

Dual Plate Check Valves

& Other Special Check Valves



.ICARUS

ICARUS

EUROPEAN DUAL PLATE CHECK MANUFACTURER



ZERO GAS LEAKAGE DESIGNED & TESTED PRODUCTS

We are able to provide special designed valves, manufactured with proven practice. The precision and expertise of our work allow us to deliver valves that have been tested with zero leakage results during high pressure gas tests.



FIRE SAFE DESIGNED & TESTED PRODUCTS

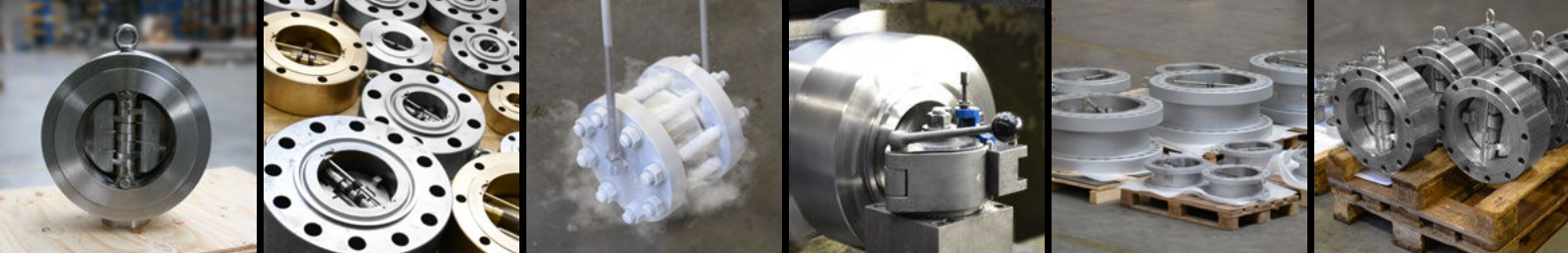
Our products are Fire-Safe Certified according to ISO 10497, API 607, API 6FA, API 6FD and BS 6755. These certifications ensure our Dual Plate check valves strictly meet the performance requirements once they are facing fire conditions.



CRYOGENIC DESIGNED & TESTED PRODUCTS

Our technical knowledge and expertise at your service for cryogenic applications: we are equipped to perform low temperature to cryogenic pressure tests with our test benches according to BS6364 or specific customer requirements.





DUAL PLATE CHECK MANUFACTURER & SERVICE PROVIDER

ICARUS

Company Profile

Since 1991, ICARUS SA has been an ambitious Dual Plate check valve manufacturer with its own workshop and design office in Belgium. In addition to its production activity, ICARUS is also a single source supplier of complete piping packages, offering experienced services such as project management, design and quality control.

ICARUS is part of a group of valve manufacturers including Saccap and Coyard, two French valve companies approved by major actors of the oil industry. With the aim of always achieving the highest quality for our products, we are using first class European suppliers.

Based on each company's specificities and strengths, we are able to produce a wide range of tailor-made valves (Dual Plate check valves, casted and forged Gate / Globe / Check valves) for onshore, offshore and subsea applications.

Established as a reliable supplier by major oil and gas companies, our global presence and our experience guarantee the management of most complex projects with a high level of engineering knowledge.

Market & Customers

For more than 30 years now, internationally renowned chemical, petrochemical and engineering companies, subcontractors and end-users have entrusted ICARUS with their most critical orders worldwide.

Our flexibility as well as our professionalism allow us to adapt our service to a large scale of projects such as emergency repairs, refurbishments, shutdowns or long-term projects.

Designed & Manufactured Valves

Upon customer requirements and needs, at ICARUS workshop, we manufacture Dual Plate check valves from 2" to 24", and pressure class 150 to 2500 in different material grades.

We are also qualified to design:

- Compact flanges according to NORSOK L-005 - NCF-4 and NCF-5 custom-made for offshore and subsea markets
- ASME B16.5 / API6A flanges including cladding in alloy 625, 825...
- Special forged components "inhouse" designed: swivel ring flanges, buckle arrestors, pipe anchors, wyes, barred tees, clamp connectors...
- Prefabricated spools
- Manifold with extruded outlets
- ...

Additional Products

- Pipes and tubes:
seamless / welded / finned / studed
- Line pipes and bends
- Fittings:
BW, SW & threaded (NPT / BSP)
- Flanges
- Outlet fittings:
weld / sock / thread... o'let
- Plates and sheets
- Special products (custom-made)

Materials

- Standard stainless steel (304L, 316 L, 321)
- High temperature (304H, 321H, 347H, 800HT) & low temperature carbon steel
- Corrosion resistance (duplex & super duplex, nitric: 310L, 904L, Uranus S1®...)
- Nickel alloy (Alloy 400, 600, 601, 625, 825, C276...)
- Low Alloy steel (P5, 9, 11, 22, 91), Carbon steel (gr B, gr 3, gr 6, X52, X60, X65, X70)
- Titanium
- ...

Quality

Quality control is committed to delivering zero-defect valves. Thus, we set up a strict quality control system from raw material to finished products.

At our workshop we have equipment and qualified workers to undertake performance testing as follows:

- Non-destructive testing: hardness, PMI, dye penetrant, ferrite, US, X-ray, magnetic testing...
- Pressure testing: hydro & gas
- Destructive testing: corrosion & impact test
- Cryogenic testing

In addition, ICARUS is certified ISO 9001 / ISO 14001 / OHSAS 18001.



