

General Presentation

Company & Products

icarus.



A COMPREHENSIVE RANGE OF PRODUCTS AT YOUR SERVICE

GENERAL

VALVES

PIPING & FITTINGS

SERVICES

COMPANY
PROFILE



TEST RANGE
QUALITY ASSURANCE
PACKAGE
PROJECT MANAGEMENT

...

EUROPEAN MANUFACTURER

European origin

Global presence

PLANTS

.ICARUSPIPE & FITTING SUPPLIER
(FULL PACKAGE)VALVES, SUBSEA & SPECIAL PIECES
MANUFACTURERParc Industriel des Hauts Sarts, Zone 3
Rue des Alouettes, 100 - 4041 Herstal
Belgique

OWNED BRANDS

.ICARUS

TOTAL SURFACE

34,500 m²

COVERED SURFACE

8,300 m²**Painting / Assembly / Tests / Repair :**
Service Centers available in Asia for local support.

ACTIVITIES

- Production of valves, flanges and forged parts
- Supply of **complete packages of piping and fittings**



Valves



Piping and fittings



Compact and subsea
flanges



Forged parts
for subsea applications

MAIN MARKETS



Oil & Gas



Chemical & Petrochemical
industry



Energy & Renewable



Mining

CLIENTS

End-users



oil & gas companies,
(petro-)chemical industry, ...

Engineering Companies



E.P.C

Equipment manufacturers



industrial piping,
boilerwork, industrial furnaces, ...

VALVES



Ø : ¼" to 30"

Dual plate check valves	Wafer, double flanged, hub & BW ends
Other check valves	Tilting, disc, swing, piston
Double block & bleed & Ball valves	Ball x Ball (floating or T-M), Gate x Gate, Globe x Globe Various according to requirements Floating Trunion-mounted
Gate & globe valves	Gate valves, globe valves, through conduit gate
Cupro nickel valves	Gate, globe, check & ball

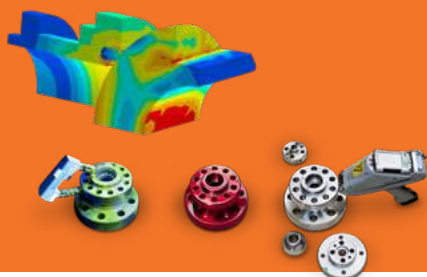
PIPING & FITTINGS



Ø : ¼" to 102"

Pipes	Seamless or welded, finned, studded, all dimensions
Flanges	Compact, WN/SW/slip on & blind standards, long welding neck, orifice, anchor, swivel
Forged fittings	Elbows, tees, caps, plugs, nipples, couplings, unions, crosses, o-lets
BW fittings	Elbows, tees, lateral & barred tees, reducers, caps
Bolting	Bolts, nuts, washers, screws, studs
Gaskets	API ring joints, anti-vibration, elastomer seals, engineering plastics, expansion joints, o-rings, hydraulic seals, spiral wound gasket
Clamps & hubs	Clamps connectors, hubs

SERVICES



ENGINEERING	
Calculation	Structural resistance, tightness, CFD
Design	3D modelling & 2D design drawings
QUALITY	
Non-destructive tests	High pressure gas, magnetic, dye penetrant, PMI, ferrite, hardness, ultrasonic, pig test, fugitive emissions, cryogenic
Destructive tests	Sub-contracted according to requirements

INTEGRATED QUALITY MANAGEMENT

Handling company organization & management, product quality, health & security.



ISO 9001
QUALITY MANAGEMENT SYSTEMS



ISO 14001
ENVIRONMENTAL MANAGEMENT SYSTEMS



ISO 45001
HEALTH & SAFETY MANAGEMENT SYSTEMS

OTHER CERTIFICATIONS



PED 2014 / 68 / EU
PRESSURE EQUIPMENT DIRECTIVE



PE(S)R 2016 N°1105 (UKCA)
PRESSURE EQUIPMENT (SAFETY) DIRECTIVE



EUROPEAN CONFORMITY
EC DIRECTIVES FOR RELATED PRODUCTS

KEY TECHNICAL SKILLS

- Safety Officers
- Environmental Experts
- Quality Engineers

- Frosio III certified agent
- Cofrend II certified agents
- ACQPA level II and anticorrosive painting certified agent

	CLASS 150	CLASS 300	CLASS 600	CLASS 900	CLASS 1500	CLASS 2500	API 6A 3,000	API 6A 5,000	API 6A 10,000	API 6A 15,000
CHECK VALVES										
Dual plate Check	2"- 30"			2"- 24"			1 13/16" - 11"			
Disc Check	1" - 30"				-					
Other Check	Tailor made check valves upon request									
ON/OFF BALL VALVES										
Floating Ball & DBB	1/2"- 6"		1/2"- 4"		1/2"- 2"		-			
Trunnion Ball & DBB	4"- 24"				1/2"- 16"		1/2" - 12"		1 13/16" - 7 1/16"	
GGC VALVES										
Gate	1/2" - 30"						1 13/16" - 4 1/16"			
Globe										
Check (Swing, Piston and Ball)										



Applications	Oil & Gas - Nuclear - Cryogenic - Oxygen Service - ...
Specific Features	3-Way Ball - Welded Design - Wafer Swing Check - Bellow sealed - ... Actuated as per request
Material	EUROPEAN ORIGIN ASTM – PED – NORSOK M630 – CUSTOMER SPECIFICATION Main: Carbon Steel (with cladding) / Stainless Steel / Duplex / Nickel Alloys Others: Cupro Aluminium / Titanium / ...

OUR STRENGTHS

→ **Deadline flexibility & responsiveness**

→ **Valves for use under extreme conditions:**

- Low and high temperatures
- Corrosive and abrasive products
- High pressures

→ **Custom solutions**

- Standards-compliant valve production
- Non-standard valve production
- Machined from bars, castings or forgings
- Specific and particular grades
- Engineering department allows management of specific requirements (size constraint, pressure, corrosion, temperature, etc.)

