

# AIK11.2

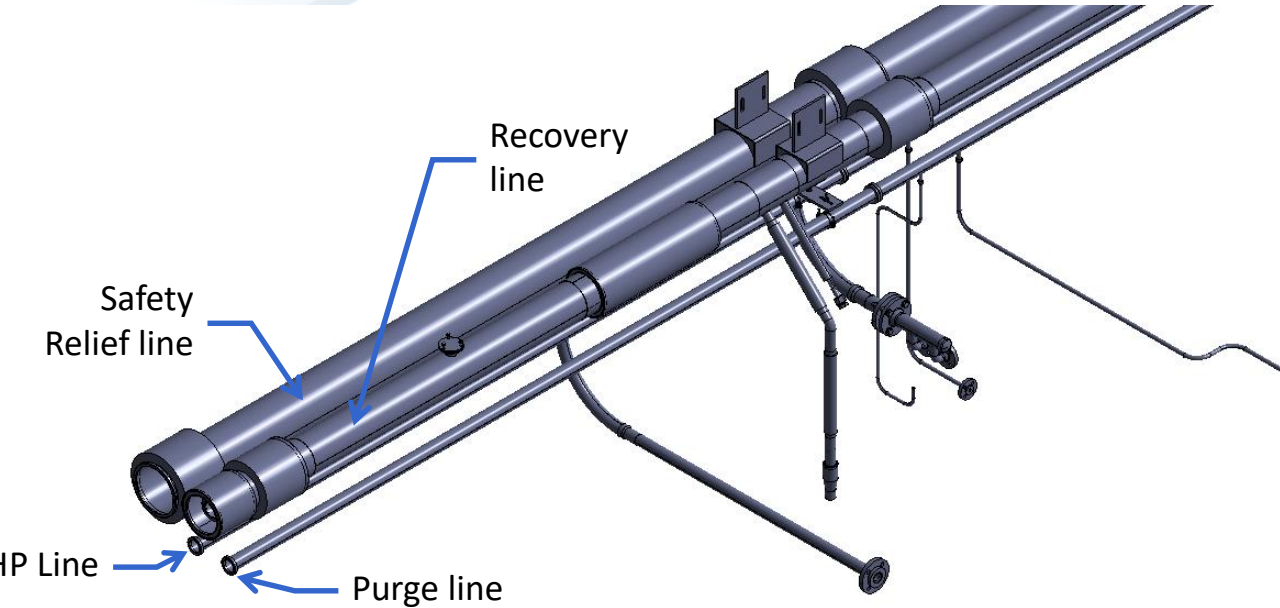
## WP11-Cryogenic Distribution System for the Spoke linac