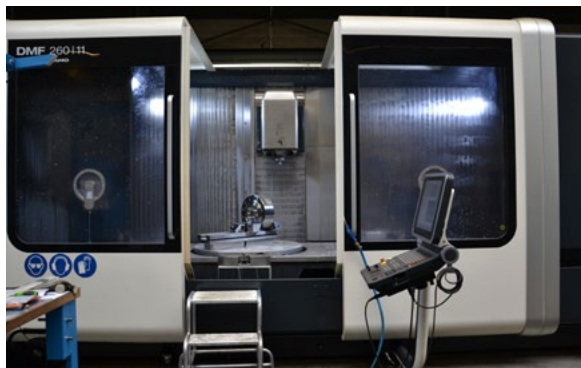
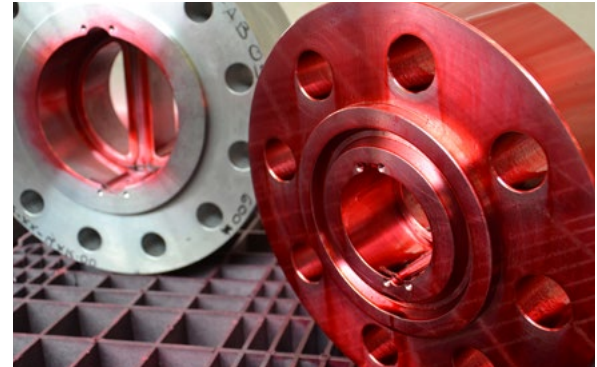
THE COMPANY

European group

Located in France and in Belgium, SACCAP COYARD & ICARUS Group has a proud history of involvement in the world's toughest applications since 1926.

In consonance with European high quality standard products and according to API 594 - API 600 - API 6A and API 6D specifications, our group pursues the goal of zero leakage performance for our custom valves.

Our group also pays close attention to the continuous improvement of its services. We are devoted to establishing an efficient, collaborative organizational structure in order to meet customers' expectations. With a mature management system and a market-oriented business concept, our 250 employees and workers make continuous efforts to keep up with advanced technology in the valve industry.



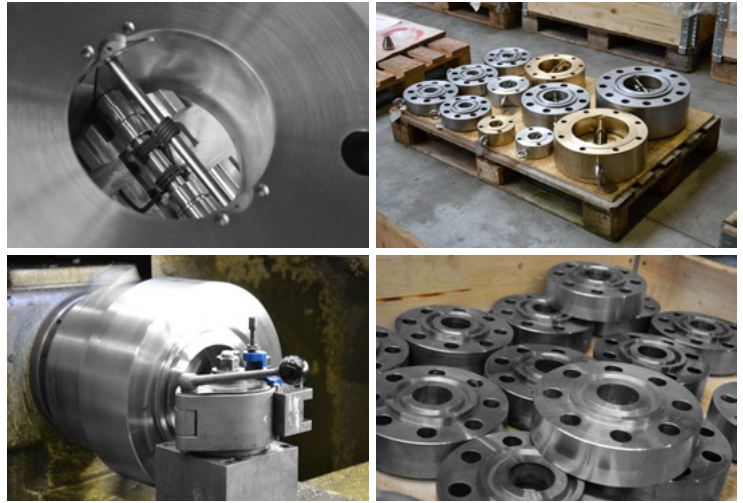
DUAL PLATE CHECK VALVES

ICARUS & Dual Plate check valves

ICARUS is the design and manufacturing centre dedicated to Dual Plate and special check valves, with 25 years of experience in delivering check valves compliant with the highest standards of the Oil & Gas industry.

Product features according to API 594

- Retainerless design
- WAFER, LUG, HUB or DOUBLE FLANGED
- CL 150 to 2500, API 5.000 and 10.000
- Material combinations: CS, SS, duplex, super duplex, titanium, nickel alloys, Ni-Al-Br alloys
- Hardfacing with Stellite® or Ultimet®
- Metal seats suitable for HP gas testing
- Cryogenic applications
- Oxygen service
- Calculations: flow simulation & calculation (CFD), FEA...
- Engineering services to design tailor-made products for each project and in particular service conditions
- Spare parts availability guaranteed during the entire life of the valve



We offer production flexibility to satisfy customers' needs, from the production of a tailor-made valve to the delivery of large scale projects, ensuring the quality of each valve, within short lead times.



DUAL PLATE CHECK VALVES

PRODUCT RANGE

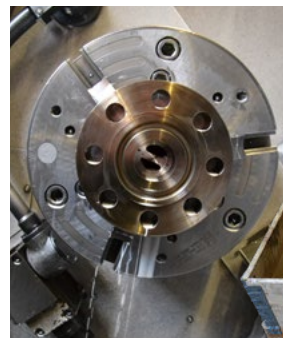
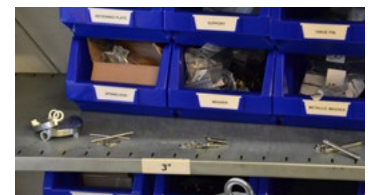
	CLASS 150	CLASS 300	CLASS 600	CLASS 900	CLASS 1500	CLASS 2500	API 6A 3,000	API 6A 5,000	API 6A 10,000
Dual Plate Check	2"- 30"			2"- 24"			1 ¹³ / ₁₆ " - 7 ¹ / ₁₆ "		

Options	Cryogenic - Oxygen Service - High Temperature - Special / Low Flow Conditions...								
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INHOUSE PRODUCTION