**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 and BS 6755. These certifications ensure our Dual Plate check valves strictly meet the performance requirements once they are facing fire conditions.

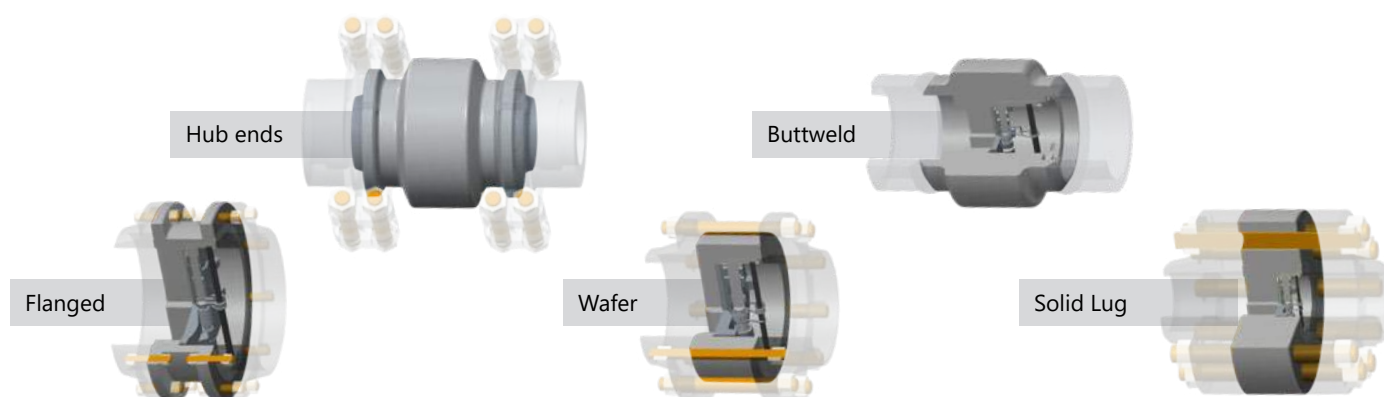
**CRYOGENIC DESIGNED & TESTED PRODUCTS**

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.

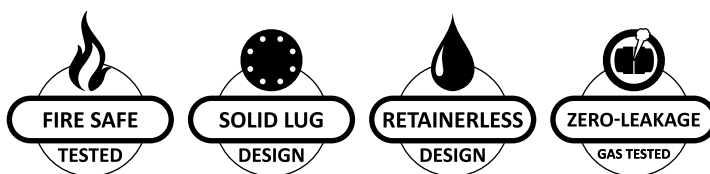
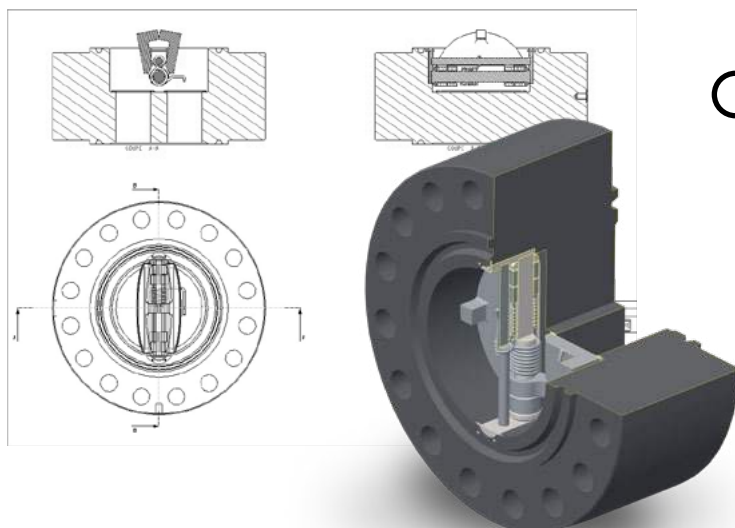


Sizes	from 2" to 30"
Pressure Ratings	ANSI: 150 to 2500 – API: 2,000 to 10,000
Material	Carbon Steel / Stainless Steel / Duplex Steel / Aluminium Bronze / High Nickel Alloys / Titanium... Forged or cast construction
Seats	Metal to metal (BARE, STELLITE®, ULTIMET®, HVOF TCC) / Soft seat (PTFE, RPTFE,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



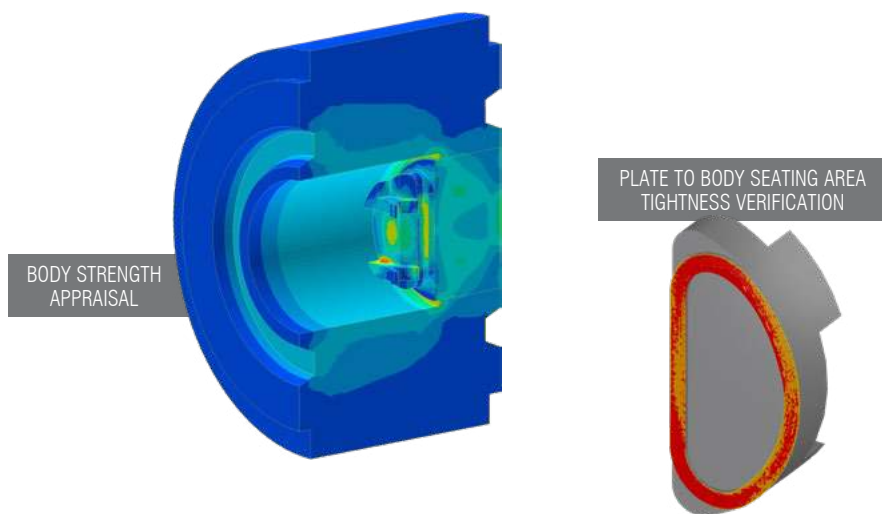
According to:

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

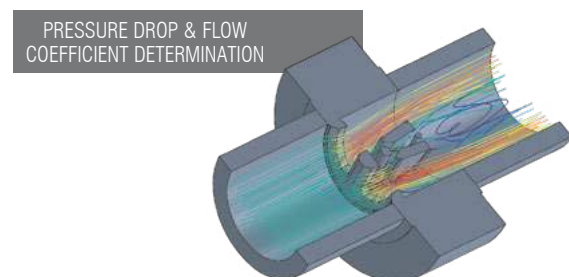
For more information

Please refer to the dedicated brochure :
ICARUS - Dual plate check.

