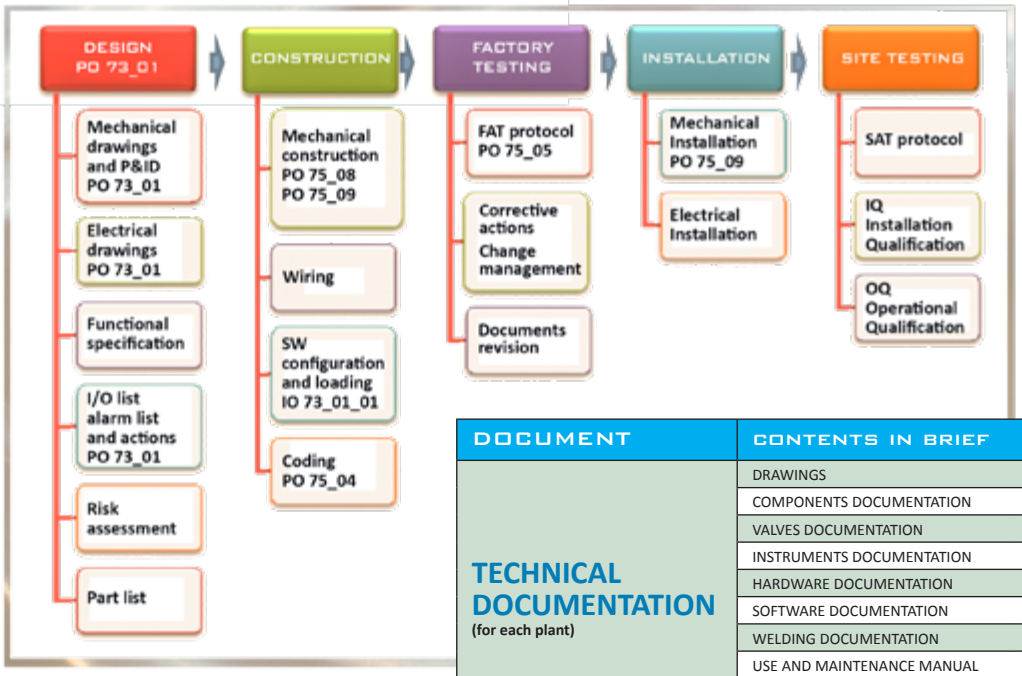
SMPT MULTIPLE EFFECT DISTILLER

A clear vision about multiple effect water distillation in pharmaceutical environment

SMPT *Project steps*

Design specifications are collected in the Design Qualification Protocol (DQ). Customer's approval of the DQ is the starting point for production activities according to Bram-Cor Quality System Procedures.



DOCUMENT	CONTENTS IN BRIEF
TECHNICAL DOCUMENTATION (for each plant)	DRAWINGS
	COMPONENTS DOCUMENTATION
	VALVES DOCUMENTATION
	INSTRUMENTS DOCUMENTATION
	HARDWARE DOCUMENTATION
	SOFTWARE DOCUMENTATION
	WELDING DOCUMENTATION
	USE AND MAINTENANCE MANUAL
	OPERATING MANUAL
	SPARE PARTS LIST
TECHNICAL DOSSIERS (for stainless steel components built in Bram-Cor)	PRODUCT DESCRIPTION
	DRAWING
	MATERIAL CERTIFICATES
	WELDING DOCUMENTATION
	PICKLING AND PASSIVATION CERTIFICATE
	NON-DESTRUCTIVE TESTS REPORT
	HYDRAULIC PRESSURE TEST REPORT

DOC. TYPE	CONTENTS IN BRIEF
F.A.T. PROTOCOL FACTORY ACCEPTANCE TEST	TEST PRE-REQUISITES
	MECHANICAL COMPONENTS ACCEPTANCE TEST
	ELECTRICAL HARDWARE ACCEPTANCE TEST
	SOFTWARE ACCEPTANCE TEST
	FUNCTIONAL TEST
	FAT REPORT APPROVAL
S.A.T. PROTOCOL SITE ACCEPTANCE TEST	TEST PREREQUISITES
	MECHANICAL COMPONENTS ACCEPTANCE TEST
	ELECTRICAL HARDWARE ACCEPTANCE TEST
	SOFTWARE ACCEPTANCE TEST
	FUNCTIONAL TEST & TRAINING
	DOCUMENTATION VERIFICATION
	SAT REPORT APPROVAL

BRAM-COR project drivers are aimed at satisfying all pharmaceutical regulatory and QA requirements, aligning the final product to the international cGMP (Good Manufacturing Practices) and Pharmacopoeias.