- Inhouse machining, assembly & testing (hydro / gas...)
- Low/high pressure gas testing according to API 598, API 6A & ISO 5208
- Inhouse quality control : MPE / DPE / Visual / Dimensional...
- Castings and forgings coming from top quality European partners
- Stock of trim components in the most common grades



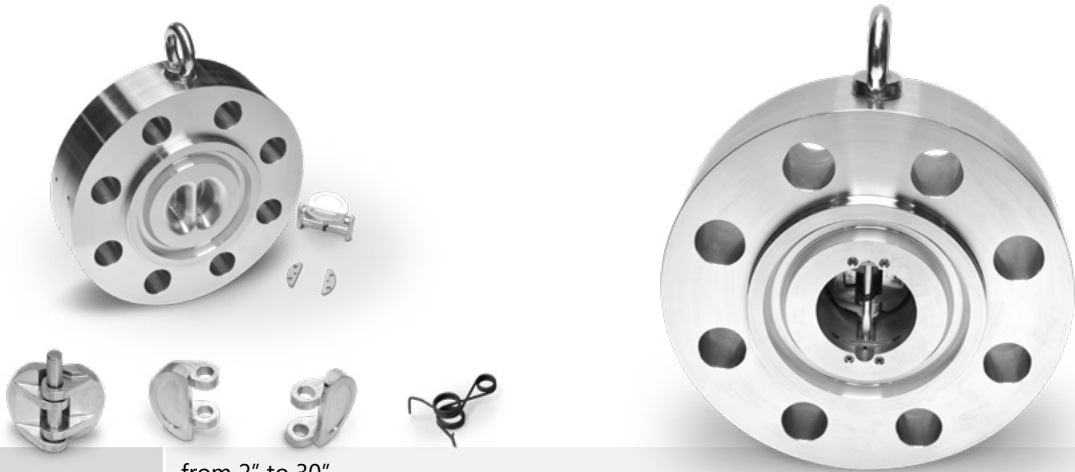
Cryogenic valves

Dual Plate check valves are fit for cryogenic applications thanks to specific design and lapping based on years of experience in LNG and FLNG projects. Low temperature pressure tests are performed in our test benches according to BS6364 or specific project requirements.

On the picture:
a 30" Dual Plate check valve
after successful testing at -196°C

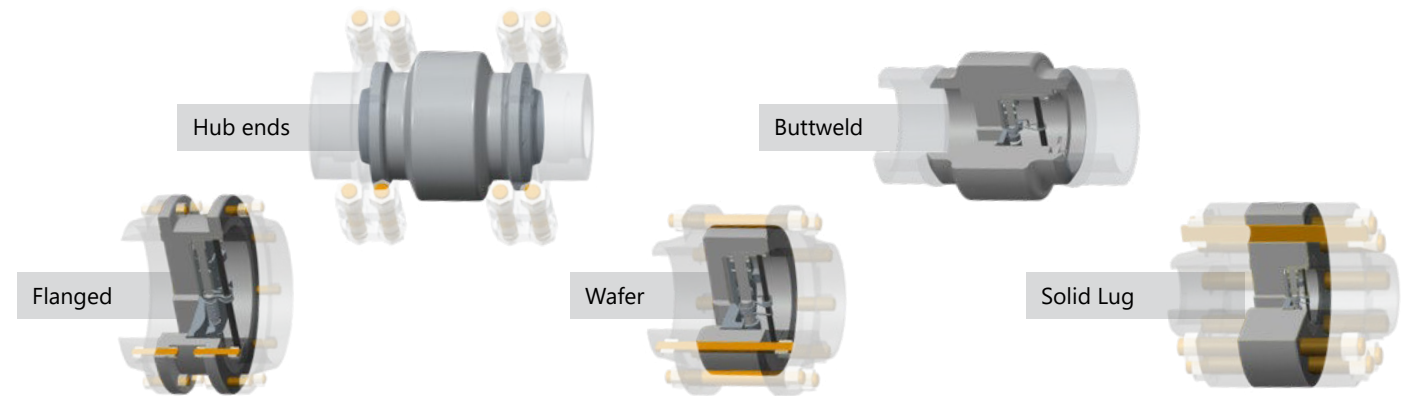


PRODUCT SHEET

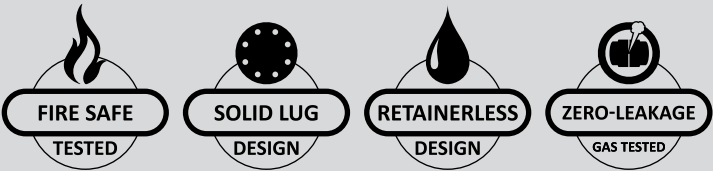
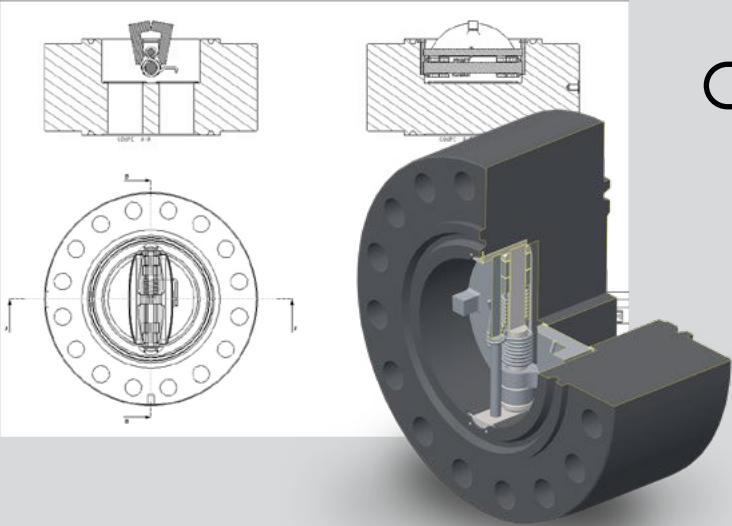


