Carry Over from Drum Boilers

Frank Gabrielli

IAPWS, Greenwich, England, September 1-5, 2013

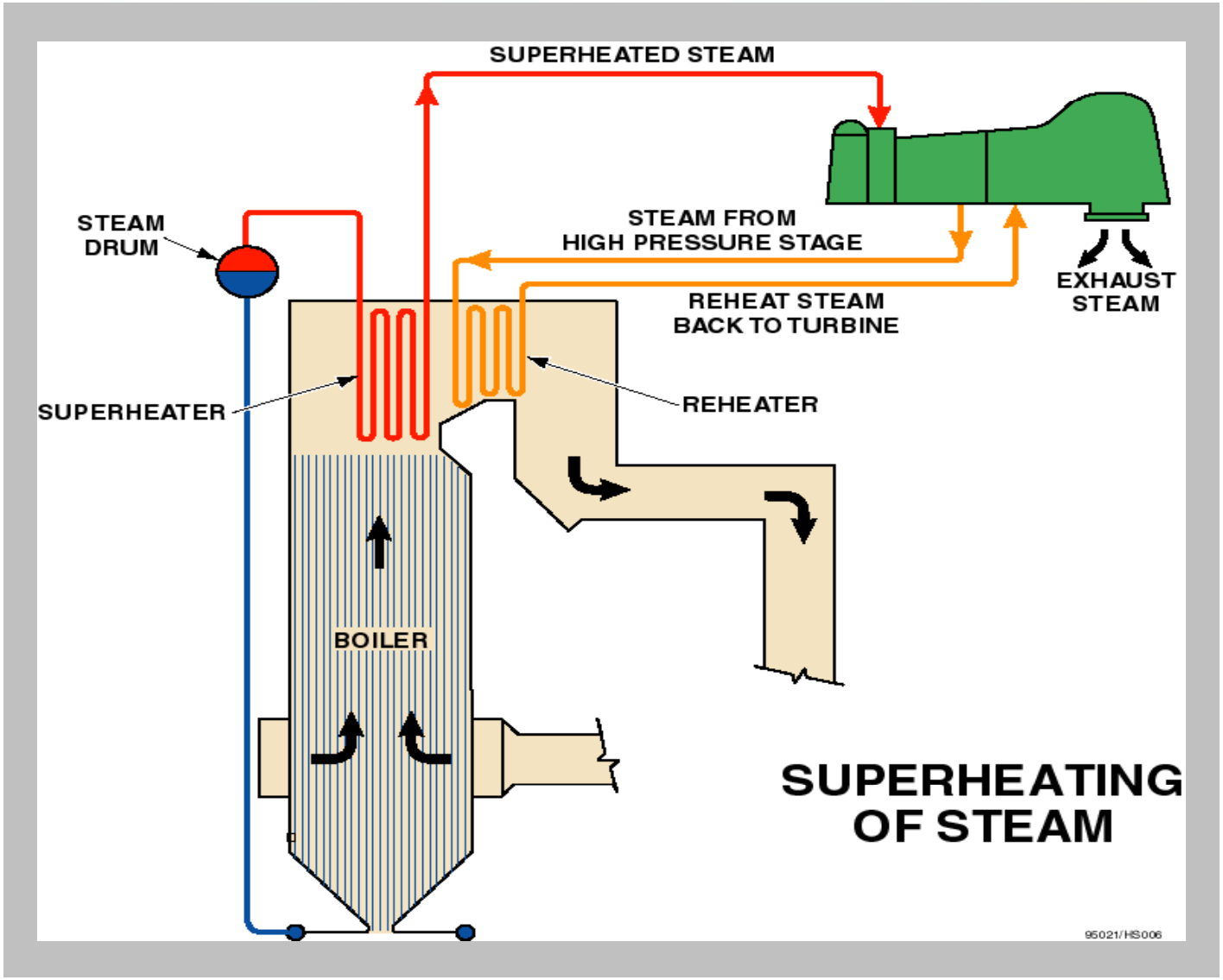
POWER SYSTEMS

ALSTOM

Agenda

POWER SYSTEMS ALSTOM

Drum Boiler



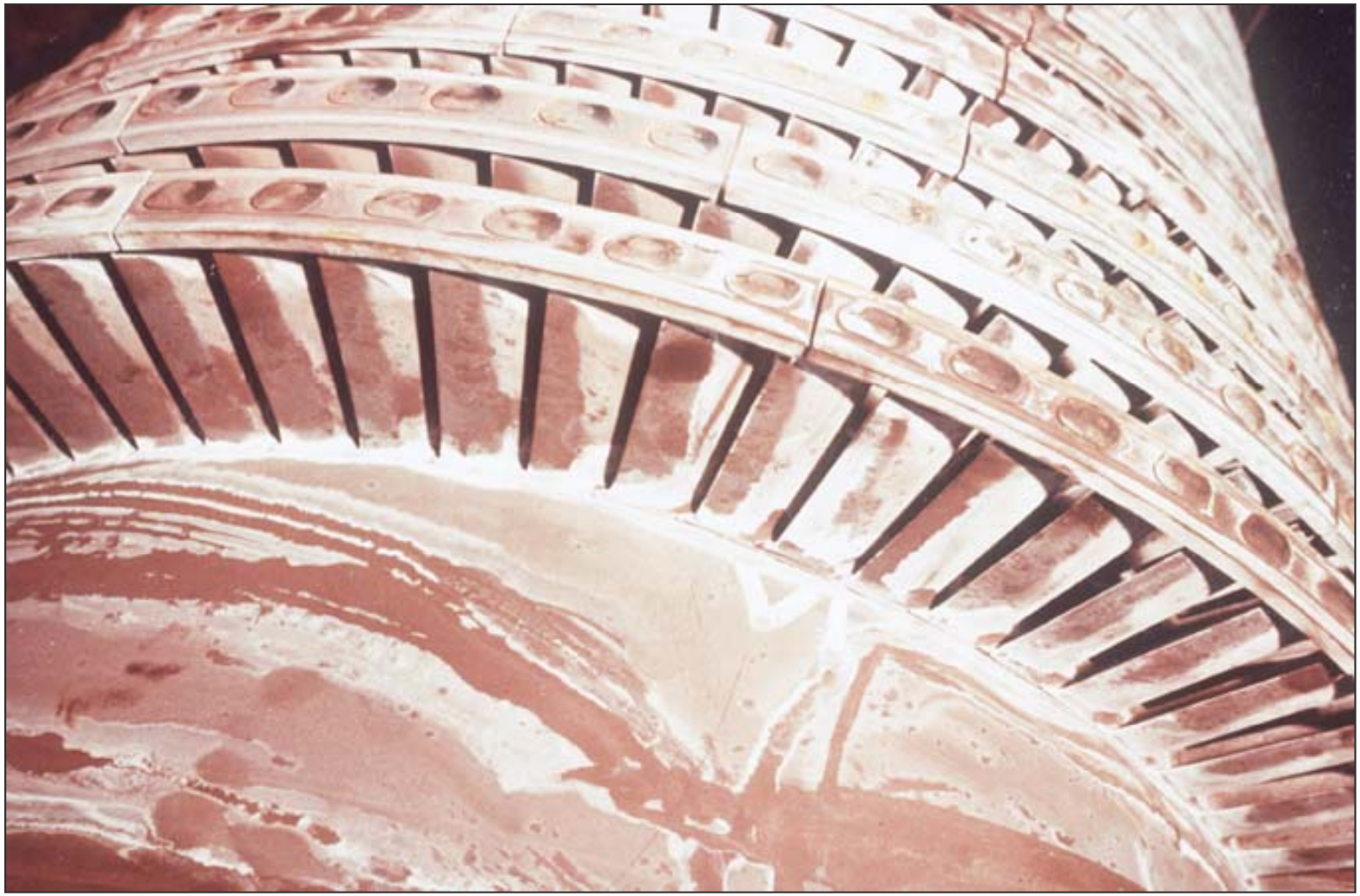
POWER SYSTEMS ALSTOM