### Auxiliary lines - CDR

### Requirements

P. DUTHIL

## ❖ The four auxiliary lines

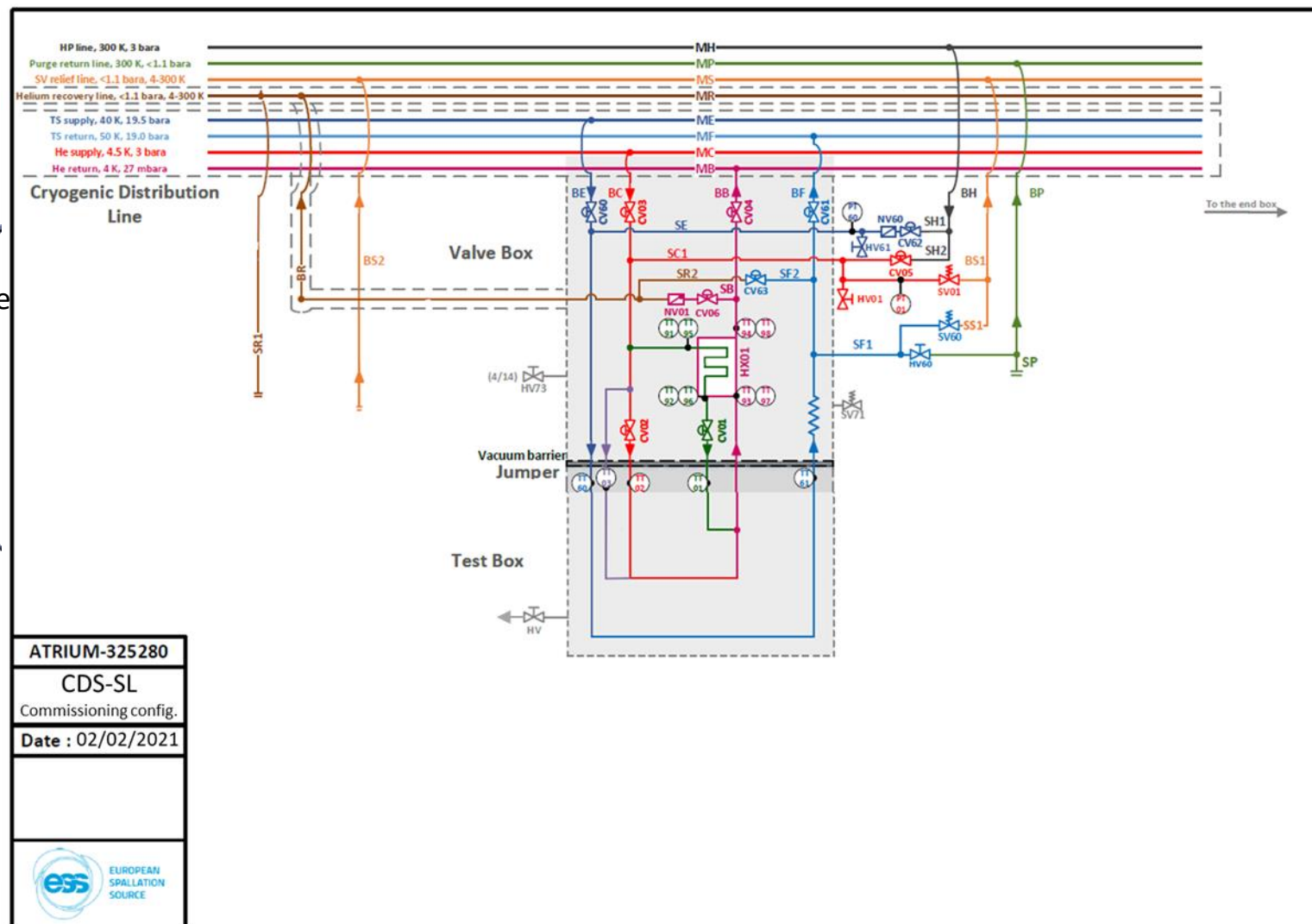
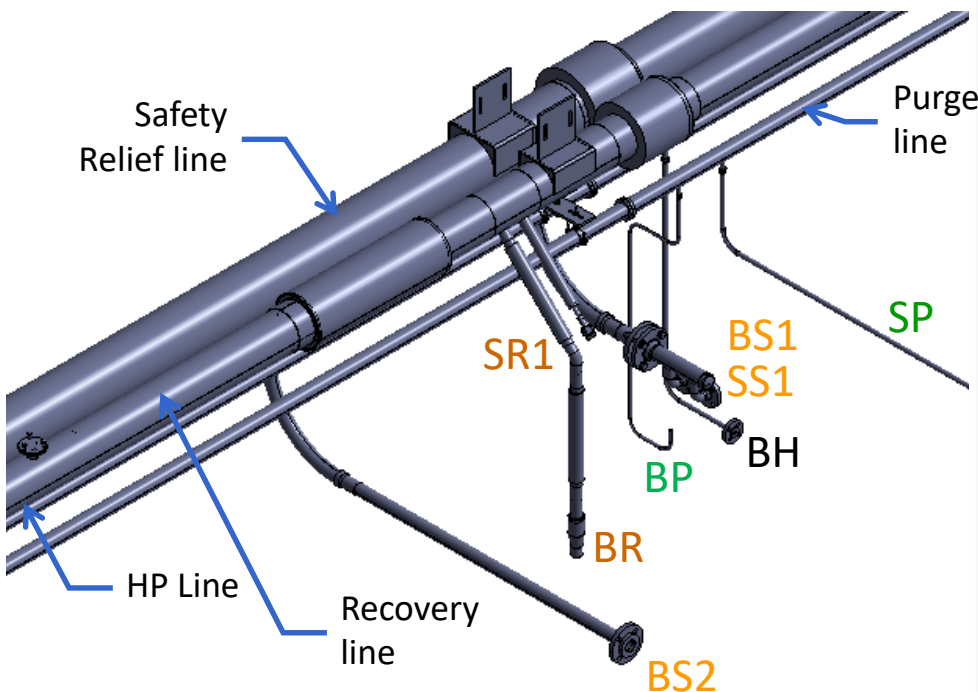