FEA ANALYSIS

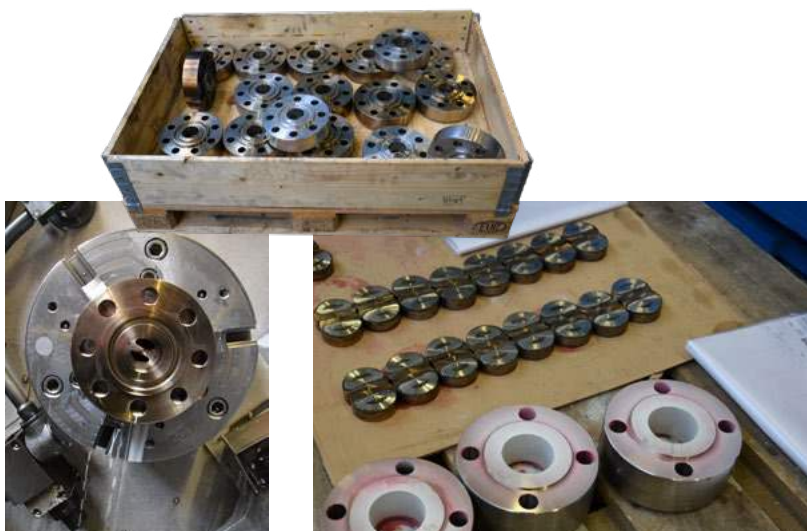


CFD ANALYSIS



INHOUSE PRODUCTION

- Castings and forgings coming from top quality european suppliers
- Inhouse machinery, assembly & testing (hydro / gas ...)
- Low/high pressure gas tested according to API598 & ISO5208
- Inhouse quality controls : MPE / DPE / Visual / Dimensional ...



DESIGN



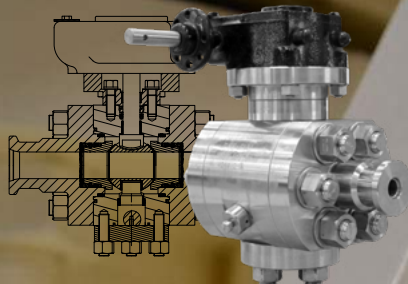
**2" API 10,000 F55
DOUBLE BLOCK &
BLEED VALVE**

Type	Trunnion Mounted or Floating
Sizes	from 1/2" to 24"
Pressure Ratings	ANSI : 150 to 2500 – API : 3,000 to 10,000
Material	Carbon Steel / Carbon Steel + weld overlay (stainless steel, Nickel alloy) / Stainless Steel / Duplex Steel / Aluminum Bronze / High Nickel Alloys / Titanium ... Forged construction
Seats	Metal to metal (HVOF TCC, HVOF CrCC) / Soft seat (PTFE, RPTFE, PEEK, DEVLON® ...) Single piston effect/ Double piston effect
End Connections	All connections available (including custom made arrangement)to: Flanged / Hub ends / Buttweld / Cartridge ...



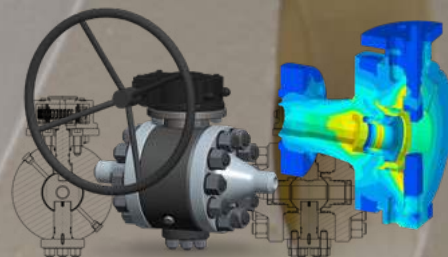
**2" 1/16 TO 3" 1/8 API 5,000 INCONEL 625 OR CS/SS
TRUNNION MOUNTED BALL VALVE**

DESTINATION: QATAR (OFFSHORE)



**3/4" TRUNNION MOUNTED
BALL VALVE**

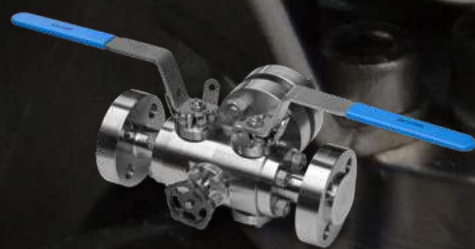
DESTINATION: NORWAY



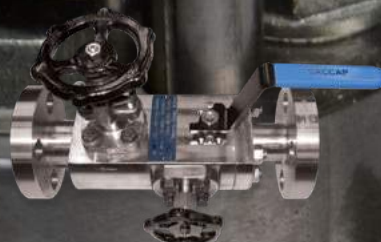
**1" 13/16 TO 2" 1/16 API 10,000 GR60K
TRUNNION MOUNTED BALL VALVE**

DESTINATION: INDONESIA

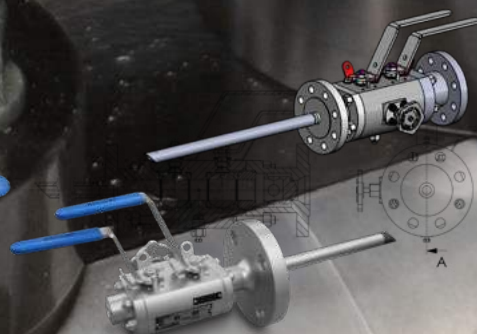
DBBS FOR INSTRUMENTATION, INJECTION,...