Typical Drum Boiler Water Quality

			≤	–	
		μ			

POWER SYSTEMS ALSTOM

Turbine Fouling



POWER SYSTEMS ALSTOM

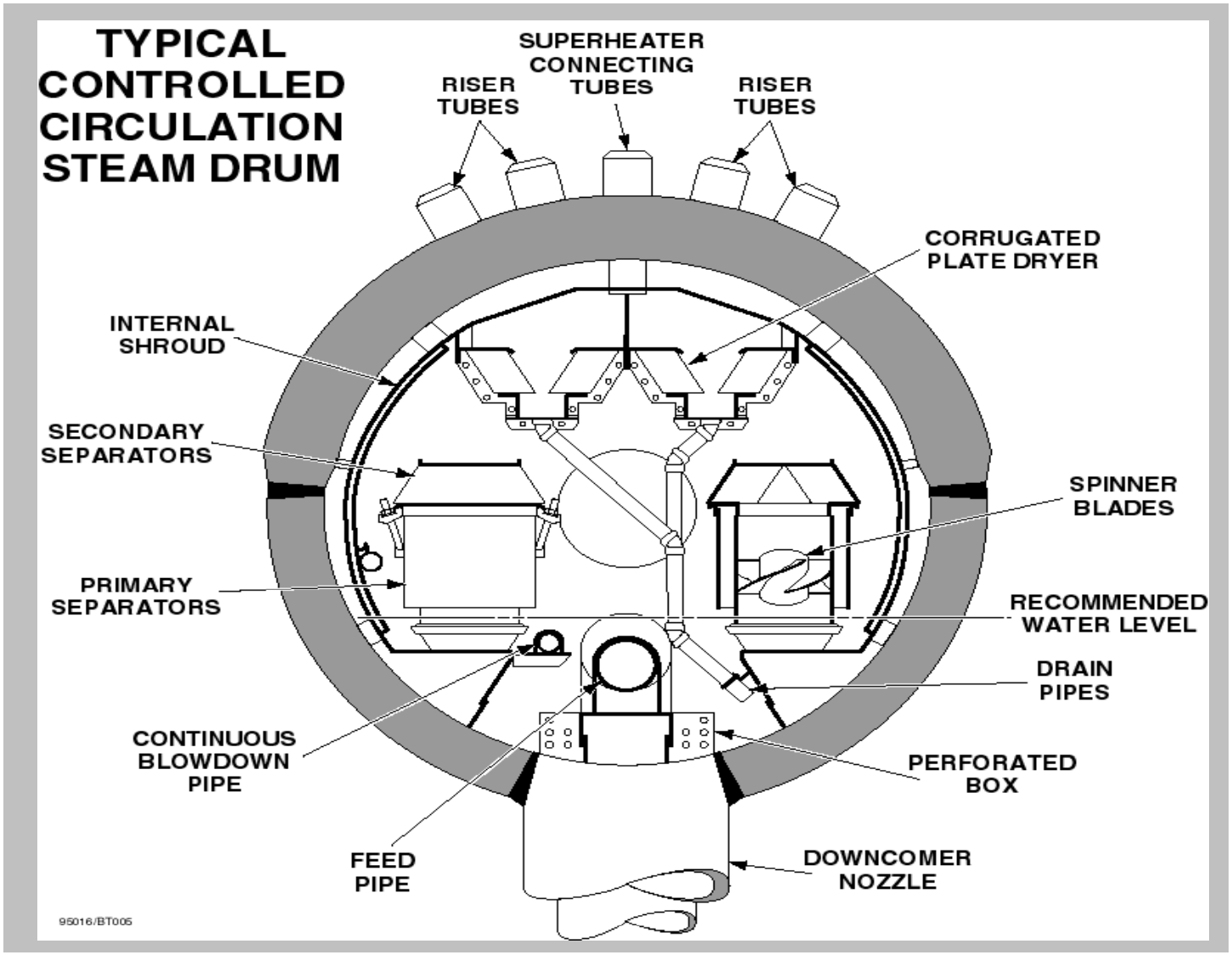
Turbine Blade Deposits

Stress Corrosion Cracking

POWER SYSTEMS ALSTOM

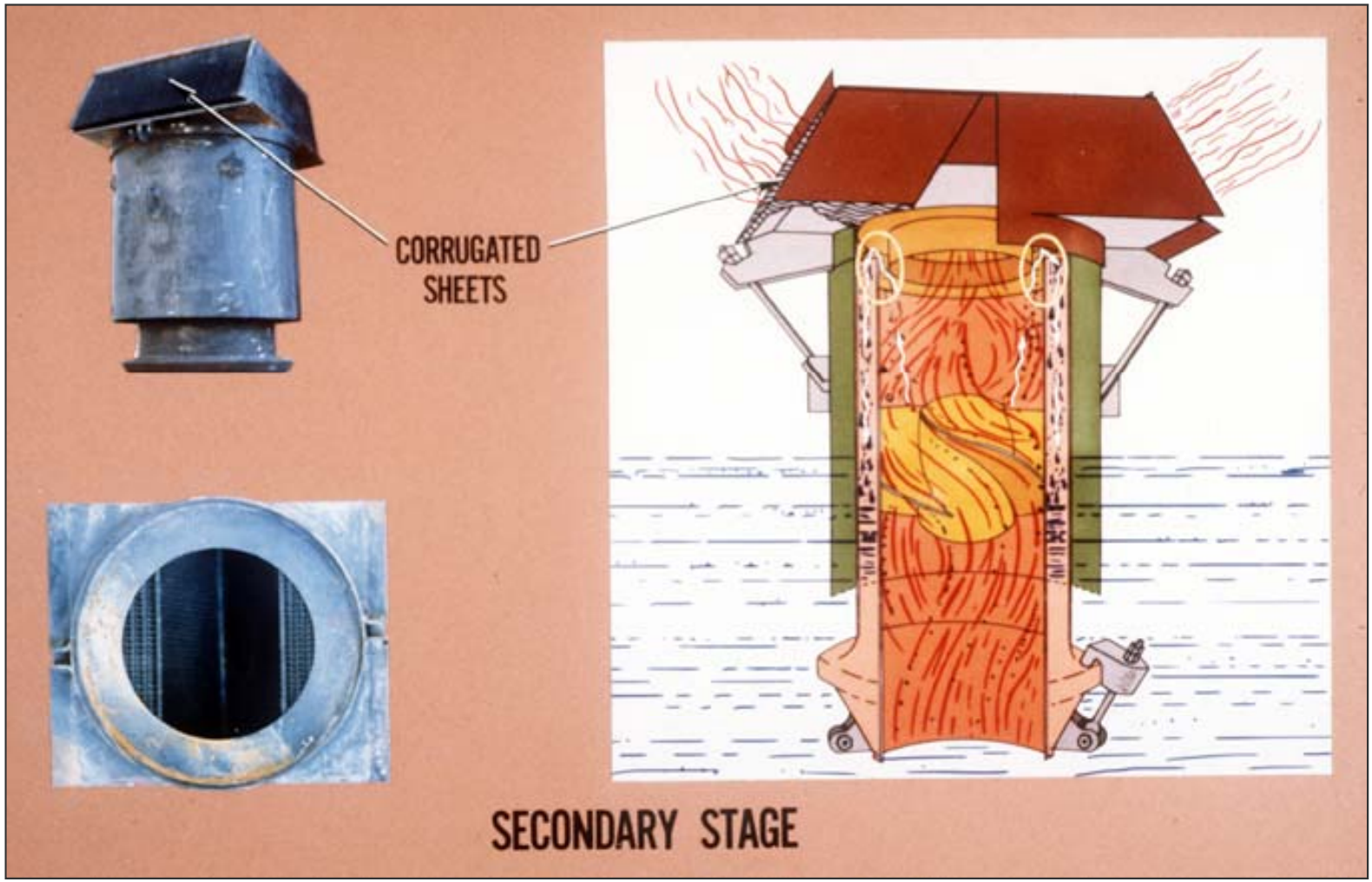
