Products and Services catalogue

T&C GROUP TROUVAY & CAUVIN

Channelling energy

PROCESS & LINE PIPES

Carbon Steel Pipes

Saadiyat Island - Abu Dhabi - UAE

CS Seamless Pipes and Tubular

- **CS Seamless tubular, size OD 1/2” to 24”, with Wall Thickness up to Sch XXS/ Sch 160**

Specification: API 5L Gr B, X Grades, ASTM A53/A106/A333

- **Alloy Seamless Pipes from OD 2” to 26”**

Specification: A335 GR P1/P5/P9/P11/P22/P91/P92

- **Tubing with OD 25.4mm up to OD 141.3 with W.T. Max up to 15mm**

Specification: A179

CS Seamless pipes up to 24” is available ex-stock in our facilities

CS Welded Pipes

- **CS HF – ERW Pipes from OD 2” TO 26” with Wall thickness up to 18mm**

Specification: API 5L (45th EDITION) PSL 1 & PSL2, GR B / A53

- **HSAW – from OD 16” TO 120”, Max WT up to 25.4 MM**

Specification: API 5L (45th EDITION) PSL 1 & PSL2, GR B / X42 UPTO X100

- **LSAW – From OD 16” to 275” with Wall Thickness up to 130mm**

Specification: API 5L (45th EDITION) PSL 1 & PSL2, GR B / X42 UPTO X100
API 5L X52 PSL2/2H-50
A671 / A672 (ALL CLASSES)
A691 (Mo – Alloy / Cr –Mo Alloy / Ni- Alloy / Mo-Ni Alloy)

CS Welded pipes up to 48” is available ex-stock in our facilities

SS Pipes & Tubes

- **Stainless Steel (300 Series), Duplex, Super Duplex Stainless Steel, Nickel Alloy and Metallurgically clad pipes from OD 3” to 80” (welded) with W.T up to 63mm (with one or two longitudinal seam / multiple circular welds)**

- **Seamless Stainless pipes from OD 1/8” to 16” with W.T up to SCH XXS and up to 24” OD in SCH 10S, SCH 20S, SCH 40S.**

Specifications: A312 /A358 CLS 1,2,3,4,5 / ASTM A790 / ASTM A928 CLS 1,2,3,4,5 / ASTM 775 / 904L

- **Tubing with OD 25.4MM up to OD 141.3 with W.T max up to 4.6 MM.**

Specification: A213 / A269

Seamless Pipes

- Carbon Steel

  API 5l Gr B
  API 5L X Grades: 42; 46; 52; 56; 60; 65; 70; 100
  ASTM A 53 gr B
  ASTM A 106 Gr B
  ASTM A 333 Gr 3 & Gr 6
- Alloy Steel

  ASTM A 335 P1; P5; P9; P11; P22; P91
- Stainless Steel

  ASTM A 312 TP 304; 304H; 304L

Welded Pipes

- Carbon Steel

  API 5l Gr B
  API 5L X Grades: 42 ;46; 52; 56; 60; 65; 70
  ASTM A 671;
- Alloy Steel

  ASTM A691
- Stainless Steel

  ASTM A 312 TP 304; 304H; 304L; 316; 316H; 316L; 321; 321H; 310S; 317; 317L; 347
  ASTM A 358 TP 304; 304H; 304L; 316; 316H; 316L; 316Ti; 321; 321H; 310S; 317; 317L; 347

OCTG Pipes

API 5 CT H40; J55; K55; M65; N80; P110
API 5 CT L80 TYPES 1; 9Cr; 13Cr
API 5 CT L90 TYPES 1;2
API 5 CT L95
API 5 CT T95 TYPES T1;T2

Piping Accessories

- ELBOWS 45°, 90°, 180°
- Induction Bends
- Tees – Straight, Reducing, Concentric & Eccentric
- Fittings & Flanges in exotic materials
- Forged Steel Fittings: ASME B16.11
- Line Spades; Spacers and Line Blinds
- Gaskets
- Nuts & Bolts

General Pipe Conditions

- End Connections Line Pipes:

  Plain; Bevel; Screwed; Screwed & Coupled
- End Connections OCTG Pipes:

  Full range
- Sizes:

  Up to 72”nb full range within ASME B36.10M and API 5 CT
- Wall Thicknesses

  Full range within ASME B36.10M API 5CT
- Special requirements

  Coatings FBE & LDPE; NACE;PSL 1 & 2; NDE

Butt Weld Fittings

ASTM B16.9 & MSS SP 75

- Carbon Steel
  ASTM A 234 WPB; WPHY 42; 46; 52; 56; 60; 65; 70
- Alloy Steel
  ASTM A 234 WP 1; 5; 9; 11; 22; 91
- Stainless Steel
  ASTM A 403 WP 304; 304H; 304L; 316; 316H; 316L; 321; 321H; 310S; 317; 317L; 347
- Sizes
  Up to 60”nb
- Wall Thicknesses
  Full range within ASME B36.10M

Flanges

ASTM B16.5 & B16.47 A & B

- Carbon Steel
  ASTM A105
  ASTM A350 LF2; 3
  ASTM A 694 f 42; 46; 52; 56; 60; 65; 70
- Alloy Steel
  ASTM A 182 F1; 5; 9; 11; 22; 91
- Stainless Steel
  ASTM A 182 F 304; 304H; 304L; 316; 316H; 316L; 321; 321H; 310S; 317; 317L; 347
- Sizes: up to 60”nb

Subsea Forged Fittings & Connectors

- Flanges - Anchor; Compact; Swivel; Hanger; Misalignment
- Clamp-type Hub Connectors
- Piggable Wyes
- Barred Tees
- Buckle Arrestors
- J-Lay Collars

Valves & Actuators

With decades of experience in the supply of valve packages and our strong ties with numerous reputed valve makers, ***TROUVAY & CAUVIN**'s* Valves & Instrumentation Division are the ideal partners to meet all your valves and instrumentation needs.

Our team of trained engineers are capable of providing you the best solution at the most competitive prices and are able to assist our clients in the right selection of material and provide assistance in optimizing their requirements. Furthermore, ***TROUVAY & CAUVIN***, can provide you with bespoke solutions specific to your project requirements. In addition, ***TROUVAY & CAUVIN***'s quality personnel monitor performance at our sub-vendors, conduct shop visits to ascertain progress of orders and employ a strict quality procedure to ensure that our sub-vendors meet or exceed our clients requirements and our own. Drawings and documentation are always prepared and/or reviewed by our project team to ensure compliance with our client's requirements.

In addition to the supply of valves and instrumentation, ***TROUVAY & CAUVIN*** are also capable of providing Logistics support, stocking facilities and material management. Our stock yards are capable of handling large quantities of valves stocks, and include personnel trained to perform periodic preventive maintenance, re-tests and recertification. Our Valve Actuation Center can also provide automation services, repairs, refurbishment etc., to meet the requirements of our clients.