BRAM-COR target in design, manufacturing, documentation, testing and validation activities focuses on the overall compliance of equipments to the needs of the pharmaceutical and biotechnology industry.

BRAM-COR *WFI Generation*

TO MEET ANY PHARMACEUTICAL WFI REQUIREMENT

To produce Water For Injection, BRAM-COR employs two different technologies: WFI from Vapor Compression Distillation System (STMC models) and WFI from Multiple Effect Distillation System (SMPT models). The comparison table shows both the distillation systems.

In case of low capacities (since absorbing much energy and cooling water) and of budget constraints, BRAM-COR also offers the Single Effect Distiller (Mod. DPSG), that is both a Still and a Pure Steam Generator. The production process consists in PW water evaporation followed by pure steam separation and condensation.

This equipment produces dry, saturated steam to be used as sterilizing agent. The Pure Steam, when condensed through a Double Tube Sheet condenser, meets the requirements of international pharmacopoeias for Water for Injection. The system can therefore provide a simultaneous production of Pure Steam and WFI.

PHARMACEUTICAL WATER DISTILLATION SYSTEMS
MULTIPLE EFFECT VS VAPOUR COMPRESSION TECHNOLOGY

parameters	MULTIPLE EFFECT DISTILLER	VAPOR COMPRESSION DISTILLER
OUPUT FLEXIBILITY	Reduced output modulation	Capacity ranging from 0 to max. cap. of the still
TEMPERATURE FLEXIBILITY	WFI output 85÷99°C	WFI output from infeed water T + 10°C till 99°C
HEATING MEDIA FLEXIBILITY	Industrial steam or electricity	Industrial Steam and/or electricity
COOLING WATER	High consumption depending on quantity of columns	No cooling water required
FEED WATER	SI02 < 1 ppm, Amines free resins (in case of DI), double stage RO preferred	SI02 <30 ppm, Single stage RO or even softened water acceptable
FEED WATER INPUT	Must be higher than primary steam pressure	< 1 bar
WFI OUTPUT	Atmospheric pressure	1 / 1.5 bars
WFI QUALITY	0.2÷0.5 microS/cm with FW <5mS	0.15÷0.4 microS/cm with FW <5mS
PREVALIDATION (endotoxin challenge)	Yes	Yes
HEAVY METALS	Free	Free + elimination of chlorine solvents
MOVING PARTS	Feed pump	Compressor, Recirculation pump
PURE STEAM FROM 1ST COL.	Possible	Possible
STRESS CORROSION	Very high "Rouging" percentage higher	Very low
CLEANABILITY	More tough than VCD	More easy than MED
START UP	SCADA 15 min for steam heating	SCADA 15÷40 min for steam heating