**1/2" 2500# F51
DOUBLE BLOCK & BLEED VALVE**
DESTINATION: NORWAY



**DOUBLE BLOCK & BLEED
GLOBE / NEEDLE / BALL VALVE**



**DOUBLE BLOCK & BLEED
WITH INJECTION QUILL**

SPECIAL DESIGN BALL VALVES & DBBs



**2" 4500# CARBON STEEL
DOUBLE 3 WAYS VALVE**
DESTINATION: NORWAY



**2" 300# F321 (-46°C TO 160°C)
BALL VALVE WITH STEM EXTENSION
(FOR INSULATION)**
DESTINATION: NORWAY



**8" 2500# 316
CRYOGENIC BALL VALVE**
DESTINATION: ALGERIA

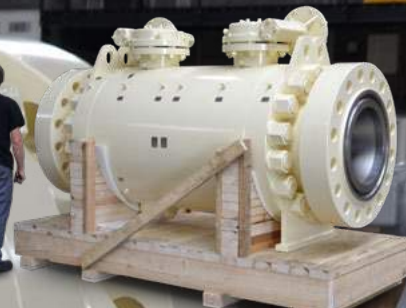
LARGE SIZE BALL VALVES & DBBs



**12" 1500# CARBON STEEL
TRUNNION MOUNTED BALL VALVE**
APPLICATION: OFFSHORE



**20" 1500# CARBON STEEL
TRUNNION MOUNTED BALL VALVE**
DESTINATION: QATAR (OFFSHORE)



**12" / 16" / 24" 1500# CARBON STEEL - 24" 1500
DOUBLE BLOCK & BLEED VALVE**
DESTINATION: UAE (OFFSHORE)

**FET TESTED
ISO 15848-1 CLASS B C01**

PRODUCTS

Pipes	BW Fittings	Forged Fittings	Clamps & Hubs
Seamless & Welded Finned / Studded All dimensions	▪ Elbows ▪ Tees ▪ Lateral & Barred Tees ▪ Reducers ▪ Caps	▪ Elbows ▪ Tees ▪ Caps ▪ Plugs ▪ Nipples ▪ Couplings ▪ Union ▪ Crosses ▪ O-lets SW / NPT / ...	▪ Clamps connectors ▪ Hubs
Flanges	Bolting	Gaskets	
▪ Compact flanges ▪ Standard flanges ▪ Long welding neck ▪ Orifice ▪ Anchor ▪ Swivel ▪ Fully designed & calculated flanges	▪ Bolts ▪ Nuts ▪ Washers ▪ Screws ▪ Studs	▪ API ring joints ▪ Anti vibration ▪ Elastomer seals ▪ Engineering plastics ▪ Expansion joints ▪ O-rings ▪ Hydraulic seals ▪ Spiral wound gaskets	

MATERIAL GRADES

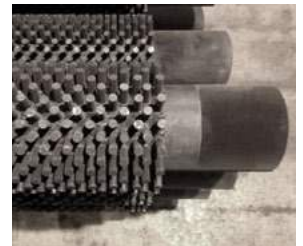
Stainless steel Corrosion resistance	Alloy & Stainless steel	Austenitic-ferritic steel	Carbon steel
▪ 316 Mo+ ▪ 317L ▪ Alloy 28 ▪ Alloy 20 ▪ 904L ▪ 19.25 HMo ▪ 254 SMO® ▪ 310L	▪ P11 ▪ P22 ▪ P5 ▪ P9, P91 ▪ 316L ▪ 304L ▪ 304H ▪ 321H ▪ 347H ▪ 310S	Duplex : UNS S31803 / S32205 Super Duplex : UNS S32750 / S32760 Nickel & Nickel alloy Alloy 600, 601, 625, 825, 400, 200/201, C276, C22, 800, 800H, 800HT	▪ A106 Gr B ▪ A105 ▪ A234WPB ▪ P265 GH Low temperature : ▪ LF2, A333 Gr 6 ▪ LF3, A333 Gr 3 High yield strength : API 5L X52-60-65-80

ICARUS MATERIAL COMPARISON

ITEM	GRADE	STRENGTH	TEMPERATURE	WELDING	OTHER
1	316 Mo+	505	300	W	
2	317L	505	300	W	
3	Alloy 28	505	300	W	
4	Alloy 20	505	300	W	
5	904L	505	300	W	
6	19.25 HMo	505	300	W	
7	254 SMO®	505	300	W	
8	310L	505	300	W	

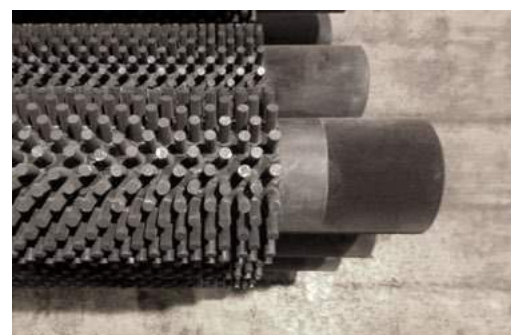
... this is a non-exhaustive list, Do not hesitate to contact us for other needs.

