

SMPT MULTIPLE EFFECT DISTILLER

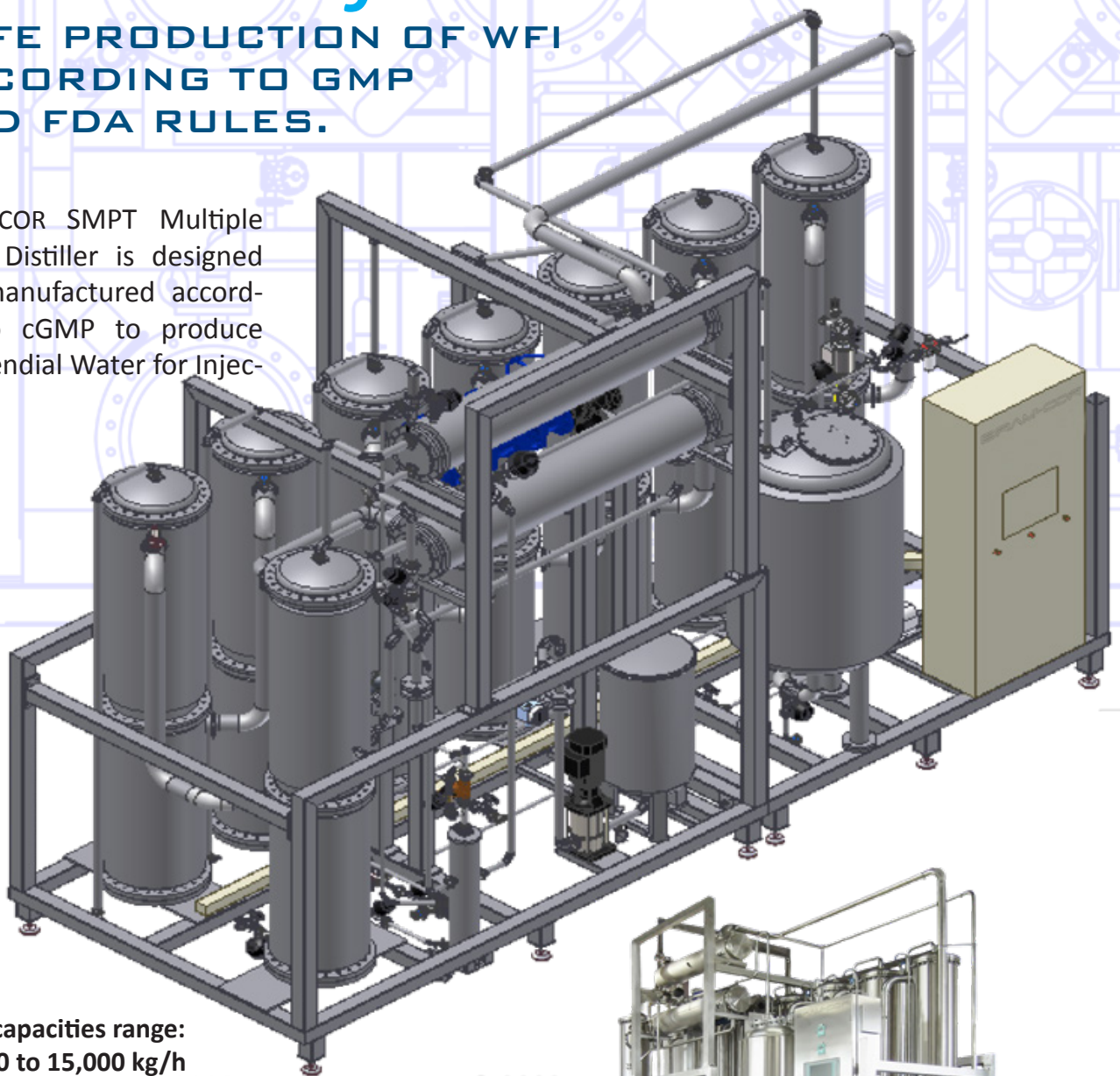
*A clear vision about
multiple effect
water distillation
in pharmaceutical
environment*



SMPT *Performance*

**SAFE PRODUCTION OF WFI
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.



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

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.

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.