Localized Overheating

Steam Drum and Internals



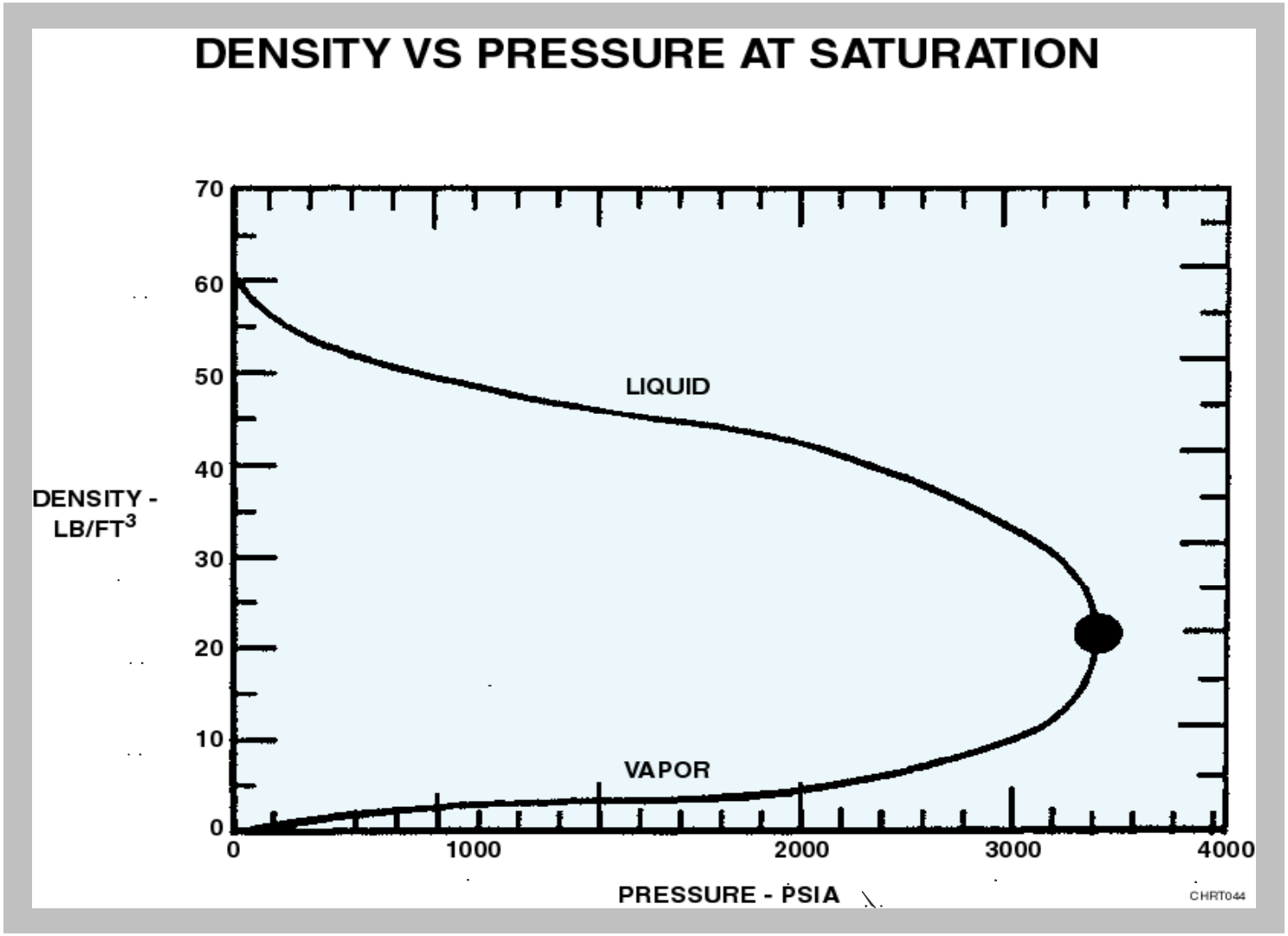
POWER SYSTEMS ALSTOM

Water/Steam Separator



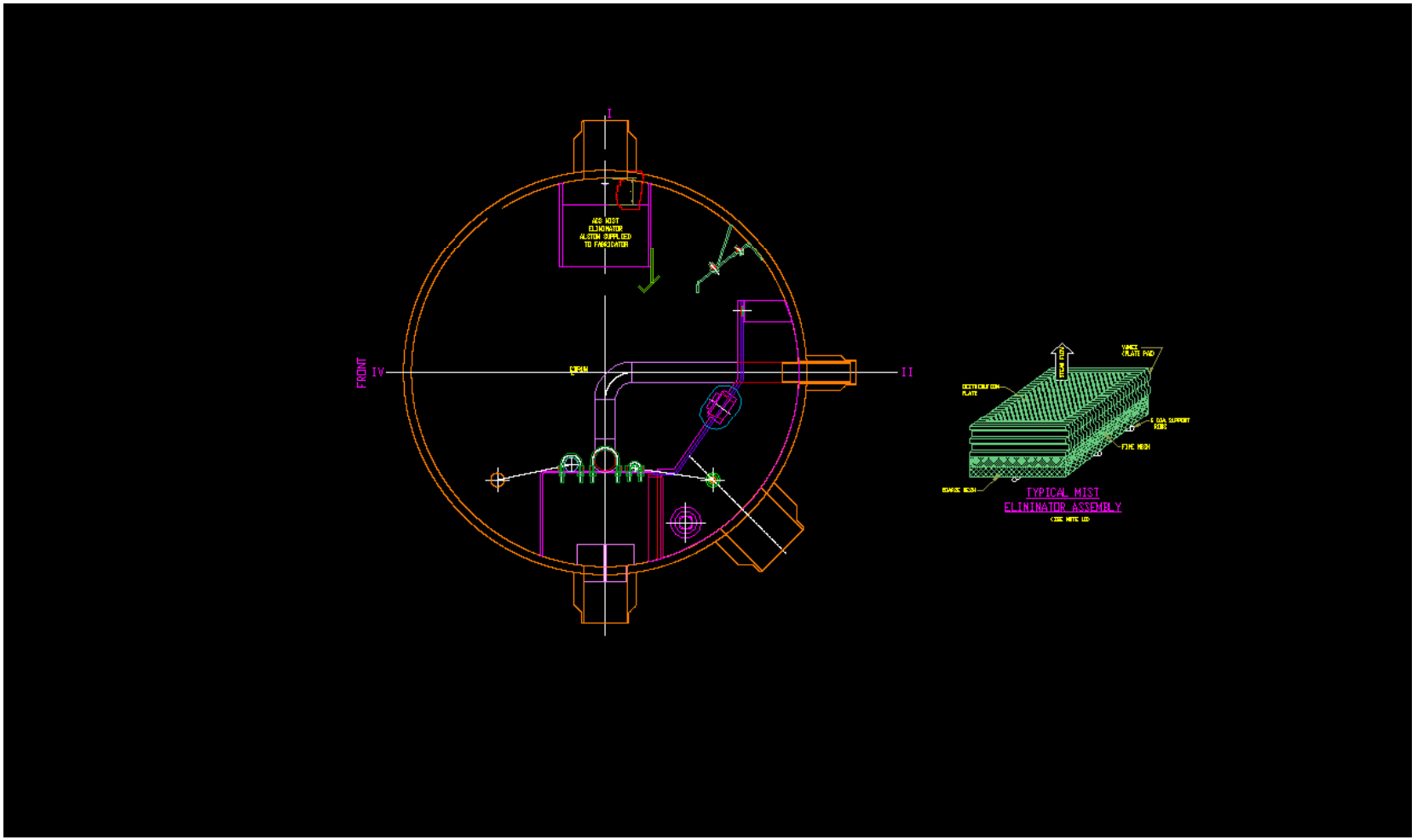
POWER SYSTEMS ALSTOM

Water/Steam Saturation Curve



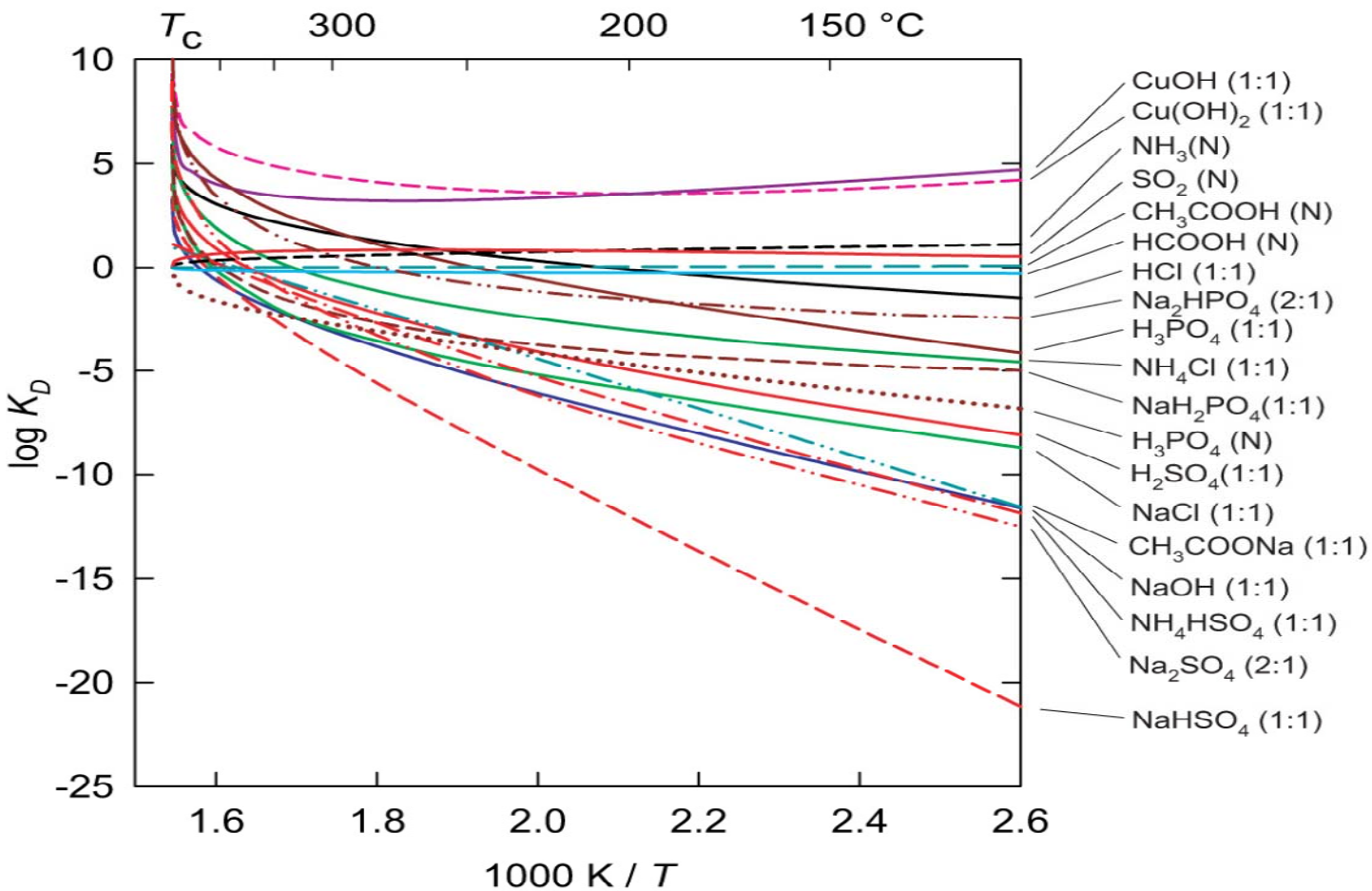