Our range of products include but are not limited to:

- Gate Valves (Flex Wedge, Through Conduit, Slab, Parallel Slide, PSB, Bellow Sealed, Knife etc.)
- Butterfly Valves (Concentric, Double Offset, Triple Offset, Double Block and Bleed)
- Ball Valves (Trunnion, Floating, Full Welded, Top Entry, Side Entry, DBB, 3-way, 4-way, etc.)
- Plug Valves (Lubricated, Non Lubricated, Non-Lubricated Metal Seated, DBB, Lined etc.)
- Globe valves
- Check Valves (Piston, Swing, Dual plate, Nozzle, Tilting Disc, Counter-weight etc.)
- Strainers (Y-Type, Conical, Basket)
- Sampling Valves
- Control Valves
- Steam traps, Manifolds, Steam management equipment & Humidifiers
- Actuators (Pneumatic, Electric, Gas Over Oil, Hydraulic, Electro-Hydraulic etc.)
- Interlocking Devices
- Instrumentation (Pressure, Temperature, Level & Flow)

T&C GROUP TROUVAY &CAUVIN

Valves

- Gate Valves
  - ✓ Wedge
  - ✓ Penstock / Sluice
  - ✓ Through conduit
- Globe Valves
  - ✓ Piston
  - ✓ Ball
  - ✓ Swivel disc
- Check Valves
  - ✓ Swing
  - ✓ Axial flow / Nozzle
  - ✓ Wafer
  - ✓ Spring return
- Ball Valves
  - ✓ Floating
  - ✓ Trunnion Mounted
  - ✓ Soft & Metal seated
- Plug Valves
  - ✓ Sleeved
  - ✓ Lubricated
- Butterfly Valves
  - ✓ Concentric rubber lined
  - ✓ Double/Triple offset
- Choke Valves
  - ✓ Positive Inline
  - ✓ Adjustable
- Double Block & Bleed Valves
  - ✓ Ball valve design
  - ✓ Butterfly valve design
  - ✓ Twin seal plug valve design
- Control Valves
- Pressure Reducing Valves
- Safety Relief Valves
- Piston Valves
- Crown Valves
- Pressure Vacuum Relief Valves
- Tank Blanketing Valves
- Breather Valves
- Diaphragm Valves
- PFA/PTFE Lined Valves
- Valve Locking Devices

- **Ball Valves**
  - Design standards: API 6D; API 608; BS 5351
  - Sizes: 1/4” nb to 56”nb
  - Floating or Trunnion-mounted
  - Firesafe to API 607; API 6FA and BS 6755-2 / ISO 10497-2
  - Full or Reduced Bore
  - Construction: 1,2 or 3 Piece; Welded; Top-Entry
  - Design to ANSI B16.34
  - Operation by Manual hand wheel/Gearbox or Actuation
  - Double Block & Bleed; Emergency Shut Down
  - Sub-Sea API 6D SS
  - Multiple Trims & Pressure Ratings
  - Soft or Metal seated
  - Cryogenic
  - Extended Stem for Buried Service
  - Jacketed
  - NACE MR-01-75
  - End Connections: Flanged; Butt Weld; Hub-Ends; Socket Weld
  - Threaded
  - Forged or Cast Construction- Carbon, Stainless & High Alloy

- **Plug Valves**
  - Design Standards: API 599;API 6D
  - Sizes: 1/2”nb to 14”nb
  - Lubricated or Sleeved
  - Operation by Manual, Hand Wheel/Gearbox or Actuation
  - Desalination/Reverse Osmosis Applications
  - Pressure Ratings to Class 900lbs

- **Butterfly Valves**
  - Design Standards: API 609; MSS SP 67; MSS SP-68
  - Sizes: 1/2”nb to 72”nb
  - Multiple Trims & Pressure Ratings
  - Sealing by Lining or Seats
  - Soft and Metal Seated
  - Double or Triple Eccentric
  - End Connections: Wafer; Wafer Lugged; Butt Weld; Flanged

- **Wafer & Swing Check Valves**

  Design standards: BS 5352; API 6D; API 594

  Sizes: 1/4”nb to 48”nb

  Closure: Piston; Ball; Swing; Lift; Tilting Disc; Single & Double Disc Wafer-type

- **Globe Valves**

  Design Standards: BS 5352; BS 1873

  Sizes: 1/4”nb to 18”nb

  Configuration: Straight, Angle, and Y-Type

- **Gate Valves**

  Design Standards: API 6D, API 600, API 602, BS1414

  Sizes: 1/4"- 72“

  Closure: Screwed NPT/SW/BW/Flanged RF & RTJ

  Merla ACV Series

  Adjustable Choke Valve

  Merla positive Inline Choke Valve

  High Pressure Adjustable Choke Valve

  Motor Flow Control Valves

Parameters for Check, Globe and Gate Valves:

- → Multiple Trims & Pressure Ratings
- → Cryogenic
- → NACE MR-01-75
- → End Connections: Flanged; Butt Weld; Socket weld; Threaded
- → Forged or Cast Construction
- → Bonnet: Bolted; Pressure Sealed; Welded

Cryogenic Gate valves

- Liquefied Gas & liquefied LNG
- Flanged or welded connection
- Range of working temperature -196°C to + 538°C
- Class 150-1500, NPS 2”-12”
- Unreduced flow
- Non-turning stem & bolted body-bonnet joint

Operations

- Hand wheel
- Hand wheel with gearing
- Electrical actuator

Globe & Butterfly valves also available

Cryogenic Ball valves

- Floating or trunnion mounted
- Liquid nitrogen, oxygen and LNG
- Flanged or welded connection
- Range of working temperature -30°C to - 196°C
- Class 150-900, NPS 2”-30”
- KEL-F seals and seats or inserts guarantee the best performance in cold conditions
- Equipped with anti-blow stem and antistatic device

Operations

- Pneumatic actuator
- Hand wheel with gear box
- Electrical actuator

Actuators

- Electric on multi & part turn applications, including ON / OFF, APT (Analog Position Transmitter) & Proportional (from 4 - 20 mA output signal)
- Pneumatic (DA or SR) on part turn applications, including ON / OFF, APT (Analog Position Transmitter) & Proportional (from 4 - 20 mA output signal)
- Hydraulic on multi & part turn applications
- Gas on part turn applications

Instrumentation

Mechanical & Electronic devices for the measurement of:

- **Pressure**
  - ✓ Switches (gauge or differential types)
  - ✓ Gauges (tube, capsule, diaphragm, differential types)
  - ✓ Sensors / Transducers
  - ✓ Transmitters (fixed range or smart and configurable type)
  - ✓ Diaphragm / Tubular Seals
  - ✓ Pressure limiters, Dampeners, Siphons, Cocks & Valves

- **Temperature**
  - ✓ RTD Sensing elements (probes, sensors…)
  - ✓ Infrared pyrometers
  - ✓ Bimetallic thermometers
  - ✓ Gas filled thermometers
  - ✓ Mechanical switches
  - ✓ Accessories

Mechanical & Electronic devices for the measurement of:

- **Level**
  - ✓ **Potentiometric level measurement**
  - ✓ **Level switches / sensors for hygienic application**
  - ✓ **Magnetic or Glass level gauges**
  - ✓ **Magnetostrictive level transmitters**
  - ✓ **Guided wave radar transmitters**
  - ✓ **Laser transmitters**
  - ✓ **Ultrasonic transmitters & switches**
  - ✓ **Vibrating level switches**
  - ✓ **Thermal dispersion level switches**
- **Flow**
  - ✓ **Transmitters**
  - ✓ **Switches**
  - ✓ **Meters**

Instrumentation

- Test & Calibration
  - ✓ Precision pressure gauges
  - ✓ Tube manometers
  - ✓ Pressure generators
  - ✓ Portable pressure calibrators
  - ✓ Portable calibrating systems
  - ✓ Dead-weight tester
  - ✓ Dry block portable calibrators
  - ✓ Portable / Non portable temperature bathes
  - ✓ Reference temperature probes
- Inductive Conductivity Transmitters
- Control Cabinets
- Solenoid Valves
  - ✓ Direct acting type
  - ✓ Pilot operated poppet type
  - ✓ Diaphragm operated
  - ✓ Namur solenoid vales
  - ✓ Redundant operation

Structural Steel

Main Markets

- Offshore Platforms
- Scrapper Decks
- Sub-Sea Pipe Line & Risers
- FPSO/FLNG vessels
- Jack Up Rigs
- Single Point Mooring System
- Barge Building
- Marine Industry
- Pressure Vessels
- Chemical/Power Plants
- Refineries
- Ship Building

Tubular Product available Ex Stock

- Seamless API 5L X52/EN10225 S355G15+M/N
- OD range from 4” to 20”
- WT range from 6.05mm to 31.80mm

Seamless Line Pipes available Ex Stock

- API5L X60/65 (Sour Service)
- OD range from 2” to 16”
- WT range from 6.05mm to 36.00mm