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	<ul style="list-style-type: none"> • 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 qualified 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	<p>Functions operated by the PLC (Programmable Logic Controller):</p> <ul style="list-style-type: none"> • Input of measured values and setting of limit values • Automatic Sequences (production, sanitization, ...) • Control Functions (PID control for valves and speed of pump) • Alarm management and Verification of parameters • Input of measured values and setting of limit values • Output commands for digital and analogic values
Visualization system	<p>HMI (Human Machine Interface):</p> <ul style="list-style-type: none"> • Display of machine state • Controls management • Verification of alarms • Set points inserting and limit values setting • Graphic interface <p>SCADA (Supervisory Control And Data Acquisition) / SCADA SERVER</p> <ul style="list-style-type: none"> • All HMI values and controls • Data historicization • Historical alarms • Trend • Report • Recipes formulation / Batch • Data backup / Restore <p>All automation systems can be in compliance to 21 CFR PART 11 or Siemens Operator Panel, through audit management and electronic signature. Access management included (user/password).</p>
Communication system	<p>Bram-Cor automation systems can virtually communicate with all network partners through maximum security protocol (Ethernet, Profinet, OPC Unified Architecture, ...)</p> <p>Options:</p> <ul style="list-style-type: none"> • Teleservice (malfunctions managed remotely by Bram-Cor) • Remote Control (customer operator receives a message / a text message / a warning mail) • Server-side data centralization (customer can centralize data on his service, or Bram-Cor provides it)
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.

N12

BRAM-COR *WFI Generation*

TO MEET ANY PHARMACEUTICAL REQUIREMENT

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.

To produce WFI by distillation, 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.



PHARMACEUTICAL WATER DISTILLATION SYSTEMS MULTIPLE EFFECT VS VAPOUR COMPRESSION TECHNOLOGY		
parameters	MULTIPLE EFFECT DISTILLER	VAPOR COMPRESSION DISTILLER
OUTPUT 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	SiO2 < 1 ppm, Amines free resins (in case of DI), double stage RO preferred	SiO2 < 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

In case of low capacities required, BRAM-COR also offers the DPSG Single Effect Distiller: DPSG is both a Still and a Pure Steam Generator. The equipment produces dry, saturated steam to be used as sterilizing agent. The Pure Steam, when condensed, meets the pharmacopoeias requirements for WFI. The system can therefore provide a simultaneous production of Pure Steam and WFI.

SMPT *Documentation*

COMMISSIONING & QUALIFICATION PACKAGE

BRAM-COR SMPT documentation is composed by:

- GMP collection of plant-specific drawings, technical specifications, materials certificates, calibration certificates, hardware and software specifications, welding documentation, plant

manuals (TECHNICAL DOCUMENTATION);

- DATASHEETS & MANUALS BOOK, containing all the datasheet and manuals of the commercial components (valves, instruments, pumps, etc) installed on the equipment.

DOCUMENT	MAIN CONTENTS IN BRIEF
TECHNICAL DOCUMENTATION <i>(for each equipment / line)</i>	GENERAL DOCUMENTATION AND CONSTRUCTIVE SPECIFICATIONS (WITH DQ, RISK ASSESSMENT, DRAWINGS AND CONFORMITY DECLARATIONS)
	COMPONENTS, VALVES AND INSTRUMENTS DOCUMENTATION (WITH 3.1 MATERIAL CERTIFICATES FOR PRODUCT-CONTACT SURFACES AND CALIBRATION CERTIFICATES FOR CRITICAL INSTRUMENTS)
	PIPING, FITTINGS AND WELDING DOCUMENTATION
	MANUALS AND SPARE PARTS LIST (INCLUDING USE & MAINTENANCE MANUAL AND OPERATING MANUAL)
DATASHEETS & MANUALS BOOK	MANUFACTURERS' DATASHEETS AND INSTRUCTION MANUALS FOR COMMERCIAL COMPONENTS
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