PDF version available for download at www.icarus-be.com



EXTRUDED MANIFOLDS
MATERIAL: ALLOY 800HT

EXTRUDED MANIFOLDS
MATERIAL: ALLOY 800HT





DSS, SDSS, HYCS

2200T.
Average per FPSO



BY SEA, BY PLANE OR EVEN BY TRAIN FROM EUROPE TO CHINA
Custom solutions for all needs

FAST DELIVERY = FAST ASSEMBLY

- Agreements with mills to optimise delivery time
- Ability & capacity to manage simultaneously multiple FPSO projects

TOTAL
EGINA

ENI
CORAL FLNG

PETROBRAS
MERO/BUZIOS

BP
SKARV/QUAD

ENI
GOLIATH

ONGC
KAKINADA

• • •

SINCE 2020



LOCATION ON THE VESSEL	Topside / Hull
INSPECTION	B.V. - Marine & Offshore 3.1 / 3.2
MAJOR MATERIAL GRADE	Duplex / Super Duplex
ITEM TYPE	PIPING

DATE OF AWARD BY ICARUS	2020
TOTAL TONNAGE	2200 Tons
ORIGINS	EU
AVERAGE DELIVERY TIME	16 → 22 weeks for standard 6 → 8 weeks from stock plates

DATE OF AWARD BY ICARUS	2021
TOTAL TONNAGE	2500 Tons
ORIGINS	EU
AVERAGE DELIVERY TIME	16 → 22 weeks for standard 6 → 8 weeks from stock plates

DATE OF AWARD BY ICARUS	2022
TOTAL TONNAGE	2500 Tons
ORIGINS	EU
AVERAGE DELIVERY TIME	16 → 24 weeks (36 weeks elsewhere) 12 → 14 weeks from stock plates

DATE OF AWARD BY ICARUS	2021
TOTAL TONNAGE	SDSS: 70 T / Cu-Ni : 200 T
ORIGINS	EU / Korea
AVERAGE DELIVERY TIME	16 → 22 weeks standard delivery

DATE OF AWARD BY ICARUS	2022
TOTAL TONNAGE	222 Tons (until now)
ORIGINS	EU
AVERAGE DELIVERY TIME	16 → 24 weeks (36 weeks elsewhere) 12 → 14 weeks from stock plates

DATE OF AWARD BY ICARUS	2024
TOTAL TONNAGE	DSS/SDSS: 1000 T / HYCS : 1200 T
ORIGINS	EU (HYCS/DSS/SDSS) / CN (DSS thin wall)
AVERAGE DELIVERY TIME	16 → 25 weeks (36 weeks elsewhere) 12 → 14 weeks from stock plates

ITEM	TYPE	GRADE	DIAMETER	THICKNESS
DUPLEX PIPES	Seamless	ASTM A790 UNS S31803/32205	½" → 6" 8" → 10"	Sch. 10S → 28,68mm (6" x 28,68mm) VERY HEAVY WALL
	Welded	ASTM A928 Cl.1/3 UNS S31803/32205	8" → 36"	Sch. 10S → 69,85mm (16" x 69,85mm)
SUPERDUPLEX PIPES	Seamless	ASTM A790 UNS S32750/32760	½" → 6"	Sch. 10S → 25,40mm (6" x 25,40mm)
	Welded	ASTM A928 Cl.1/3 UNS S32750/32760	8" → 42"	Sch. 10S → 66,68mm (16" x 66,68mm)
HIGH YIELD PIPES	Seamless	API 5L X52, X60, X65	½" → 16"	Sch. 80 → 82,55mm (16" x 82,55mm)
ALLOY 625 PIPES	Seamless Welded	ASTM B444 / B474 UNS N06625	2" → 16"	Sch. 40 → 50,50mm (16" x 50,50mm)
OVERLAY PIPES	Seamless	API 5L X60 / X65 Alloy 625 overlay	8" → 16"	Sch. 100 → 82,80mm (16" x 82,80mm)

OUR TECHNICAL SUPPORT AT YOUR SERVICE

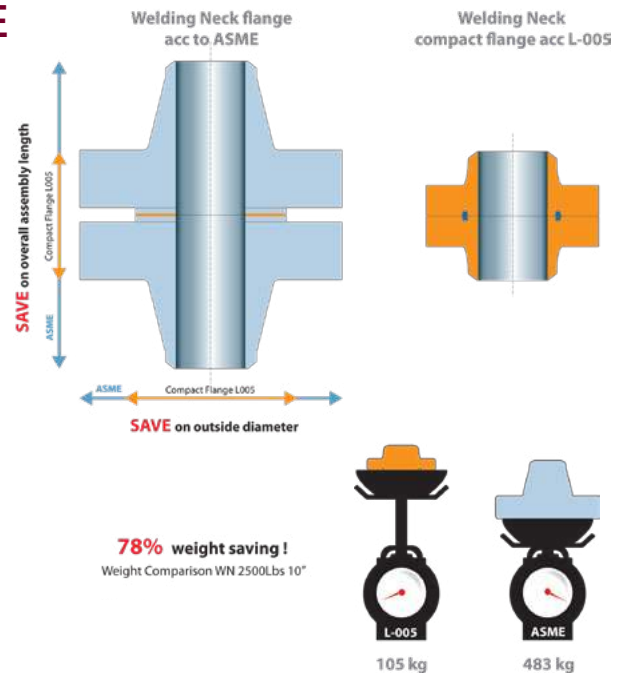
We are at your disposal for:

- Studies undertaken according to your requirements
- Flanges and forged pieces
- Special parts

COMPACT FLANGE VS. ASME FLANGE

Main benefits of L-005 compact flange

- Much **lighter** (save up to 80% on weight)
- **Smaller dimensions** (in both overall length and diameter)
- **More reliable** sealing : seal ring instead of gaskets
- Multiple sealing areas
- No corrosion/erosion on flange faces (gapless)
- No need to re-tighten bolts on a regular time scale



THE RAISED FACE (RF) ON AN ASME FLANGE IS A WEAK POINT

- 1) Bending forces on the piping system will relax bolting on ASME flanges after a while so that re-tightening of the bolts is required. Which is not the case for compact flanges.
- 2) Gap between 2 ASME flanges (due to RF) can cause crevice corrosion or erosion.