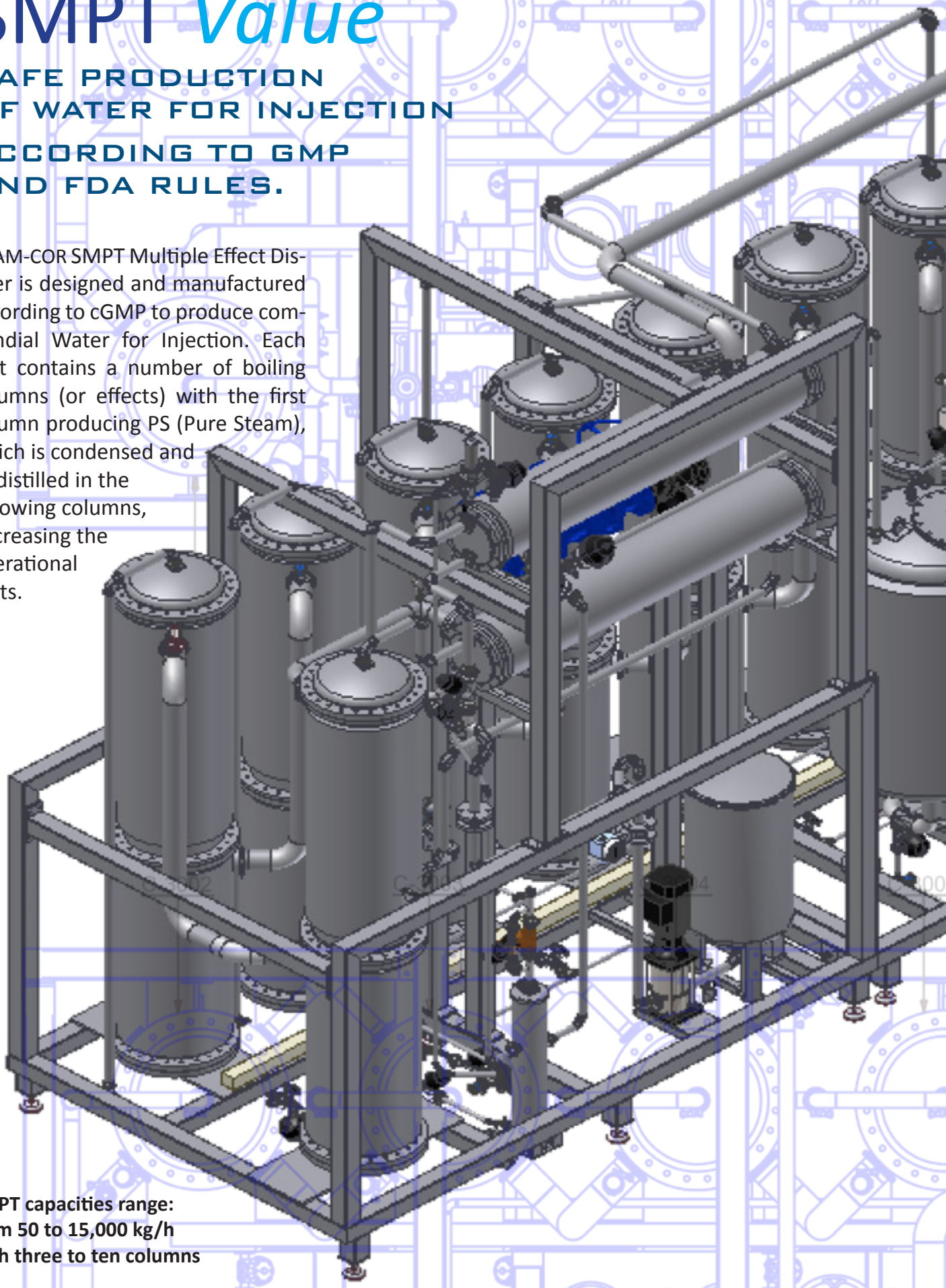
WATER FOR INJECTIONS IN BULK

	EU. PH. PHARMACOPOEIA	USP PHARMACOPOEIA
Physical/chemical		
Appearance	Colorless, clear	Not defined
Conductivity	≤ 1,1 µS/cm@20°C	≤ 1,3 µS/cm @25°C
TOC	≤ 0.5 mg/l	≤ 0.50 mg/l
Nitrates NO_3	≤ 0,2 mg/l	Not defined
Aluminium	≤ 10 ppb	Not defined
Microbiological		
Bacterial count	≤ 10 CFU/100 ml	≤ 10 CFU/100 ml
Bacterial endotoxins	≤ 0.25 IU/ml	≤ 0.25 EU/ml