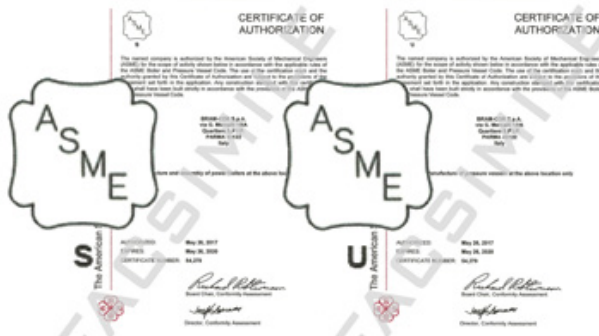
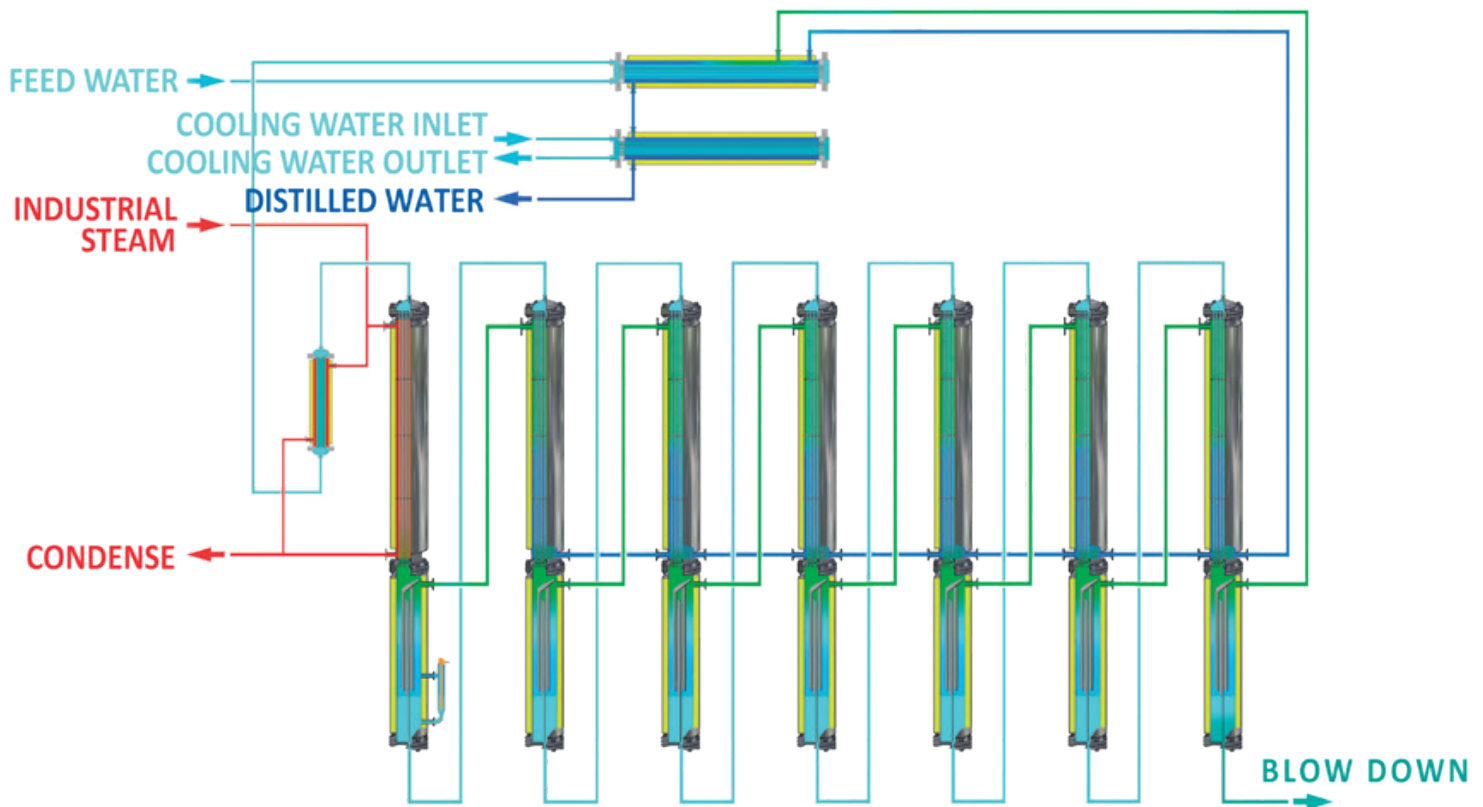
DOC. TYPE	MAIN CONTENTS IN BRIEF	
VALIDATION PACKAGE	DQ	QUALITY PLAN
		FUNCTIONAL DESIGN SPECIFICATION
		HARDWARE DESIGN SPECIFICATION
		SOFTWARE DESIGN SPECIFICATION
	IQ	RISK ASSESSMENT
		DOCUMENTATION VERIFICATION
		AS-BUILT VERIFICATION
		COMPONENTS VERIFICATION
		INSTRUMENTS VERIFICATION
		HARDWARE VERIFICATION
		SOFTWARE INSTALLATION VERIFICATION
	OQ	PRODUCT CONTACT MATERIALS VERIFICATION
		SAFETY VERIFICATION
UTILITIES & BOUNDARIES CONNECTION VERIFICATION		
HMI AND COMMUNICATION VERIFICATION		
ACCESS VERIFICATION		
OQ	INPUTS/OUTPUTS VERIFICATION	
	ALARMS VERIFICATION	
	FUNCTIONAL VERIFICATION AND TRENDS REPORTS VERIFICATION	
	POWER FAILURE VERIFICATION	
	AUDIT TRAILS AND CSV VIOLATION VERIFICATION (FOR SCADA SYSTEMS ONLY)	
	TRAINING VERIFICATION AND FINAL REPORT	