INHOUSE MACHINING OF
CF SWIVEL RING
BLOCK 17 PHASE 2 TOTAL ANGOLA

HYDROTEST
ON CF ASSEMBLY
BLOCK 17 PHASE 2 TOTAL ANGOLA

SWIVEL HUB & RING WITH
SPECIAL COATING
AND FLANGE FACE PROTECTION

WELDING NECK CF WITH
PROPER PROTECTION
ON FLANGE FACES

INDUCTION BENDS FOR TOPSIDE APPLICATION & RISER SYSTEMS

Icarus works alongside with world leading manufacturer of pipe bends to provide a wide range of bending solutions :

■ High Flexibility

- All types of material : starting from seamless or welded pipes in CS, Alloy Steel, SS, DSS, SDSS, Nickel Alloy and **cladded pipes with weld overlay method**.
- Wide range of bend radius, angle and bend plane
- **Close tolerances** (optimum ID tolerances...)

■ Several applications : sour service, low temperature, topsides, ...

■ Optimum Heat Treatment Process to meet the strict mechanical requirements

- Stress relieving
- Normalizing
- Quenching & Tempering
- Solution Annealing

■ Full compliance to International Standards and Specifications :

- DNV (DNV-OS-F101, ...)
- TOTAL specifications (PVVs, PLR 231, ...)
- Chevron's specifications (PPL-SU-U737-D, ...)

...



22" 3D Bends

Material : API 5L GrB X65

8" 3D Bends

Material : Duplex UNS S31803

Contractor : HHI

Client : BP

Project : Clair Ridge

6" 3D Bends

Material : Duplex UNS S31803

Contractor : Subsea7

Client : Total

Project : Pazflor

Standards : DNV-OS-F101





42" 5D Bends

Dimension : ID 1068,4 mm x 54,5 mm
Material : API 5L X65 PSL2 (SAWL)
Contractor : DSME
Client : Chevron Australia
Project : Wheatstone Upstream Project

6" & 10" 5D Induction Riser Bends

Material : API 5L X60 QS PSL2
Contractor : DSME
Client : Chevron
Project : Mafumeira Sul Project



6" 5D Bends Pressure test

Material : API 5L X65 PSL2 (DNV 450)
Contractor : Technip France
Client : Tullow
Project : TEN Project
Standards : DNV-OS-F101

6", 8" & 10" 5D Bends

Material : API 5L X65 PSL2 (DNV 450)
Contractor : Technip France
Client : Tullow
Project : TEN Project
Standards : DNV-OS-F101



SUPPLY OF COMPLETE PACKAGE

We are able to provide you a complete package of products for your project

- Standard or special valves
- Piping & fittings
- Special parts from Engineering (flanges, forgings, etc.)

SERVICES PROVIDED

The entire range of supplied products is supported by an offer of complete services

- Quality assurance / Quality control
- Contract review
- Proven project management
- Following standards and specifications required by each project
- ITP management
- Third-party inspection
- Expediting
- Certificate management
- ...

QUALITY ASSURANCE



DIMENSIONAL ANALYSIS

Specific measurement tools

- FARO 3D measuring arm
- Wenzel 3D measuring table
- Someco Dynascan profile projector
- Coating thickness measurement tool
- Ultrasonic thickness measurement



TEST RANGE

Non-destructive tests

- Magnetic particle examination
- Dye Penetrant test
- PMI
- Feritscope®
- Hardness
- Ultrasonic test
- X-ray
- Pig gauge trial



Additional tests on demand

SIMULATION OF EXTREME CONDITIONS

Specific service or environment

- High pressure (air / gas / water)
- Fugitive emission test (helium)
- Cryogenic test
- Fire test



PRESSURE TESTS

Test capacities:

- Hydraulic up to 1200 bars
- Pneumatic up to 6 bars
- High pressure gas up to 1000 bars
- Cryogenic down to -196°C
- Leak detection test (with helium)

Test equipment:

- Presses
- Safety bunkers for pressure tests
- Cryogenic tanks

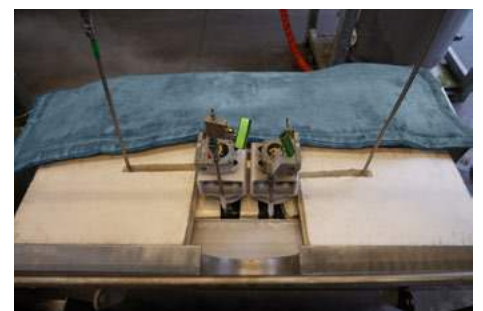
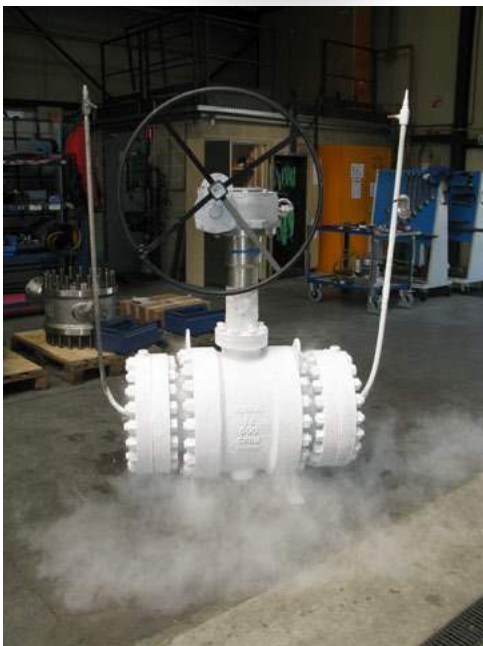
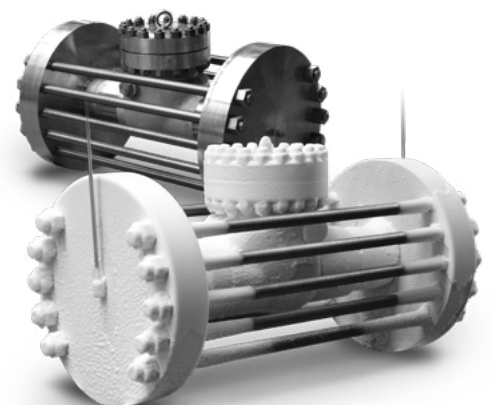


CRYOGENIC SETUP

DEDICATED EQUIPMENT & TECHNICAL CAPACITIES

In-house validation of cryogenic capabilities by testing @-196°C according to BS 6364, ISO 28921-1, EN 12567 or customer specification.