POWER SYSTEMS ALSTOM

Drum Separator – Wire Mesh/Chevron Demister Pads



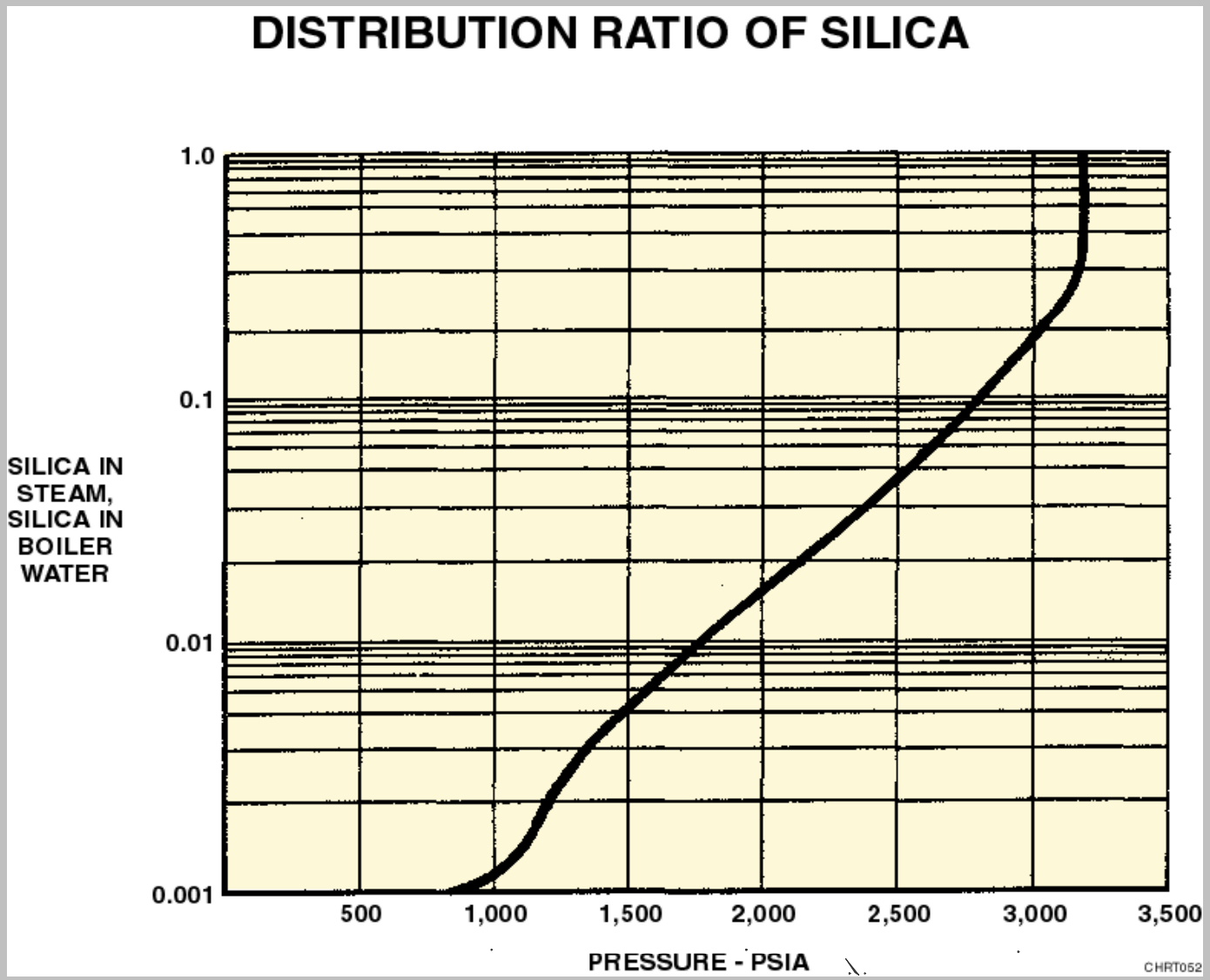
POWER SYSTEMS | ALSTOM

Vaporous Carryover



POWER SYSTEMS ALSTOM

Silica Vaporous Carryover



POWER SYSTEMS ALSTOM

A new IAPWS guidance document on the determination