Sizes	from 2" to 30"
Pressure Ratings	ANSI: 150 to 2500 – API: 2,000 to 10,000
Material	Carbon Steel / Stainless Steel / Duplex Steel / Aluminium Bronze / High Nickel Alloys / Titanium... Forged or cast construction
Seats	Metal to metal (BARE, STELLITE®, ULTIMET®, HVOF TCC) / Soft seat (PTFE, RPTFE, HNBR, VITON® ...)
End Connections	Wafer / Solid lug / Flanged / Buttweld / Hub ends

Note: This table describes the typical range of products. Other sizes or configurations are available on demand.



DESIGN

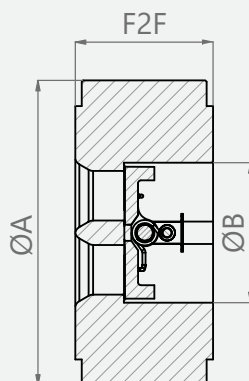
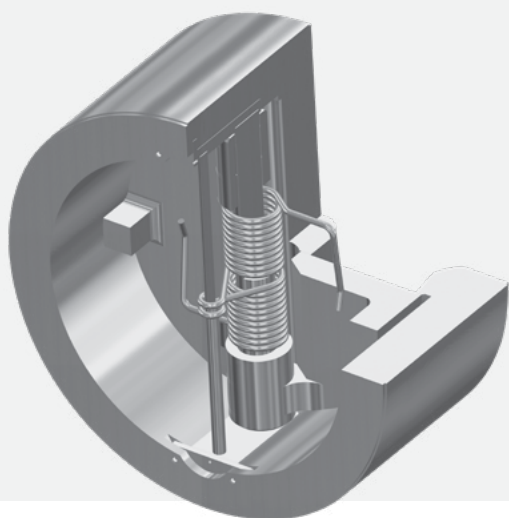


According to:

- API 594 ■ API 6D ■ API 6FD
- Customer specifications
- API & ISO Fire Safe certifications

WEIGHT & DIMENSIONS TABLE

DUAL PLATE CHECK **WAFER TYPE**



Design acc. to API 594

Flanges acc. to ASME B16.5

Seats: Metal-Metal
(soft seats available on request)

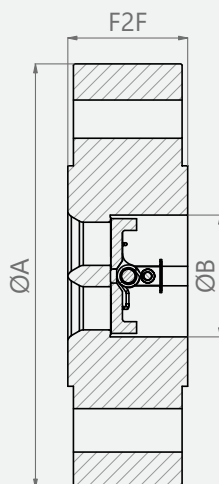
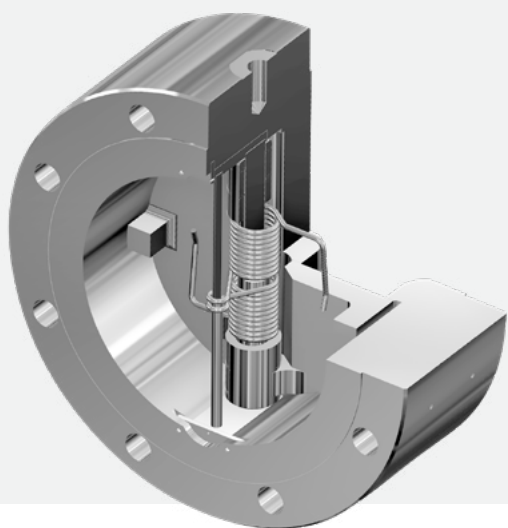
Connection: RF or RTJ
(HUB and BW available on request)

Size	50	65	80	100	150	200	250	300	350	400	450	500	600
	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
B (mm)	55	67,5	80	105	155	210	260	310	365	415	465	520	620
CLASS 150													
F2F (mm)	60	67	73	73	98	127	146	181	184	191	203	219	222
A (mm)	103	122	134	172	220	277	337	407	448	512	546	603	715
Weight (kg)	3	5	6	10	16	36	52	97	123	133	141	215	337
CLASS 300													
F2F (mm)	60	67	73	73	99	127	146	181	222	232	264	292	318
A (mm)	108	127	146	178	248	305	359	419	482	537	594	651	771
Weight (kg)	3	5	8	11	20	40	56	98	176	207	294	363	521
CLASS 600													
F2F (mm)	60	67	73	79	137	165	213	229	273	305	362	368	438
A (mm)	108	127	146	190	264	317	397	454	489	562	610	680	787
Weight (kg)	3	5	8	13	36	72	118	164	186	331	394	544	819
CLASS 900													
F2F (mm)	70	83	83	102	159	206	241	292	356	384	451	451	495
A (mm)	140	162	165	203	286	356	432	496	518	572	635	696	836
Weight (kg)	8	11	12	19	54	122	203	293	395	530	610	635	1230
CLASS 1500													
F2F (mm)	70	83	83	102	159	206	248	305	356	384	468	533	559
A (mm)	140	162	172	207	280	350	432	518	575	639	702	753	899
Weight (kg)	8	11	13	21	52	116	203	373	485	588	790	1275	2714
CLASS 2500													
F2F (mm)	70	83	86	105	159	206	254	305	-	-	-	-	-
A (mm)	143	165	194	232	315	385	474	547	-	-	-	-	-
Weight (kg)	13	15	16	30	70	132	218	394	-	-	-	-	-

Note: This table describes the typical range of products. Other sizes or configurations are available on demand.
Data based on the API 594 Standard.

