION SHELL	AISI 316L	
46	1	LOCKING WASHER	AISI 304	*
41	1	SPACER	AISI 304	
40	1	GASKET	GRAPHITE	*
39	1	BUSHING	AISI-316 WITH INSIDE IN PTFE	*
28	4	NUT	A 194 Gr. 8M	
19	2	ANTISTATIC DEVICE	STAINLESS ST.	
18	1	THRUST WASHER	PTFE + 50% S.S.	*
17	1	WASHER	AISI 304	
16	1	BOLT	DIN-933 A2	
15	4	STUD	A 193 Gr. B8M	
14	2	STOP PIN	STAINLESS ST.	
13	1	BODY CONNECTOR SEAL	AISI 316L + GRAPHITE	*
12	1	STEM THRUST SEAL	PTFE + 50% S.S.	*
11	2	GLAND PACKING	GRAPHITE	*
10	1	GLAND	AISI 316	
9	1	STOP PLATE	17-4 PH	
8	2	DISK SPRING	E.N.P. + CARBON ST.	
7	1	GLAND NUT	AISI 303	
6	1	WRENCH	NODULAR IRON	
5	2	SEAT RING	TFM	*
4	1	STEM	NITRONIC 50	
3	1	BALL	AISI 316	
2	1	BODY CONNECTOR	ASTM A 351 CF8M	
1	1	BODY	ASTM A 351 CF8M	

Rev.	Modification	Date	Nam.	Approv.
0	First issue	5-11	J.R.	

Dimensions mm.	Drawn	17-5-11	J. Rubio	JC Ball Valves
Weight:	Checked	17-5-11	J.R.	
	Appr. Eng.			
Substitutes:	Scale:			GENERAL DIMENSIONS
Substitutes by:				FIG.530 I.I.TFM DN-1" Class-300
				CRYOGENIC SERVICE

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Ref.:

Drawing nº.: 7328 (0)