SAW/ERW PIPE (API 5L X52, X60 & X65) available Ex Stock

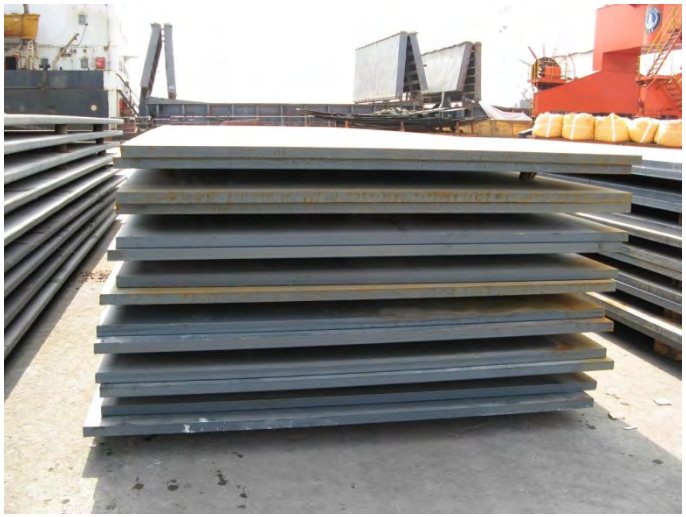
- OD range from 20” to 36”
- WT range from 6.05mm to 31.80mm

Plates

- High yield structural steels (EN10025 S355J2+N & S355 K2+N)
- Offshore quality grades (API 2W, API 2H GR. 50 EN10225 S355G8, S355G10+N/M.
- Shipbuilding steels includes ABS AH36, DH36 & EH36
- Plate Thickness range from 6mm to 200mm

Beams and Sections

- American(W Size)
- British(UB/UC size)
- European(IPE, HE, UPN)



Structural steel materials could be offered in different supply conditions:

- As rolled
- Normalized
- Quenched and tempered (Q&T)
- Thermo-mechanically control rolled (TMCP)

Structural steels with supplementary requirement including:

- Simulated post-weld heat treated (PWHT) tested
- Through thickness tested
- Ultra-sonically tested
- Strain age impact tested
- Low Carbon
- Low Sulphur

Structural steels Pipes Seamless & Welded Certification as per EN 10204-3.2:

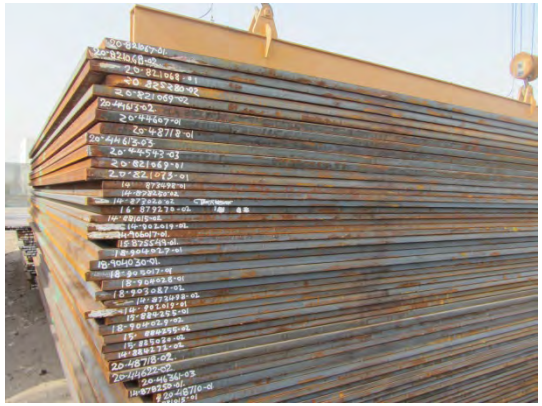
- TPI offered by

  ABS
  Bureau VERITAS
  Lloyds

Steel for Pressure Vessel, Boilers & Tanks

Hot rolled plate

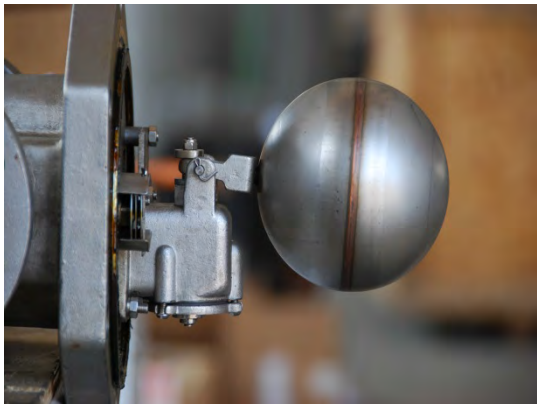
- A285 Gr C
- EN10028 Gr P265 GH, P295 GH, 16Mo3, 13CrMo4-5, 10CrMo9-10, P275NH, P275NL1/2, P355NH, P355 NL1/2, P355 GH, P460 NH and P460 NL1/2
- A516 Gr 60, 65 and 70
- A537 Class 1, Class 2 and Class 3
- A387 Gr 5 / 9 / 11 / 22 / 91 Class 2



Tubes

- A179 Gr C
- A209 Gr T1, T1a, T1b
- A213 Gr T5 / T9 / T11 / T22 / T91 / T92

Filtration & Speciality Products



Filtration

- **Filters**
  - Basket Filters
  - Simplex Filters
  - Duplex Filters
  - Cartridge Filters
  - Carbon Filters
  - Self Cleaning Filters

- **Strainers**
  - Conical Strainers
  - Flat Strainers
  - T Type Strainers
  - Forged Strainers
  - Cast Y Type Strainers
  - Fabricated Y Type Strainers

Speciality piping products

- **Tank & Vessel Protection**
  - Pressure Vacuum Relief Valves
  - Tank Blanketing Valves
  - Vents
  - Manways & Hatches
- **Safety Products**
  - Flame Arresters
  - Exhaust Heads
- **Accoustic controls**
  - Accoustic enclosures
  - Separator Silencers
  - Pressure reducing Silencers: for Control ef Valves
  - Absorptive Silencers
- **Separation**
  - Steam and gas/liquid separators
- **Miscellaneous**
  - Flow sight glasses
  - Sample coolers

Special site equipment

Construction project-related services and equipment:

- Scaffold supplies/installation/safety management
- Lloyds and DNV approved PFP (passive fire protection) systems
- Fast-track pressure vessel and steel fabrication works
- Extra-large diameter valves and fittings up to 150”
- Hazardous and non-hazardous lighting
- Complete dosing and mixing systems
- Sampling and chemical injection, odorization and detection systems.
- High pressure air-driven liquid systems, gas booster and air amplifiers

Accommodation and site equipment for projects in remote areas:

- Living quarters and accommodation for onshore and offshore projects
- All types of containers and prefabricated housing for fast mobilization, including housing, kitchen, canteen, water treatment, sewage treatment, hospital, sanitary containers, power stations, incinerator and laundry
- GRP water tanks for potable and non-potable applications (up to 20,000 m^3)
- Steel security fencing and mobile fencing
- Container petrol stations for gasoline, diesel, Jet A1 (helicopters and aircrafts), LPG (car and cylinders refuelling)
- H2S shelter protection system
- Oil & Gas mobile testing laboratory
- Safety equipment: personal protective equipment and fire-fighting equipment
- Converted and armored vehicles: fire-fighting vehicles, ambulances, security and armored vehicles (cars/truck/mini buses), refrigerated vans and trucks, 4x4 –mini buses. Spare parts for all of the above

Line pipe and pumping station equipment

- API 610 pumps for Oil & Gas /ANSI for Water
- Line pipe, piping, coating
- Pig launchers and receivers
- Instrumentation (i.e. pressure gauges)
- Interlocking devices and installation
- Oil into water analyzers and separators
- Emergency shutdown valves and solenoid valves
- Pipe services (sand blasting, beveling, coating, cement lining and galvanization)
- Valve Automation Center (actuator on-site survey and installation, steam and condensate audit, interlocks)
- Automatic welding system for line pipe, subsea, offshore and process

Civil works equipment

- Construction: graders, dozers, loaders, excavators, backhoes, forklifts, mobile cranes and scrapers
- Mining: mining trucks, shovels, excavators, drills and crushers
- Power & hydraulics: generators, batteries, compressors and pumps

PIPING FOR BUILDING & INFRASTRUCTURE

Ductile Iron

Cast Iron

Grooving system

HVAC

- **Trouvay & Cauvin Seamless Black Carbon Steel Pipe;** Size OD 1/2” to 24”, ASTM A53 Gr. B, Schedule 40 / 80 / Standard.
- **Trouvay & Cauvin Welded Black Carbon Steel Pipe;** Size OD 1/2” to 64”, ASTM A53 Gr. B, Schedule 40 / Standard; BS 1387 Medium / Heavy.
- **Trouvay & Cauvin Welded Carbon Steel Fittings ;** ELBOWS 45°, 90°, 180°, Induction Bends, Tees – Straight, Reducing, Concentric & Eccentric Reducers.
- **UL Listed Grooved and Threaded Pipe Fittings;**
  - TYCO - Shurjoint 300 psi Black Threaded Couplings & Fittings.
  - TYCO - Shurjoint Painted Grooved Couplings & Fittings.
  - TYCO - Shurjoint Grooved Valves for HVAC Pipelines.
  - TYCO - Shurjoint Ring Joint shouldered couplings for diameters up to 96”
- **Armstrong Air Vents**

The material is currently available ex-stock from our facilities

FIREFIGHTING

- **Trouvay & Cauvin Seamless Galvanized Carbon Steel Pipe;** Size OD 1” to 14”, ASTM A53 Grade B, Schedule 40 / 80 / Standard.
- **Trouvay & Cauvin Welded Galvanized Carbon Steel Pipe;** Size OD 1/2” to 14”. ASTM A53 Grade B, Schedule 40 / Standard, BS 1387 Medium / Heavy.
- **UL / FM listed Grooved and Threaded Glavanized Pipe Fittings;**

  TYCO - Shurjoint 300 psi Galvanized Threaded Couplings & Fittings.