WEIGHT & DIMENSIONS TABLE

DUAL PLATE CHECK **SOLID LUG**



Design acc. to API 594

Flanges acc. to ASME B16.5

Seats: Metal-Metal
(soft seats available on request)

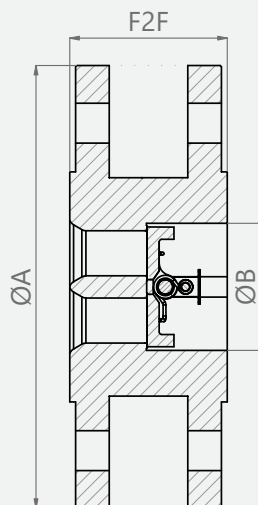
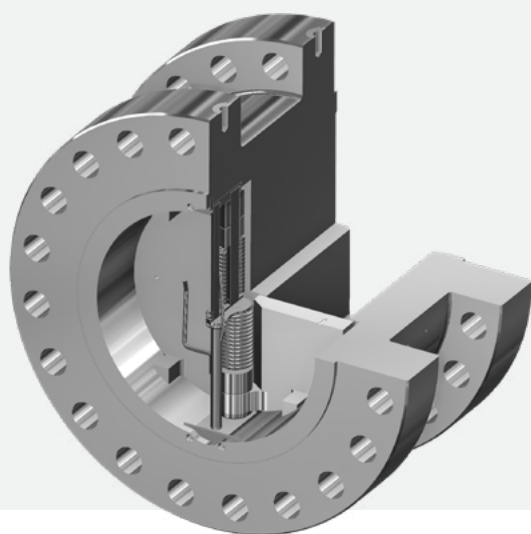
Connection: RF or RTJ
(HUB and BW available on request)

Size	50	65	80	100	150	200	250	300	350	400	450	500	600
	2"	2 ½"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
B (mm)	55	67,5	80	105	155	210	260	310	365	415	465	520	620
CLASS 150													
F2F (mm)	60	67	73	73	98	127	146	181	184	191	203	219	222
A (mm)	150	180	190	230	280	345	405	485	535	595	635	700	815
Weight (kg)	7	10	12	19	32	63	93	170	199	246	290	348	396
CLASS 300													
F2F (mm)	60	67	73	73	99	127	146	181	222	232	264	292	318
A (mm)	165	190	210	255	320	380	445	520	585	650	710	775	915
Weight (kg)	8	11	14	23	45	78	115	242	313	489	558	766	1190
CLASS 600													
F2F (mm)	60	67	73	79	137	165	213	229	273	305	362	368	438
A (mm)	165	190	210	275	355	420	510	560	605	685	745	815	940
Weight (kg)	8	11	14	30	81	134	235	304	440	660	1079	1310	1554
CLASS 900													
F2F (mm)	70	83	83	102	159	206	241	292	356	384	451	451	495
A (mm)	215	245	240	290	380	470	545	610	640	705	785	855	1040
Weight (kg)	16	23	23	45	115	218	330	510	775	850	1450	1960	2350
CLASS 1500													
F2F (mm)	70	83	83	102	159	206	248	305	356	384	468	533	559
A (mm)	215	245	265	310	395	485	585	675	750	825	915	985	1170
Weight (kg)	16	23	29	50	120	230	378	650	905	1120	1775	2200	3325
CLASS 2500													
F2F (mm)	70	83	86	105	159	206	254	305	-	-	-	-	-
A (mm)	235	265	305	355	485	550	675	760	-	-	-	-	-
Weight (kg)	19	30	38	70	184	300	490	747	-	-	-	-	-

Note: This table describes the typical range of products. Other sizes or configurations are available on demand.
Data based on the API 594 Standard.

WEIGHT & DIMENSIONS TABLE

DUAL PLATE CHECK **DOUBLE FLANGE**



Design acc. to API 594

Flanges acc. to ASME B16.5

Seats: Metal-Metal
(soft seats available on request)

Connection: RF or RTJ
(HUB and BW available on request)