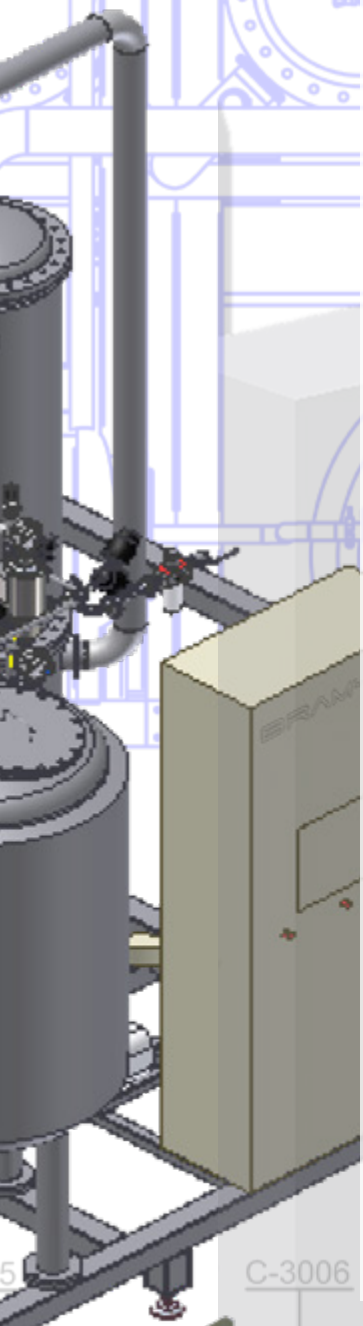
SMPT *Value*

SAFE PRODUCTION OF WATER FOR INJECTION ACCORDING TO GMP AND FDA RULES.

BRAM-COR SMPT Multiple Effect Distiller is designed and manufactured according to cGMP to produce compendial Water for Injection. Each unit contains a number of boiling columns (or effects) with the first column producing PS (Pure Steam), which is condensed and re-distilled in the following columns, decreasing the operational costs.