  TYCO - Shurjoint Galvanized Grooved Couplings & Fittings.

  TYCO - Shurjoint Galvanized Grooved Valves.

The material is currently available ex-stock from our facilities

PLUMBING

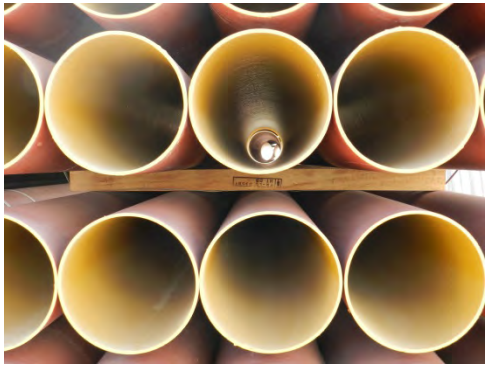
- **Trouvay & Cauvin Seamless Stainless Steel Pipe;** OD 1/8” to 24” OD in SCH 10S, SCH 20S, SCH 40S.
- **SS Grooved Pipe Fittings;**
  - TYCO - Shurjoint 300 psi Black Threaded Couplings & Fittings.
  - TYCO - Shurjoint Painted Grooved Couplings & Fittings.
  - TYCO - Shurjoint Grooved Valves for HVAC Pipelines.
  - TYCO - Shurjoint Ring Joint shouldered couplings for diameters up to 96”

DRAINAGE

(SOIL, WASTE, VENT & RAINWATER DRAINAGE)

- **SAINT GOBAIN CAST IRON HUBLESS PIPES FITTINGS & COUPLINGS;** Aboveground Internally Epoxy Coated Pipes / Fittings OD - DN 50 to DN 600 as per BS EN 877 Standards.

- **SAINT GOBAIN CAST IRON HUBLESS PIPES FITTINGS & COUPLINGS;** Belowground Internally Externally Epoxy Coated Pipes / Fittings OD - DN 50 to DN 600 as per BS EN 877 Standards.



The material is currently available ex-stock from our facilities

WATER/INFRASTRUCTURE SOLUTIONS

Ductile Iron Pipes and Fittings

- **Potable Water:** Pipes Internal Lining Sulphate resisting cement & External Coating 200 g/m² of metallic zinc plus bitumen
- **Sewerage Water:** Pipes Internal Lining Polyurethane with thickness of 1000 microns & External Coating 200 g/m² of metallic zinc plus epoxy finishing layer of thickness 150 microns

Valves, Hydrants & Air Release Valves

- Gate Valves sizes 80mm – 300mm
- Butterfly Valves sizes 400mm - 2000mm

Couplings, Flange Adaptors & Dismantling Joints

Repair Couplings for DI, HDPE, PE, PVC & Steel Pipes

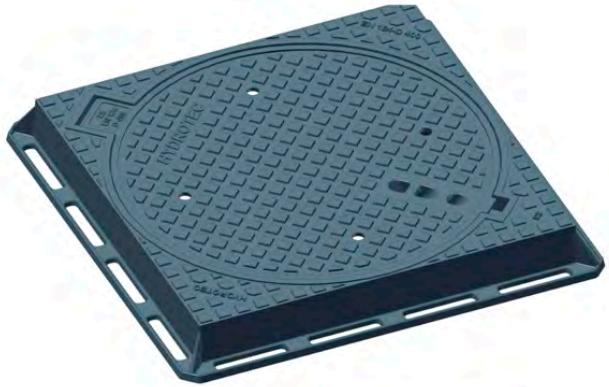
Wrapping Tape, Primer & Moulding Compound

- Wrapping tape Blue used for Potable water line
- Wrapping tape Black used for Sewerage & Foul water lines

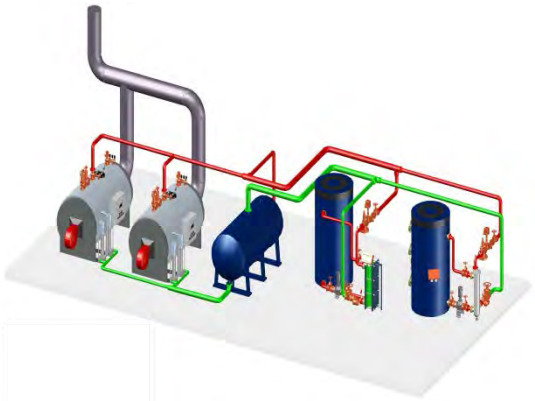
Wrapping works for pipes is done on our yards in Jebel Ali, Qatar or KSA, or on Site as per customer's request

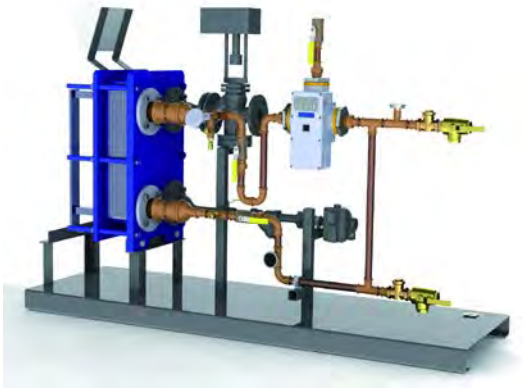
Manhole covers, drainage channels, decoration covers, waste bins & other streets, gardens & houses decorations

- Bitumen coating & Epoxy coating available



Steam & Hot Water products





Steam products

- Steam Traps
  - ✓ 3 year warranty Inverted bucket type
  - ✓ Float & Thermostatic type
  - ✓ Control disc type
  - ✓ Bimetallic
  - ✓ Thermostatic wafer type
  - ✓ Thermostatic bellow type
  - ✓ Fully equipped Trap Valve Station (TVS)
- Steam Tracing Equipment
  - ✓ Double sealed valves
  - ✓ Manifold for steam distribution
  - ✓ Manifold for condensate collection
- Steam Boilers
  - ✓ Three pass reverse, wet back
  - ✓ Genuine 3 pass
  - ✓ Electrical steam boilers
  - ✓ Clean steam generators

Steam products

- Condensate Recovery Equipment
  - ✓ Mechanical pumping trap and packages
  - ✓ Flash recovery vessels
  - ✓ Stainless steel sump ejectors
- Pressure & Temperature Control
  - ✓ Pressure Reducing Valves
  - ✓ Cyclone separators
  - ✓ Temperature regulators
  - ✓ Control valves
- Steam Tracing Equipment
  - ✓ Double sealed valves
  - ✓ Manifold for steam distribution
  - ✓ Manifold for condensate collection
- Water Heating
  - ✓ Instantaneous water heaters
  - ✓ Shell & tube heat exchangers
  - ✓ Clean in Place scale removal system
- Strainer (see valves)
- Air Vents
- Liquid Drainers