Tightness testing with Helium.



Custom products & solutions

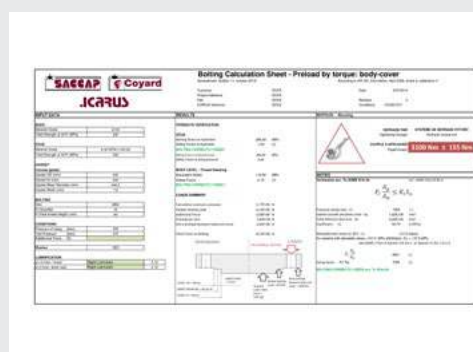
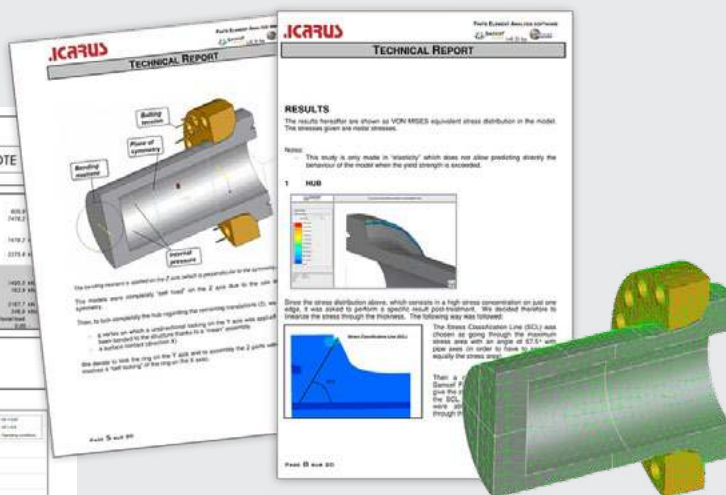
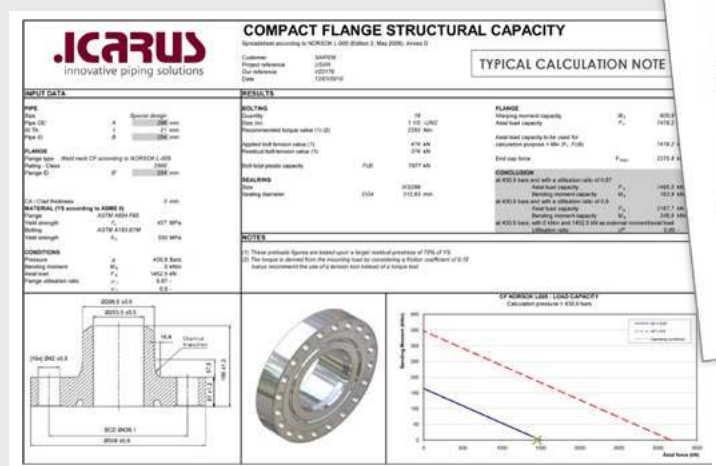
- Experienced engineering team
- Most advanced modelling & simulation software

- FEA :
 - Samcef Field
 - Siemens NX
 - Ansys
- CAD :
 - Solidworks
 - Autodesk Autocad
- CAM :
 - Mastercam
- CFD:
 - Solidworks Flow Simulation

SAMTECH

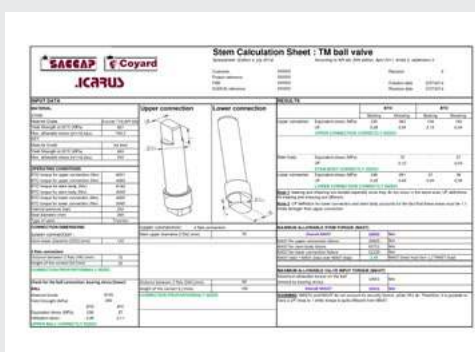
PLM Software
SIEMENS
NX**SOLIDWORKS****Autodesk****ANSYS****Mastercam**

Calculation notes



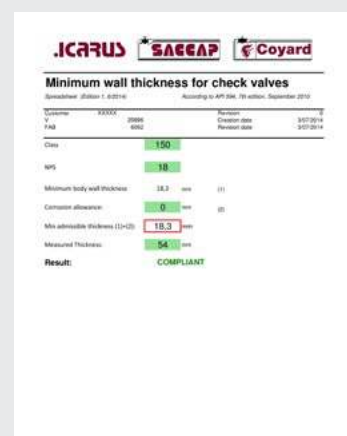
Bolting calculation:

- Tightening torque
- Reaction forces between parts
- Working coefficient (safety)