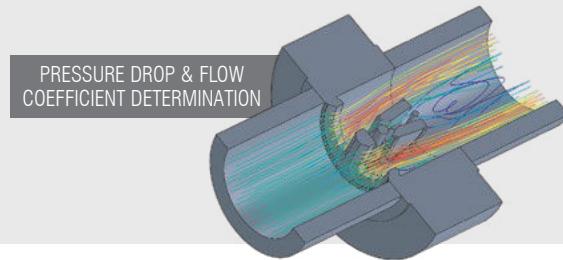
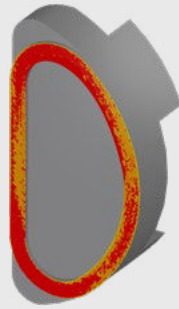
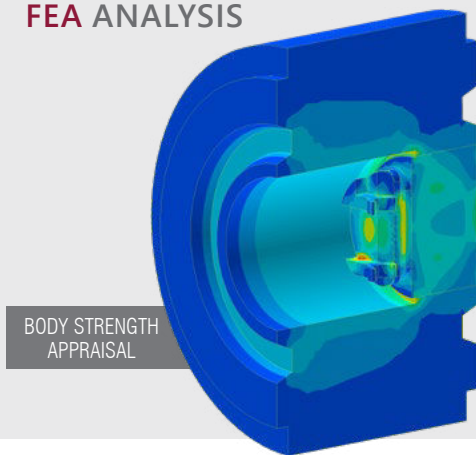
Size	50	65	80	100	150	200	250	300	350	400	450	500	600
	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
B (mm)	55	67,5	80	105	155	210	260	310	365	415	465	520	620
CLASS 150													
F2F (mm)	114	-	121	121	130	127	146	181	184	190	203	219	222
A (mm)	150	-	190	230	280	345	405	485	535	595	635	700	815
Weight (kg)	11	-	15	19	23	49	82	125	144	176	210	270	409
CLASS 300													
F2F (mm)	114	-	121	121	130	152	178	181	222	232	264	292	318
A (mm)	165	-	210	255	320	380	445	520	585	650	710	775	915
Weight (kg)	10	-	12	20	25	65	100	153	207	301	392	489	756
CLASS 600													
F2F (mm)	121	-	143	165	194	219	244	229	273	305	362	368	438
A (mm)	165	-	210	275	355	420	510	560	605	685	745	815	940
Weight (kg)	16	-	25	45	85	136	200	240	378	452	561	763	1142
CLASS 900													
F2F (mm)	165	-	165	197	219	254	267	292	356	384	451	451	495
A (mm)	215	-	240	290	380	470	545	610	640	705	785	855	1040
Weight (kg)	25	-	30	50	95	155	204	345	470	610	845	1770	1780
CLASS 1500													
F2F (mm)	165	-	207	225	292	340	387	435	476	537	565	629	733
A (mm)	215	-	265	310	395	485	585	675	750	825	915	985	1170
Weight (kg)	-	-	-	-	-	-	-	-	-	-	-	-	-
CLASS 2500													
F2F (mm)	225	-	280	330	454	489	622	686	-	-	-	-	-
A (mm)	235	-	305	355	485	550	675	760	-	-	-	-	-
Weight (kg)	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: This table describes the typical range of products. Other sizes or configurations are available on demand.
Data based on the API 594 Standard.

PRODUCT SHEET

FEA ANALYSIS

CFD CALCULATION



Gathering a dynamic team for research, design and process, we use advanced 3D modelling, finite element analysis and process simulation software to test the safety, the reliability and the energy-saving potential of our products.

Flow Coefficient (C_v) for standard Dual Plate check valves

Ratings / Taille	150#	300#	600#	900#	1500#	2500#
2	55	55	55	55	55	55
3	154	154	154	137,5	137,5	137,5
4	360	360	348	330	330	324
6	864	864	840	768	768	768
8	1752	1632	1608	1464	1464	1464
10	2688	2568	2508	2580	2628	2676
12	4070	4070	3410	3300	3267	3267
14	5830	5720	5610	5500	5500	*
16	6688	6545	6490	6210	6210	*
18	8976	7896	7320	6950	6890	*
20	12300	11784	11280	10350	9830	*
24	15000	14520	13560	12850	12130	*

* : available on demand

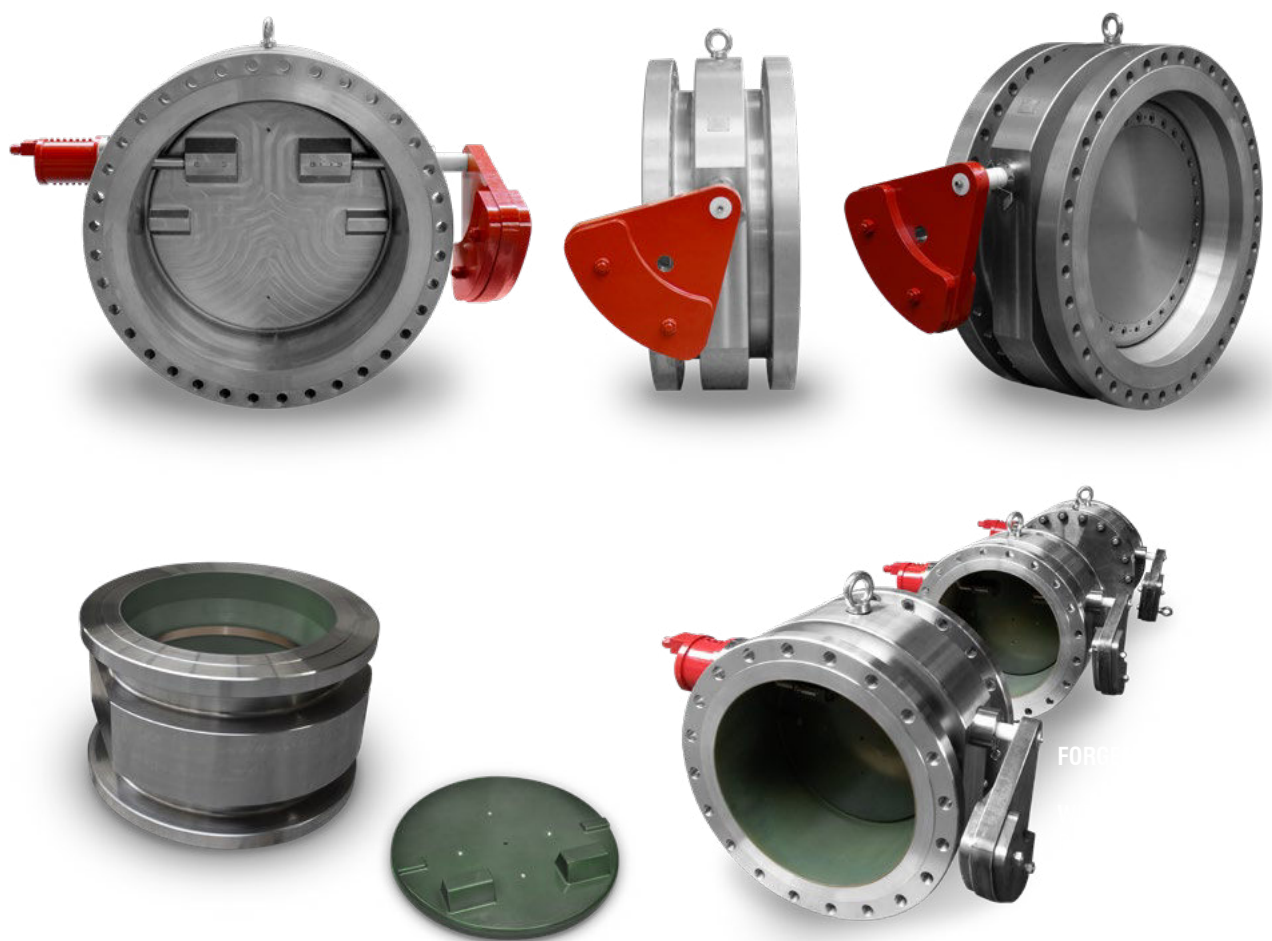
Note: The coefficients above apply to our standard design. Specific values can be reached upon request and after a design adaptation to the particular flow conditions of your project.