Hot water products

- Hot Water Boilers
  - ✓ Conventional hot water boilers
  - ✓ High efficient condensing boilers
  - ✓ Electric calorifiers
- Calorifiers
  - ✓ Steel, glass lined or sinterflon lined
  - ✓ Stainless steel
- Heat Exchangers
  - ✓ Plate heat exchangers
  - ✓ Shell & tube heat exchangers

- Solar Systems
  - ✓ Flat solar panels
  - ✓ Heat pipe collectors
  - ✓ Thermosyphon
- Heat Pumps
  - ✓ Water to water
  - ✓ Air to water
- Additional Equipment
  - ✓ Chemneys
  - ✓ Softeners
  - ✓ Chemical dosing
  - ✓ Pressurization units
- Control panels
  - ✓ Master control panels
  - ✓ All protocols
  - ✓ Remote control features

PIPES FINISHING SERVICES

Grooving & Threading service

Shot blasting service

Wrapping service

- Shot & Sand Blasting
- Coating
  - 3 Layer PE Coated
  - External FBE Coated
  - Internal Epoxy Coated
  - External Coal Tar Enamel Coated
  - Internal Cement Mortar Lined
  - External cement Mortar Coated
- Wrapping

- Cutting & Bevelling
- Grooving
- Threading
- Colour coding and project marking
- Offloading, Protective packing, Loading

Valve Automation Center

Actuation service

Interlocking service

Actuator Fireproofing service

TROUVAY & CAUVIN VALVE AUTOMATION CENTER

Trouvay & Cauvin has been working closely & successfully with all the major end users in the Oil and Gas industry covering, the Middle East, Africa, Central Asia, Europe & USA (directly or through contractors). We are approved by most of the major end users and we are constantly endeavouring to expand the scope of our approvals. We are also supported by most major actuator manufacturers and any work performed by Trouvay & Cauvin remains covered by the manufacturer‘s warranty.

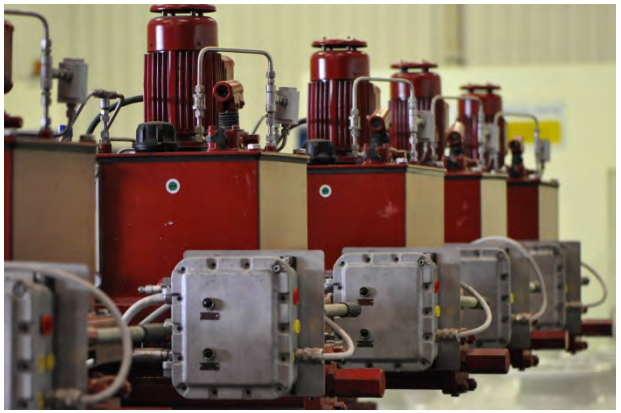
Supported by a large inventory of valves and actuators, our trained automation technicians are available in our service centres to support any of your requirements, from valve actuator sizing to field maintenance and upgrades.

The scope of our activities includes, Actuation services, Retrofit Services, Interlocking Services, Steam Services and Testing Services, as explained in detail below.

At Trouvay & Cauvin, we firmly believe in the quality of our work and our philosophy remains that no problem is unsolvable. To reflect this confidence and ensure that our clients are always satisfied, we provide unique features on our supply.

- **2 years free Trouvay & CauvIn warranty on all actuated packages over and above manufacturer warranty.**
- **24/7/365 availability of Service engineers**
- **Free Commissioning support on site**
- **Free training support where required**

As a rule, we remain committed to supporting our products through their entire life cycle and providing our clients the assurance that their supply will be hassle free and done to perfection. In this regard, we remain one of the best solution providers in the region.



TROUVAY & CAUVIN
Valve and Automation Services

Actuation Services

- Supply of Full Assembled Unit
- Assembly With Free Issue Components
- Installation & Commissioning support
- Design and Fabrication of Adaptor Kits & Interfaces
- Design & Fabrication of Control Panels including supply of Accessories & Tubing
- Training

Retrofit Services

- Survey & Installation
- Onsite and Offsite Actuator Retrofits on Existing Manual Valves
- Stem Extension Design, Manufacture & Assembly

Interlocking Services

- Survey , Onsite or Offsite
- Installation of Interlocks, Key Cabinets, etc.
- Installation & Commissioning
- Training

Fire Proofing

- Supply of Actuator & Valve Fire proofing (KMASS)
- Intumescent Coatings or Firebox options
- On & Offsite repair assistance
- Training on Maintenance and repair of Fire proofing products

Testing Services

- Hydro Tests
- Pneumatic Tests
- HP Gas Test
- Helium Leak Tests (At 3rd Party)
- Magnetic Particle Test
- Dye Penetrant Test
- Radiographic Testing (At 3rd Party)
- PMI Tests (At 3rd Party)
- Certification

Additional Services

- 2 Year TC Gulf Warranty on all Actuated Packages
- Commissioning Support On Site
- Valve Repair & Refurbishment
- Valve Painting Facilities
- Yearly Maintenance contracts
- Material Management
- Tagging, Colour Coding & Marking support for projects
- Projects Documentation Support
- Maintenance of Valve Data Register and P&ID s

Interlocking

- On-site surveys
- Installation of interlocks and key cabinets
- Installation and commissioning
- Training

Fire-proofing with K-mass technology

- Actuators, gearboxes and soft seat valves need fire protection.
- Epoxy based intumescent coating
- Durable, weather and corrosion resistant and unaffected by most process chemicals.
- Continuous service temperature of 85.6°C but it is also in service at temperatures of -40°C!

Energy Audit

Steam Trap survey

Your solution provider for Steam systems

- **Steam Production:** poor energy efficiency
- **Steam Distribution:** water hammers, leaks, insulations
- **Heat Exchange:** water hammers, corrosion, unstable temperature, joint leaks, poor energy efficiency, insulation problems
- **Liquid, Air and Steam trapping:** losses of live steam, flooded installation, frequent maintenance
- **Condensate recovery:** abnormal pump maintenance, low condensate recovery rate, water hammers, loss of flash steam

Our Methodology

Testing of Steam Trap Operation

Stethoscope & technician's analysis

Or

Automatic system monitoring (24/7)

Results Analysis

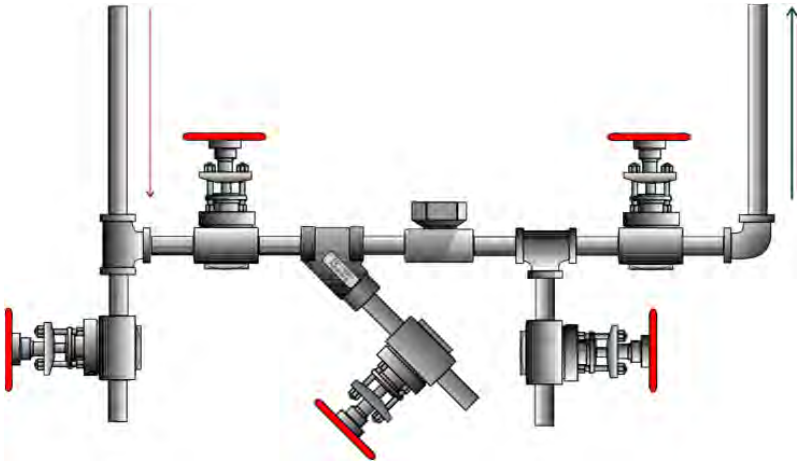
- Centralized data and accessible results
- Calculation of real steam leaks, CO2 emissions, fuel & financial losses
- Detailed reporting
- Benchmarking and ROI calculation

Improvement of problematic Trap Station

- Checking of trap technology
- Selection of correct trap technology
- Installation analysis
- Easier Maintenance
- Simplified trap station