of the Carry Over from drum boilers

Frank Gabrielli, Robert Svoboda,Barry Dooley, and PCC Committee

Presented at:

15th International Conference

International Association for Properties Water and Steam

September 7-12, 2008

Berlin, Germany

POWER SYSTEMS ALSTOM

Carryover Determination

Total carryover is determined as the ratio of the saturated steam sodium concentration to boiler water sodium concentration. Mechanical carryover is determined by subtracting the vaporous sodium carryover in the steam at high pressures.

$$T = C_s / C_b * 100$$

$$M = T - V$$

T	Total Carryover (%)
M	Mechanical Carryover (%)
V	Vaporous Carryover (%)
C_s	Tracer concentration in saturated steam (ppm)
C_b	Tracer concentration in boiler water (ppm)

POWER SYSTEMS ALSTOM

Mechanical Carryover Test Conditions

Test No.	Unit Load %MCR	Drum Operating Pressure kPa	Water Level mm-NWL
1	100	Max	0
2	100	Nominal	0
3	100	Nominal	+100
4	100	Nominal	+50
5	100	Nominal	-50
6	100	Nominal	-100
7	105 (peak)	Nominal	0
8	75	Corresponding	0
9	50	Corresponding	0

POWER SYSTEMS ALSTOM

www.alstom.com

ALSTOM