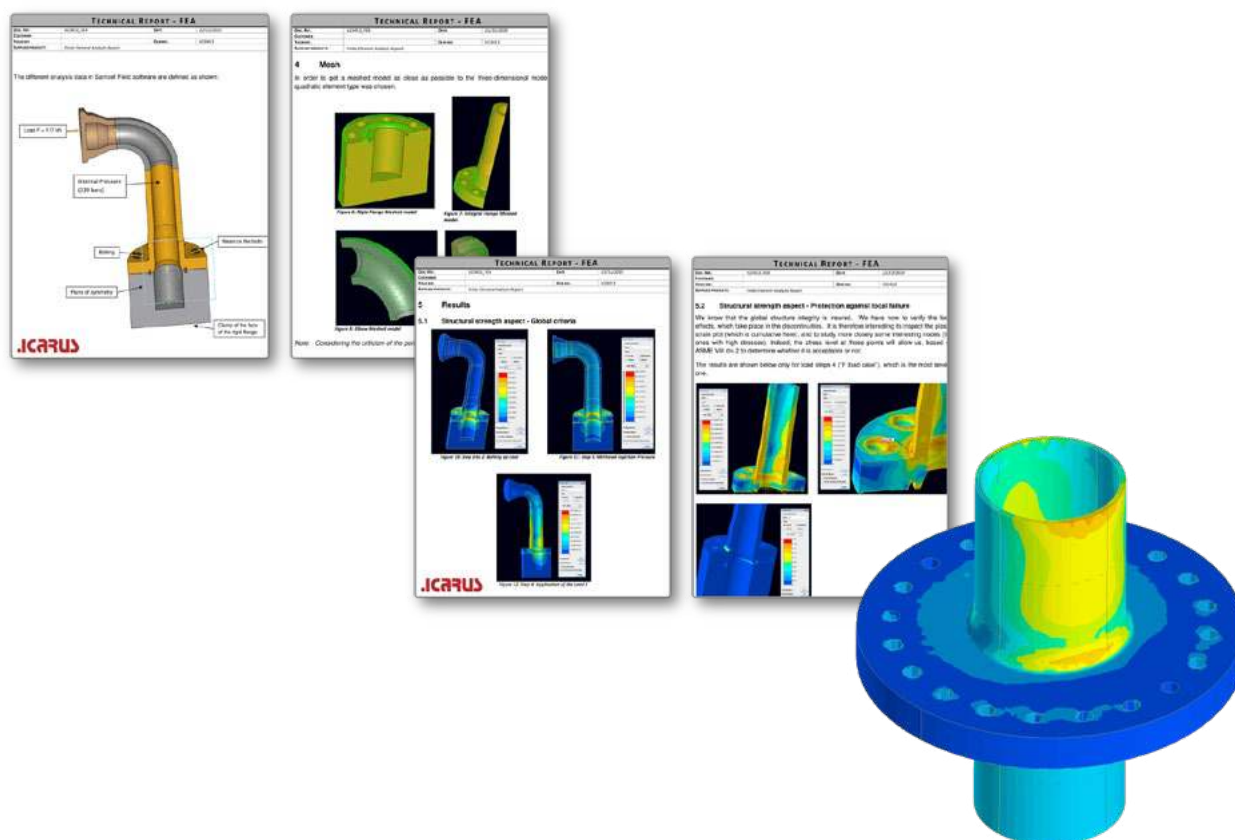


Stem dimensioning:

- Allowance for different shapes of stem-ends
- Working coefficient
- Maximum resistance of stem

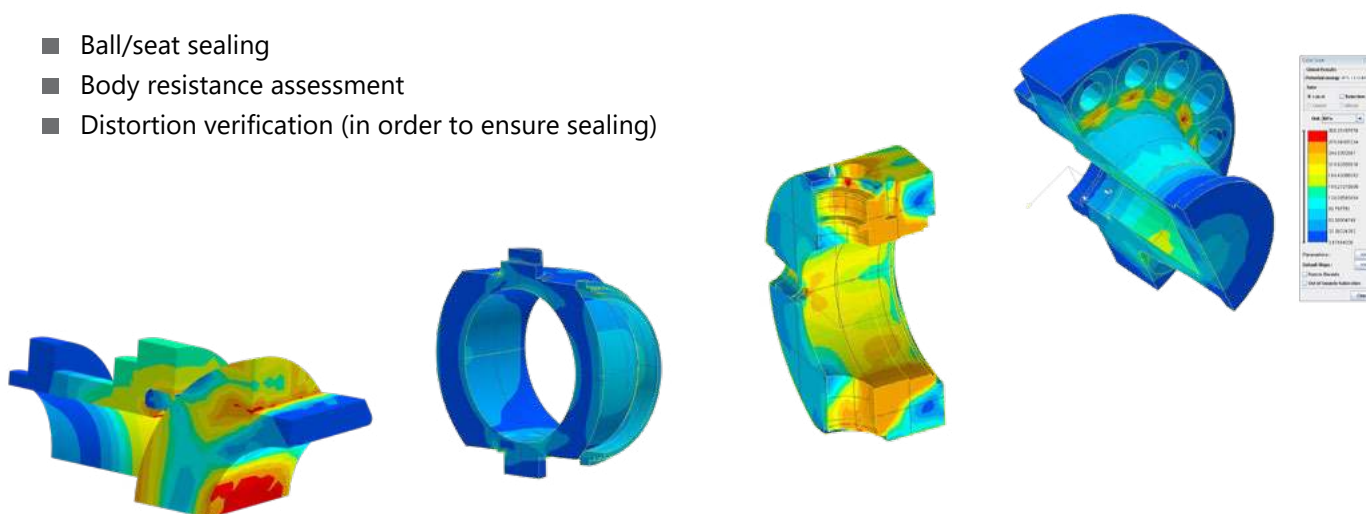
Wall thickness calculation
for check valves

In-house FEA calculation



Finite Element Analysis for valve parts:

- Ball/seat sealing
- Body resistance assessment
- Distortion verification (in order to ensure sealing)



MORE THAN A PRODUCT

Icarus owns a dedicated team using integrated management (Quality / Engineering / Production), following the ISO 9001 / 14001 (Environment) & 45001(Health & Safety) and API Q1 requirements to ensure the highest level of quality management.

Each process is subject to a risk assessment in order to maintain this very same quality management level.