1st step Survey

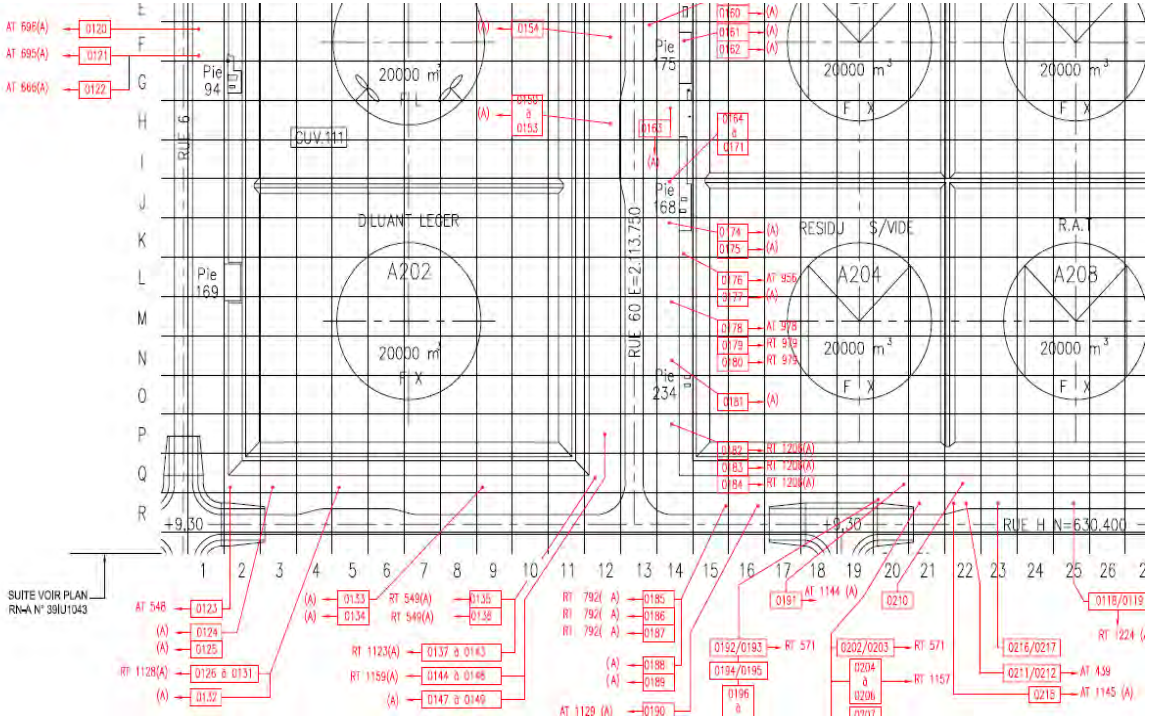
- Information collected during standard diagnostic test
- Trap Features: Manufacturer, model, connection size ...
- Differential pressure
- Application
- Operating status of the trap
- On site location
- Types of connections
- Inlet steam pressure: constant or modulating
- Discharge to atmosphere or to condensate return
- Comments and recommendations



Additional information (optional):

- Pipe size at trap inlet and outlet
- Steam line number
- Insulation type (if any)
- Check valves (if any)
- Strainer (if any)
- Trap station pictures

1st step Survey



2nd Step survey

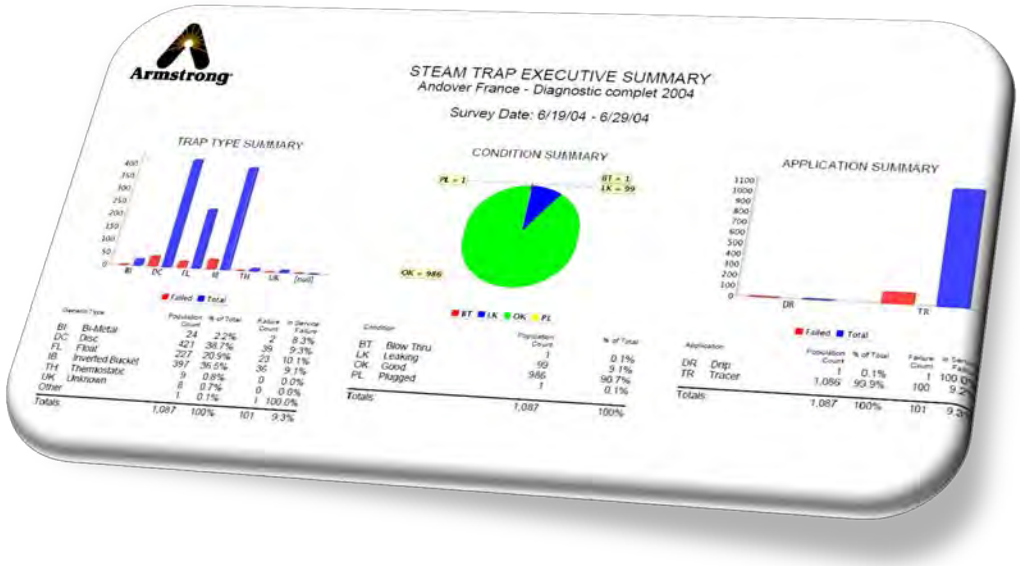
SteamStar is the first and only Web-based application (www.SteamStar.com) to record, control and manage your steam trap system data. It gives you several important advantages:

- Accurately shows losses in steam, fuel, money and CO2 emissions, based on formulas approved by the United Nations Technical Committee
- Database of more than 6,000 Cv factors allows to calculate real steam losses for any trap model from any manufacturer
- Lets you easily compare and view data from local, regional or global locations
- Provides ROI prioritization through failed steam trap work order reports
- Survey data from Microsoft Excel, third-party software or handheld testing devices can easily be uploaded
- Eliminates the need for expensive software maintenance, training, upgrades and licensing fees
- Numerous reporting capabilities include benchmarking and trend analysis
- Reports in multiple languages, measurements and currency values

2nd Step survey

The standard version of SteamStar provide you an array of reports that will give you another view of your system...

- Excel Report
- Trap Report
- Trap Executive Summary
- Trap Manufacturer Summary
- Survey Report
- Trap Recommendation



3rd Step survey

Results Analysis:

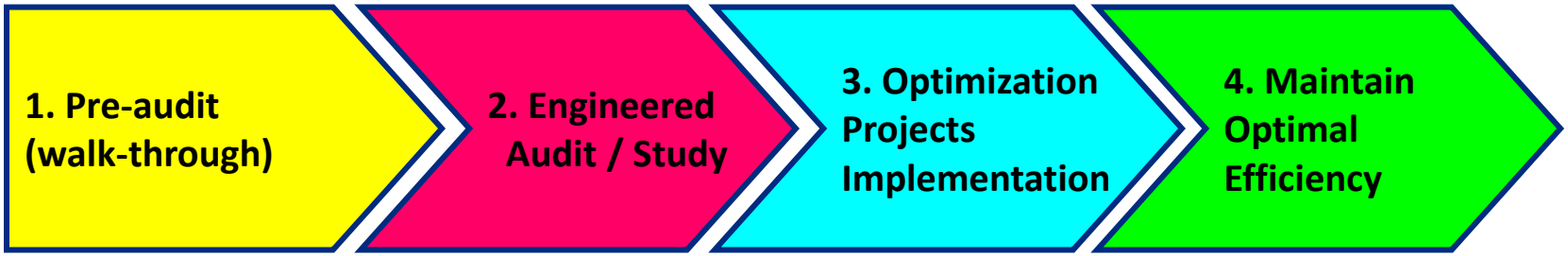
- Discussion with our technical manager
- Improvement planning
- Replacement of defective items
- Analysis of problems
- Advice to optimize the system