SMPT capacities range: from 50 to 15,000 kg/h with three to ten columns

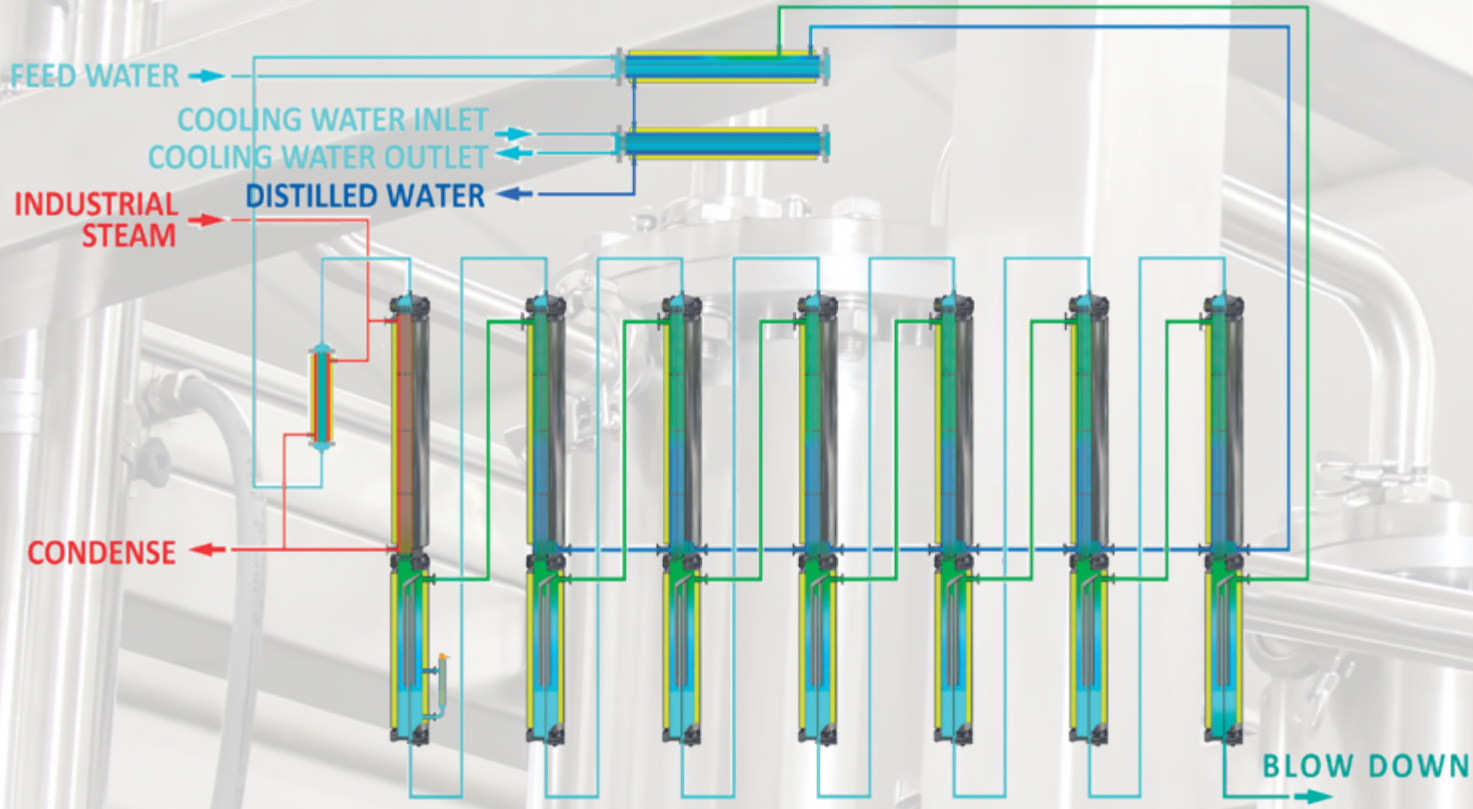


Destination of use	**Production of Water for Injection for pharmaceutical use. The SMPT distillers (from 3 to 10 columns) produce sterile and free from pyrogen water, in accordance with cGMP and FDA regulations.**
Technology	**Each unit contains boiling columns (or effects) with the first column producing pure steam, which is condensed in the following column decreasing the operational costs, or used as PS. The higher the quantity of columns, the lower overall the consumption of the equipment. The quantity of columns therefore does not influence the quality nor the output of the equipment.**
Technical features	**• cGMP design and construction**
	• Made in Italy
	• All product contact surfaces in AISI 316 L stainless steel
	• Jackets, frame and control board in AISI 304 stainless steel
	• All welds are executed by certified welders
	• Gaskets in EPDM or PTFE or Silicone
	• Pneumatic valves with Teflon/PTFE membranes and AISI 316 L SS polished body
	• ASTM C-795 – compliant insulation
	• Instruments: conductivity meter, pressure transducers, temperature probes, level transmitter, flow meter
	• Adjustable feet
	• Self-sanitizable
	• Available pure steam production from the first column
	• Available in steam operated or electrically operated model
Control system	**Automation unit: SIEMENS or ROCKWELL; integrated 24 v dc power supply with working memory. HMI: Touch-screen SCADA system for compliance to 21 CFR PART 11 or Siemens operator panel. Functions operated by the PLC: • Automatic Sequences (filling, sterilization, pre-heating, production, emptying) • Control Functions (PID control valves, etc.) • Input of measured values and setting of limit values • Output commands for digital and analogic values**
Sterilization	**Sterilization can be performed as one-shot selection before production start or as a single phase, to be periodically performed on the WFI system.**

Each SMPT equipment is manufactured following cGMP procedures. AISI 316L Stainless steel piping and AISI 304 frameworks are welded by qualified welders following Bram-Cor Sanitary Piping procedures. Non-destructive tests are performed during construction. Each component is identified by a unique TAG, engraved on metal plate, for total traceability in the relevant technical documentation. Functional testing is ensured by automation experts, with special care for monitoring of critical parameters. Documentation, inspection and field testing are included in our project management.