SOME REFERENCES

PROJECT	DESTINATION	DESCRIPTION
Martin Linge	Norway	2"-10" 150#-600# 316, Duplex (150+ pcs)
Yamal LNG	Russia	3"-30" 150#-900# LF2, 316 (140+ pcs)
Golfinho	Brazil	12" 2500# F55 with small std LF2, 316
Pre-Khuff	U.A.E.	2"-6" 2500# Inconel 625 Hub ends
Yamal	Russia	16" 150# CF8M
Statfjord B Platform	North Sea	6" 150# F55
Ofon 2	Nigeria	2"-6" 150# LF2
Libondo	Congo	2"-8" 150#/2500# Alu Bronze, LF2, F316 several orders
Amursk POX HUB Plant	Russia	2"-6" 150#-300# F53, Inconel 625 for Oxygen service
Erha North Phase 2	Nigeria	2"-12" 1500#/2500# LF2
Buzzard field development project	North Sea	3" 1500# F44
GirRI Project	Angola	3" 2500# F316
Kharyaga Phase 3 Project	Russia	2"-6" 150#/2500# LF2
Telok A/B	Malaysia	2" 900#/2500# F51

SPECIFICATIONS

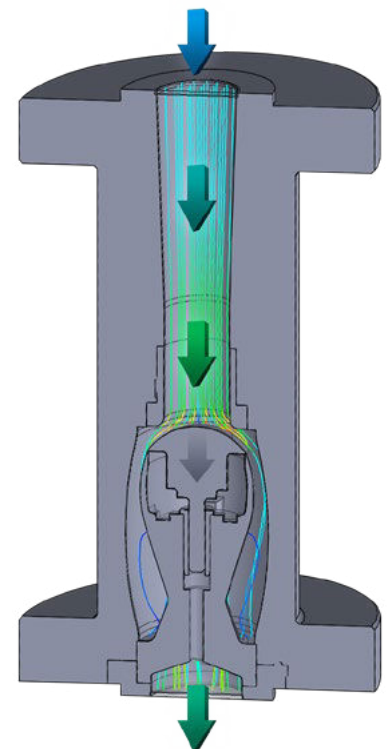
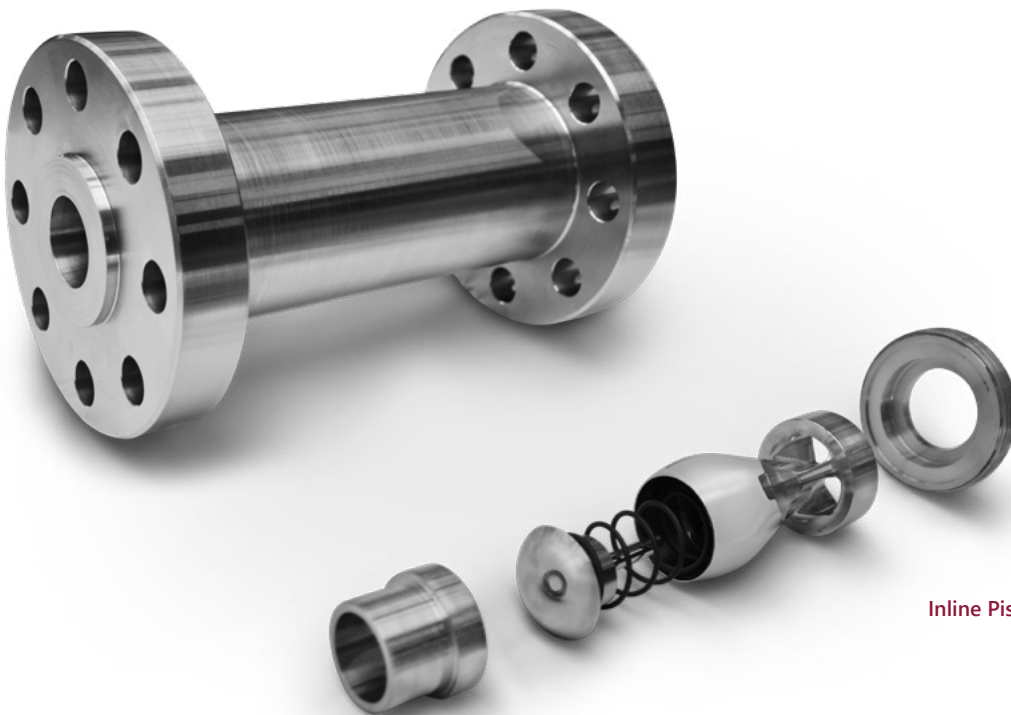
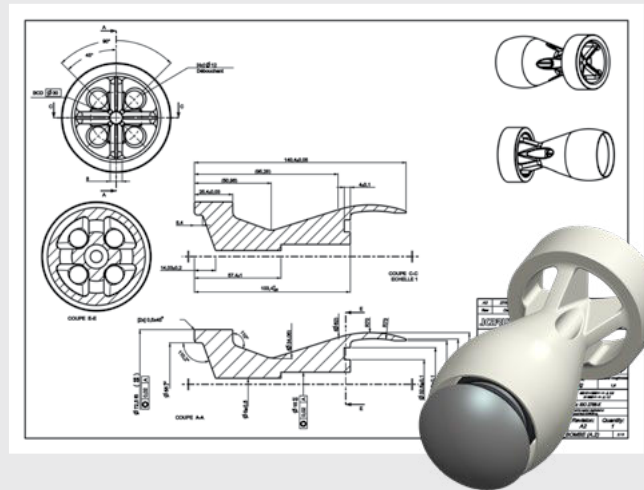
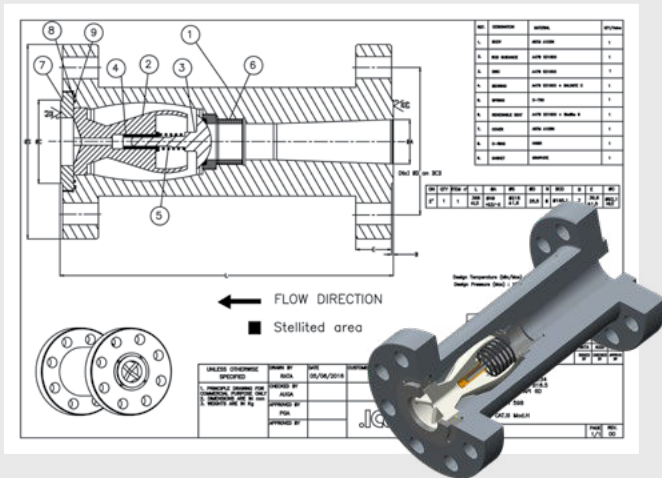
- Non slam type
- With counterweights
- With rotational damping system
- Custom face to face
- Machined from forged material



PROJECT DETAILS

- Project: Kårstø Gas processing facilities
- Scope:
 - 1 check valve 42" 150Lbs RF in Titanium B381 F2
 - 3 check valves 24" 150Lbs RF in Super Duplex A182 F55

DESIGN



Inline Piston Check 2" 1500#

.ICARUS



	CLASS 150	CLASS 300	CLASS 600	CLASS 900	CLASS 1500	CLASS 2500	API 6A 3,000	API 6A 5,000	API 6A 10,000
ON/OFF BALL VALVES									
Floating Ball & DBB	1/2"- 10"	1/2"- 8"	1/2"- 6"		1/2"- 2"	1/2"- 1"	-		
Trunnion Ball & DBB	1/2"- 24"				1/2"- 16"	1/2"- 12"	1 13/16" - 7 1/16"		
THROUGH CONDUIT GATE									
Slab Gate	2"- 24"				1"- 24"	1"- 24"	1 13/16" - 7 1/16"		
Double Expanding Gate									
CHECK									
Dual Plate Check	2"- 30"			2"- 24"			1 13/16" - 7 1/16"		