Optimizations of steam systems

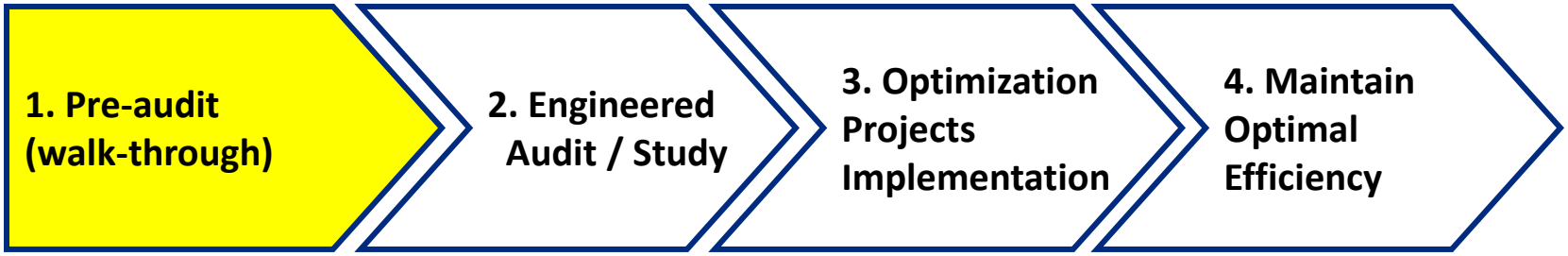
- During trap survey, the Armstrong specialized technician detects other anomalies of the steam system (outside of trap stations)
- A monthly visit of Armstrong Specialist Engineer to confirm (or not) the anomalies
- Summary report is presented during Site Unit's debriefing meeting
- Contract option foresee the possibility to study in details the Steam System's anomalies

Steam System Audit

Our Methodology

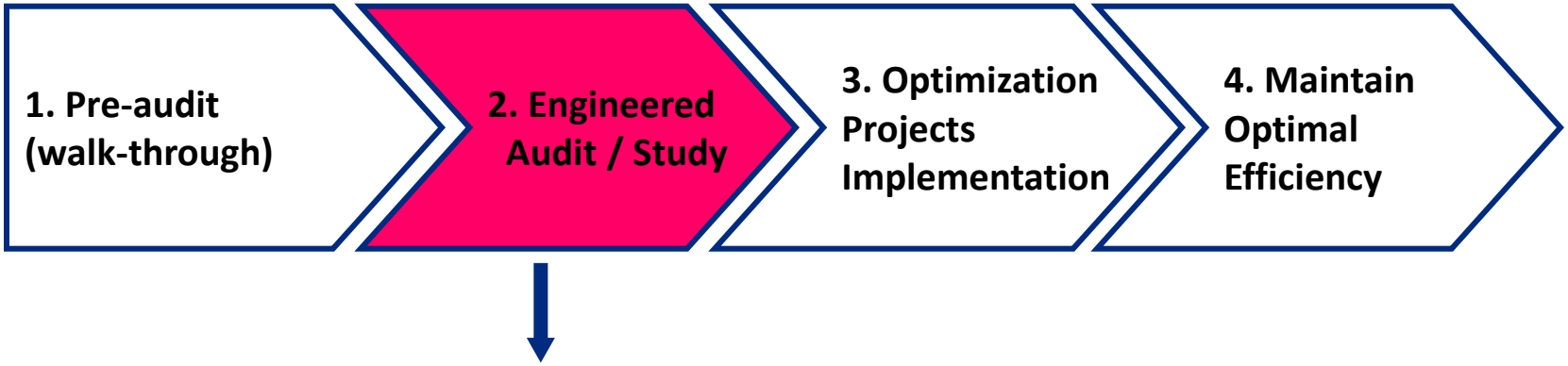


Pre-Audit (walk-through)



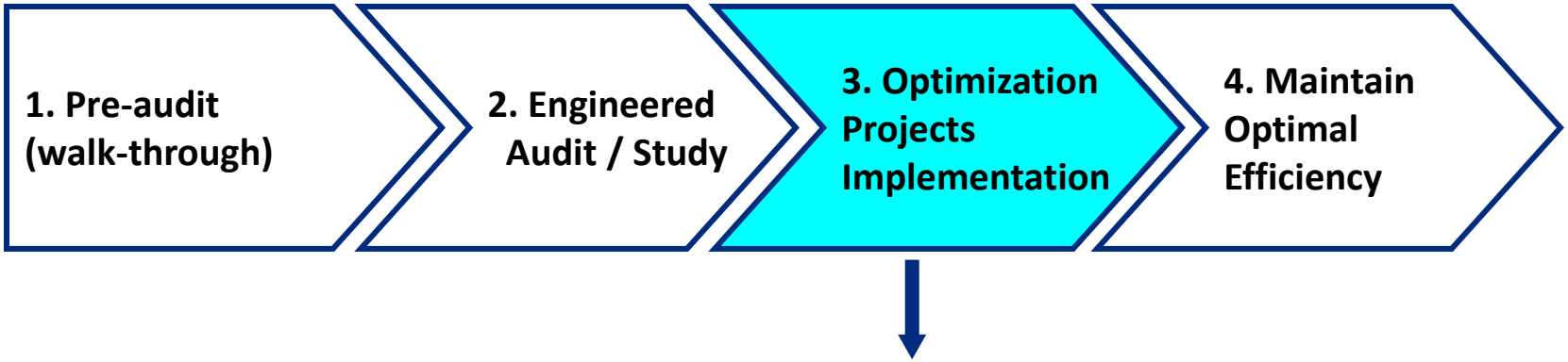
- First contact on site **to identify the needs**
- Gather energy cost data and calculate actual **yearly steam budget**
- Evaluate potential energy and CO_2 **savings**
- Confirm *(or not)* **optimization feasibility**

Engineered Audit or Study



- **Measurement campaign** to collect real application data
- Comprehensive **analysis** of the complete steam system
- Study and development of **optimization projects** with estimations of costs (+/-25%), energy / CO_2 savings (+/- 15%) and payback
- Establishment of **priority actions plan** based on payback period and process application importance

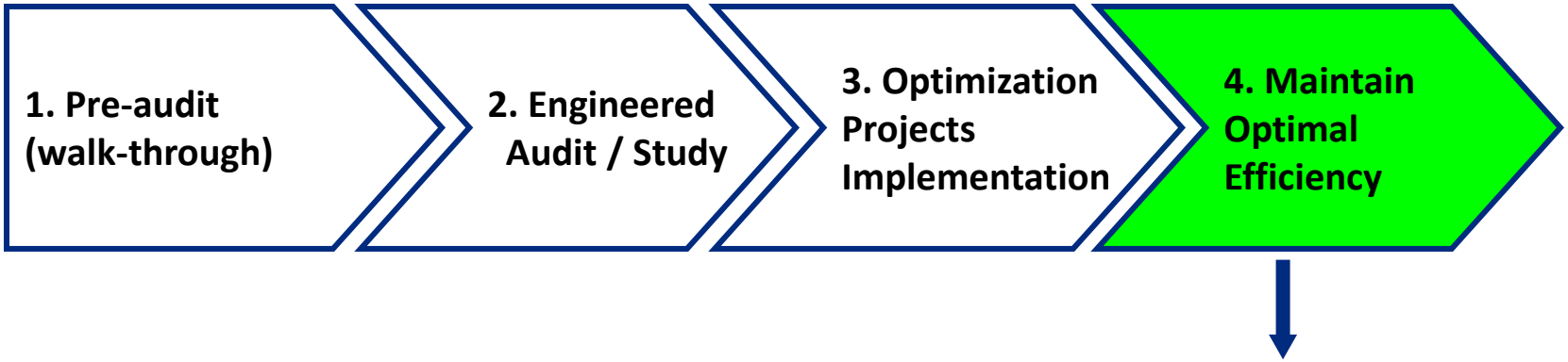
Optimization Projects



In partnership with the site:

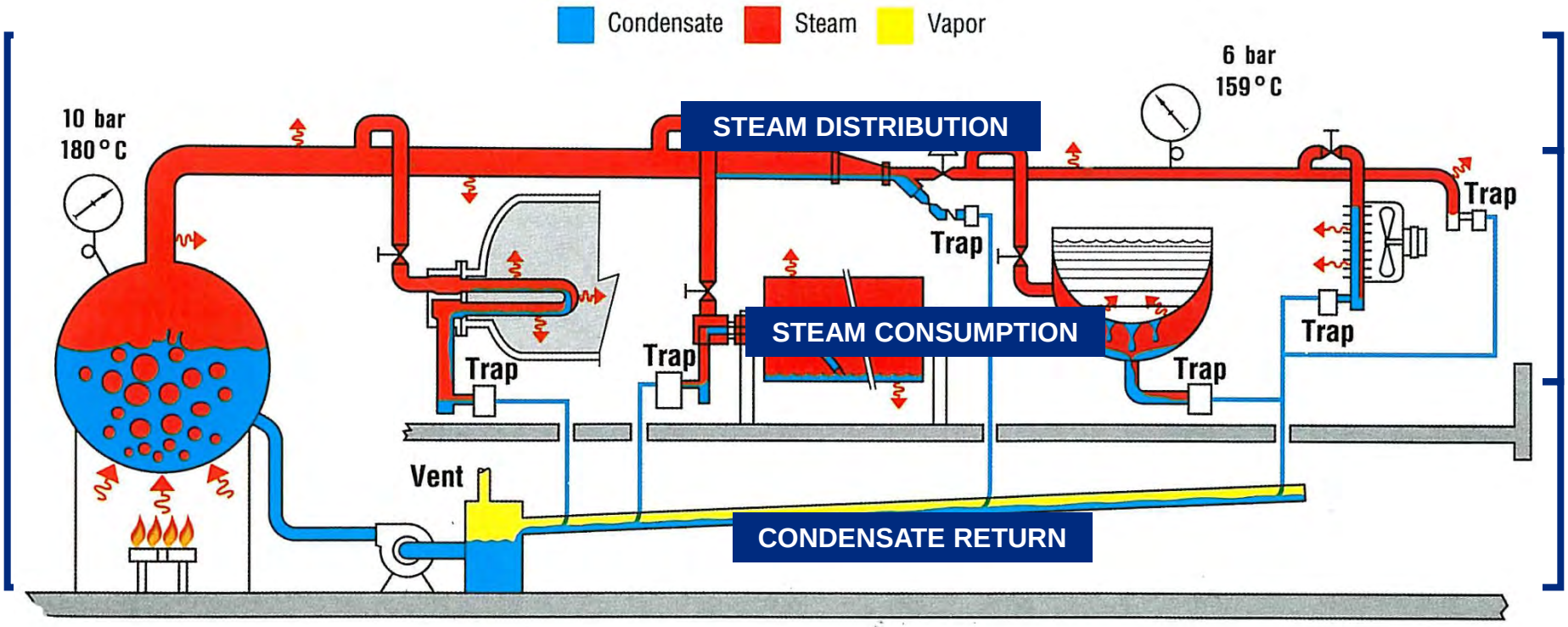
- **Detailed studies**, technical specifications and **implementation assistance**
- Turnkey contract with **performance guarantee**
- **Project follow-up:** start-up procedures, training, inspection on regular basis

Maintain Optimal Efficiency



- Put in place **Steam System Scorecard** showing system efficiency through both energy and operational KPIs
- On regular basis: detect, analyze and correct **efficiency deviations**
- **Adapt** efficiently the system to increase or decrease of the steam needs
- Assistance for efficient **new projects**

The 4 parts of a Steam System



Boilers room Optimizations

- Economizer
- Preheating absorbed air
- Oxygen rate sensor
- Steam accumulator to handle peak demand
- Pre-heating of feed water without steam
- Boiler stand-by time
- Boiler blow-down:
  - Optimal rate based on automatic blow-down, higher condensate return and improved water treatment
  - Using flash steam generated by the blow-down

Steam distribution Optimizations

- Rationalize the network (sections isolation, dead ends, etc.)
- Insulation
- External leaks
- Improved steam quality through best practices piping design:
  - Drip legs
  - Steam trap stations
- Start-up procedures
- Selecting the optimal steam pressure
- Optimized pressure and temperature controls

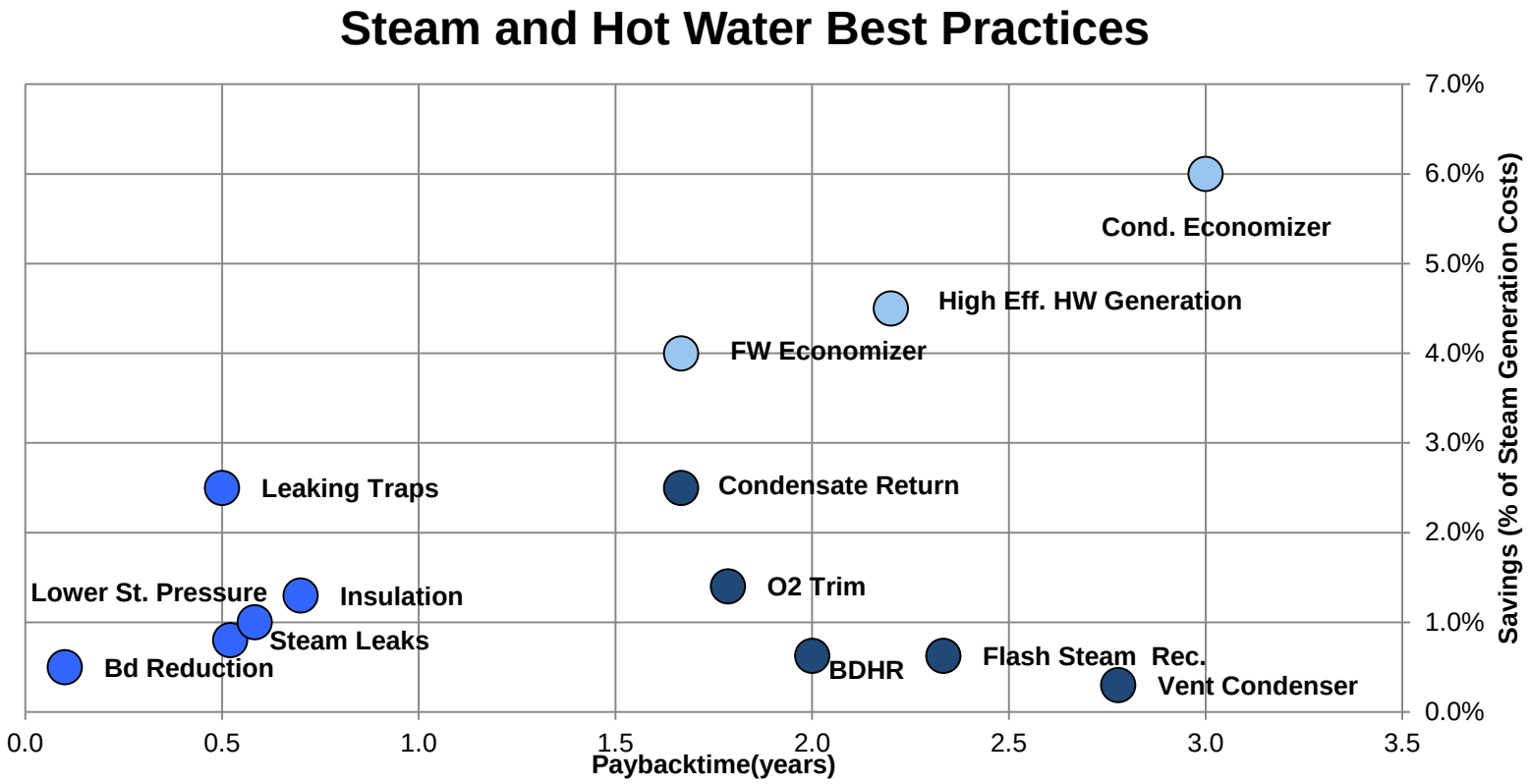
Steam usage Optimizations

- Condensate and air removal at any conditions:
  - Optimized production
  - Stable heating temperature
  - Avoided corrosion and water hammers
- Hot water generation – process, cleaning, sanitary and heating
- Heat recovery
- HVAC air quality (temperature and relative humidity)
- Steam traps:
  - Improved trap sizing, selection and installation
  - Management of trap population for sustainable optimal performance rate

Condensate recovery Optimizations

- Avoiding water hammers in condensate return:
  - Separating flash / live steam from condensate
  - Mixing cold and hot condensate
- Improving condensate return rate:
  - Piping sizing
  - Handling (possible) contamination
- Flash steam recovery and usage:
  - Flash tank
  - Steam Ejector

Optimizations project matrix



Base: 10 T/h Boiler / US and Europe Statistics