SMPT *Process*

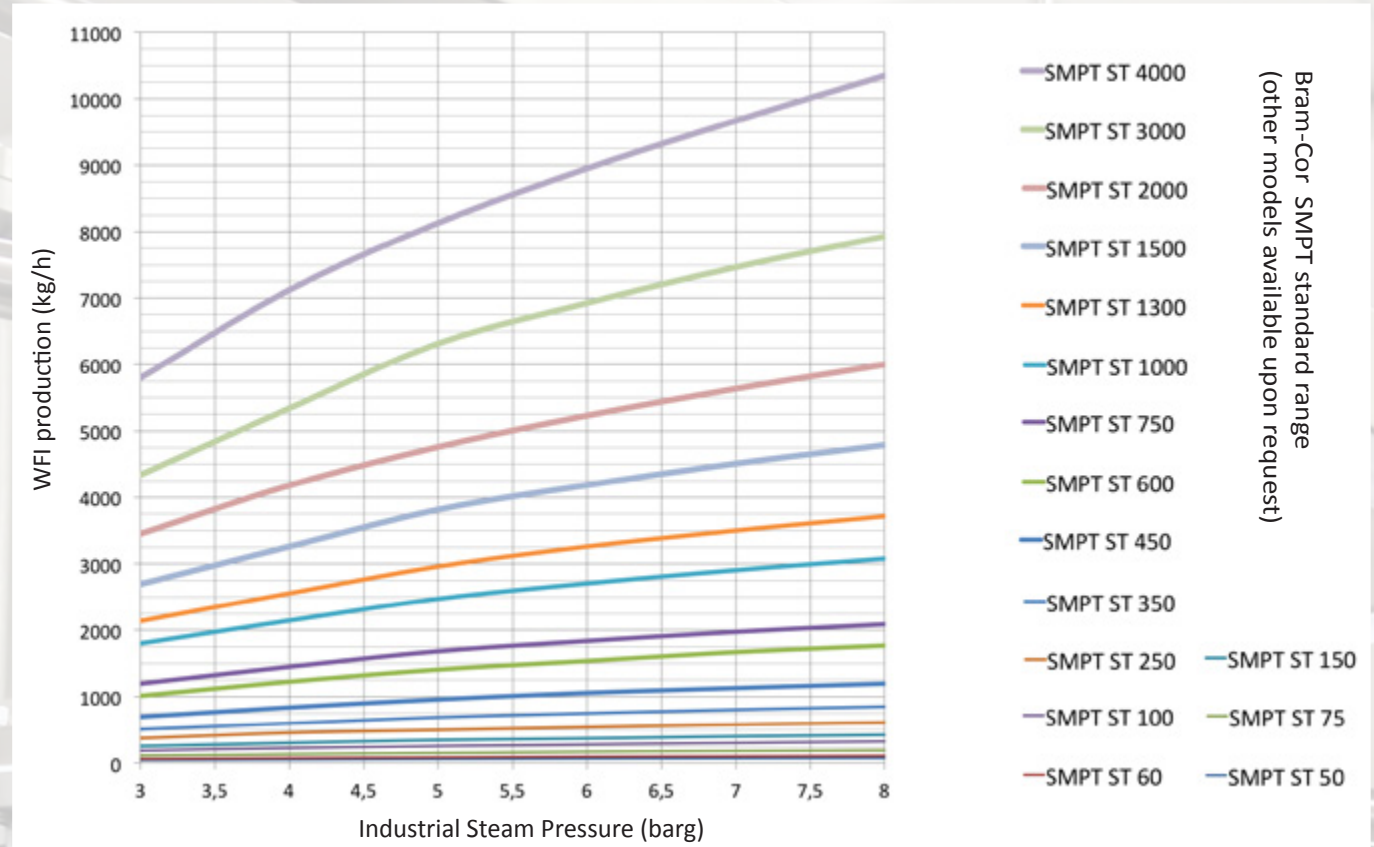
CONTINUOUS HEATING FOR EVAPORATION AND COOLING FOR CONDENSATION



BRAM-COR SMPT multiple effect distillation process runs as follows:
Heathing for evaporation and cooling for condensation processes are performed by double tube sheet heat and cool exchangers.
Evaporation is achieved by means of the thin-falling film system. A special labyrinth-separator installed in each column separates the steam generated by the evaporation process from entrained substance in the steam itself. The result is a pure, “dry”, pyrogen-free steam, condensed in compendial Water for Injection. Pressure vessels are designed according to PED and ASME VIII div. 1 regulation.

SMPT *Standard Range*

A WIDE SELECTION OF PRODUCTION OPPORTUNITIES



BRAM-COR
PHARMACEUTICAL TECHNOLOGIES

Key design concept

BRAM-COR engineering focuses on liquid/sterile drug and low/medium/high viscosity production processes, such as parenteral solutions, oral solutions, ophthalmic and oncology solutions, viscous emulsions, gel and pharmaceutical creams, cosmetic preparations.
BRAM-COR work flow structure consists of the following main activities: **Design, Construction (mechanical, electro-pneumatic, software configuration), Testing, Documentation, Installation, Validation, Assistance**. Every step of the assembly follows rigorous quality approved processes and procedures. Specification, construction and verification steps within the lifecycle are carried out according to GAMP "V-model", considering risk assessment, architecture of system components, functional specification, sanitization and validation issues with special overview to include sustainability and maintenance of the system.

Worldwide services

We deliver BRAM-COR machines all over the world and our high quality cGMP equipment is supported through our high level professional services including: Technical documentation, Factory Acceptance Test, Installation, Commissioning, Site Acceptance Test & Start-up, Training, Validation, and After sales service. Our worldwide network ensures assistance to our clients in over 50 countries, from the very beginning of a pharmaceutical project and for decades after start-up. Our ***After sales dept***. provides punctual and quick deliveries of spares and ongoing technical support.

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