WATER FOR INJECTION IN BULK*		
PHISICAL / CHEMICAL	EU.PH.	USP
<i>Appearance</i>	Colorless, clear	Not defined
<i>Conductivity</i>	≤ 1.1 µS/cm@20°C	≤ 1.3 µS/cm @25°C
<i>TOC</i>	≤ 0.5 mg/L	≤ 0.50 mg/L
<i>Nitrates NO₃</i>	≤ 0.2 ppm	Not defined
<i>Aluminium</i>	≤ 10 ppb	Not defined
MICROBIOLOGICAL	EU.PH.	USP
<i>Bacterial count</i>	≤ 10 CFU/100 ml	≤ 10 CFU/100 ml
<i>Bacterial endotoxins</i>	< 0.25 IU/ml	< 0.25 EU/ml

*update January 31, 2023

SMPT *Process*

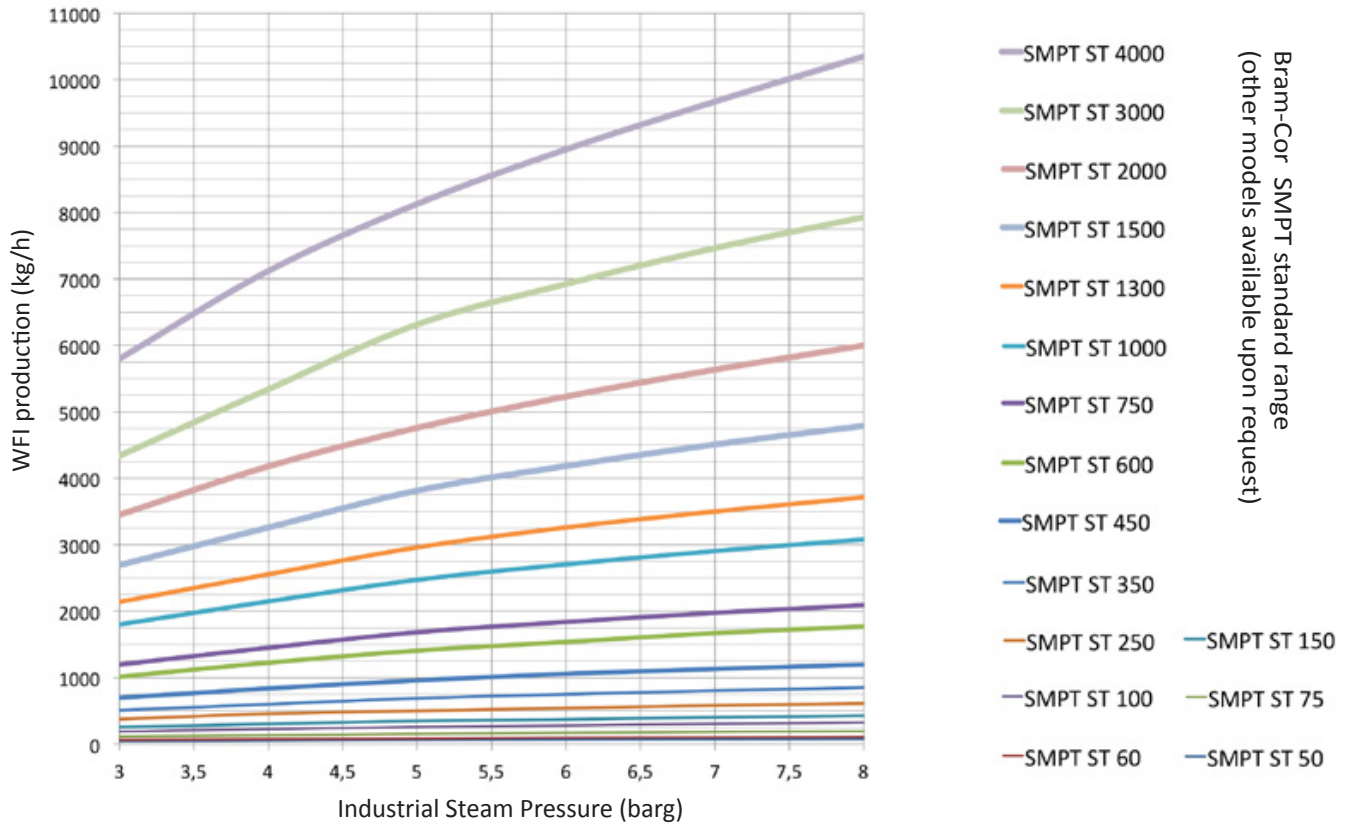
CONTINUOUS HEATING FOR
EVAPORATION AND COOLING
FOR CONDENSATION



BRAM-COR SMPT multiple effect distillation process runs as follows: Heating 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





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, low / medium / high viscosity emulsions, 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, 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.

info@bram-cor.com
www.bram-cor.com

BRAM-COR S.P.A. - V. MERCALLI 12/A - 43122 PARMA - ITALY
 TEL +39 0521 538711 - FAX +39 0521 538770 - P.IVA 01699350342