Other Check	Upon request								
CASTING									
Gate	2" - 24"	2" - 18"	2" - 14"	2" - 10"		2" - 8"	-		
Globe		2" - 14"	2" - 10"						
Check (Swing)									
FORGING									
Gate	1/2" - 2"						1 13/16" - 4 1/16"		
Globe									
Check (Swing, Piston and Ball)									

Industrial valves are our major products, in which we propose Floating & Trunnion Mounted Ball valves, Double Block & Bleed Ball valves, Gate, Globe & Check valves (casting and forging), Dual Plate check valves and Through Conduit Gate valves. Our valves are designed and manufactured to provide reliability for the longest service life possible.

Thanks to an advanced production system, strict quality control and inspection procedures, we guarantee excellent performance for every product manufactured by our group.

Valves are available in a complete range of body/bonnet materials and trim.

Detailed technical information will be provided upon request.



Parc industriel des Hauts-Sarts, Zone 3
Rue des Alouettes, 100 - B 4041 Herstal

Tel : +32 (0)4 240 01 01
www.icarus-be.com

SACCAP COYARD & ICARUS Group can efficiently respond to all of your design requests and meet your quality requirements. Our different departments are experienced to provide technical advice, professional project management, equipment maintenance and after-sale services.

We look forward to cooperating with you in a near future!

We regret to say that we shall in no way be held liable for any error or consequences resulting from a possible error related to the information contained in this brochure. When sent to press all the information was checked and, to the best of our knowledge, is correct.

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