“Radiation resistance All materials and components of the CDL placed in the linac tunnel shall tolerate the radiation dose of  $5 \times 10^4$  Gy.”

Circuit Name	Ab.	MAWP (PS)	Operating T° (K)	Ø x e (mm)	PED category
Helium recovery line (vac. Jacketted)	MR	0.5 barg 6 barg	4-300 4-300	168.3 x 2.6 88.9 x 2.6	NA article 4.3
Safety relief line	MS	1 barg	4-300	219.1 x 3	article 4.3
HP Line	MP	5 barg	300	60.3 x 2	article 4.3
Purge return Line	MH	5 barg	300	60.3 x 2	article 4.3

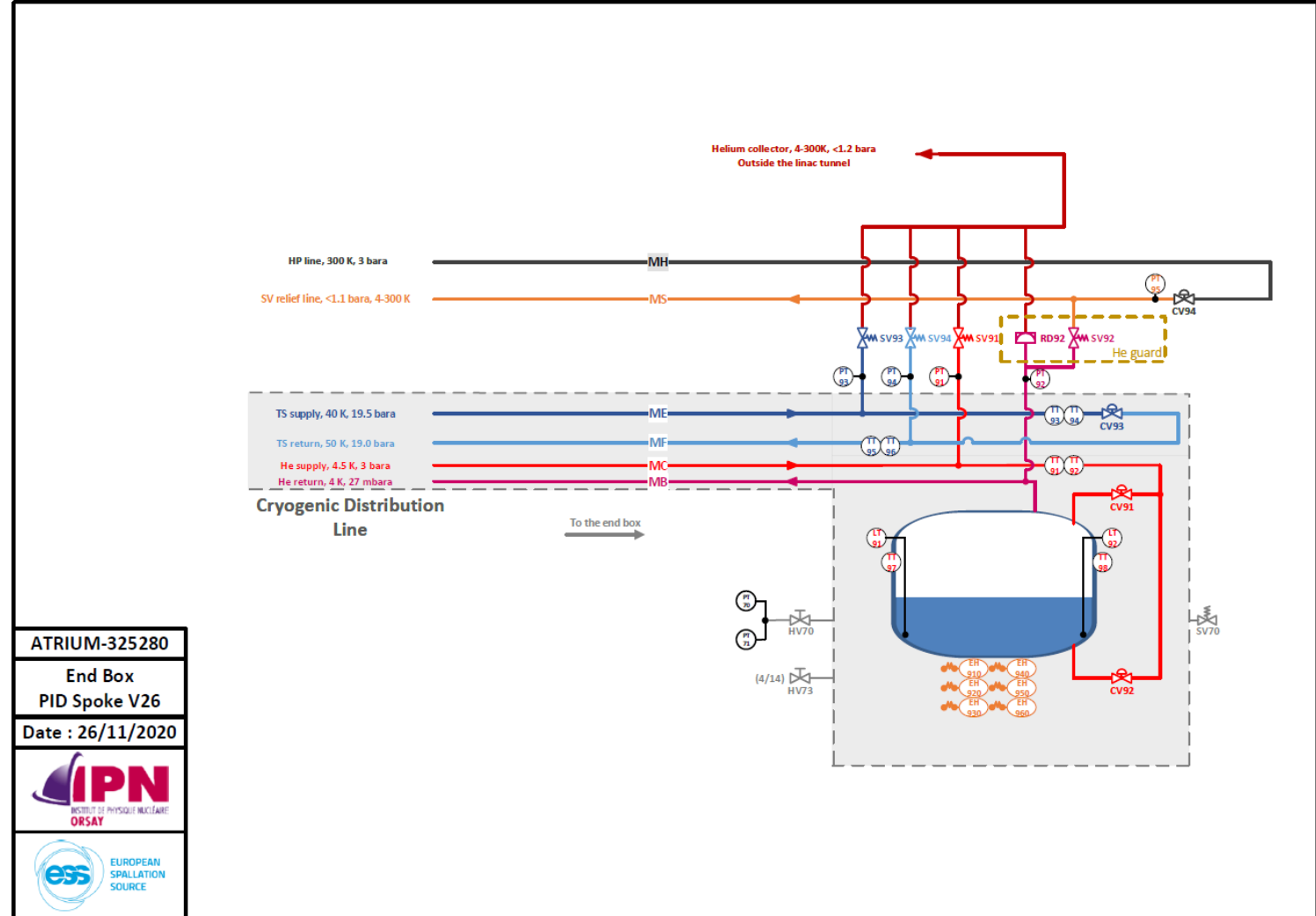
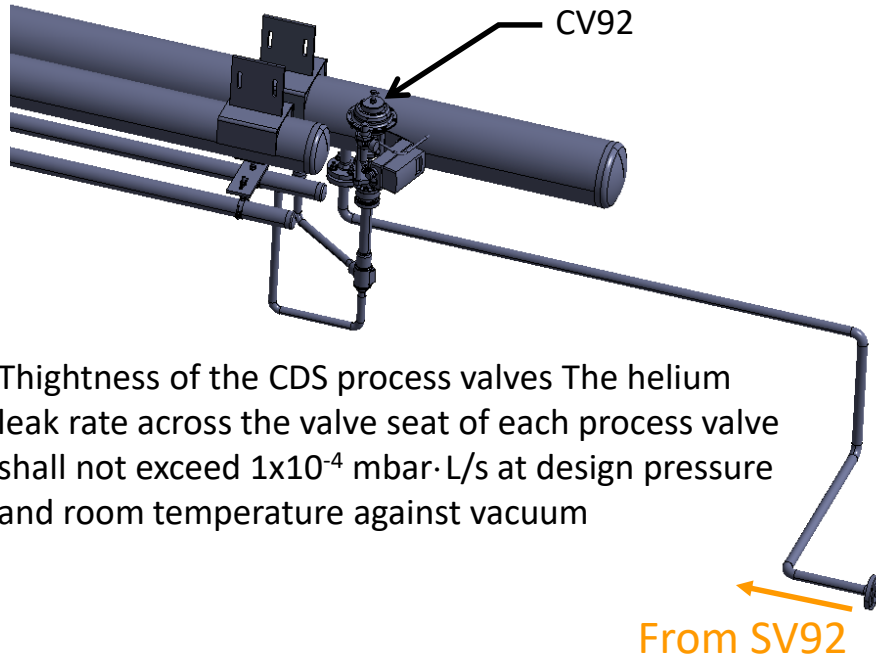
## ❖ PID

➤ Aux. lines and SPK VBs  
 (commissioning configuration)



## ❖ PID

### ➤ Aux. lines and EB (commissioning configuration)



## ❖ Requirements

Max. flow rate at the SPK He Recovery Line (MR) outlet	The He recovery line of the elliptical linac CDS shall take helium from the He recovery line of the spoke linac CDS at a maximum mass flow rate of 6.9 g/s*	* 4.8 g/s from a single cryomodule warm-up/cool-down + 2.1 g/s from the power coupler cooling loops
Helium temperature at the He Recovery Line	The He recovery line of the spoke linac CDS may return helium to the He recovery line of the elliptical linac CDS at a maximum operating temperature of 300 K and at a minimum operating temperature of 4.5 K	
He recovery line maximum operating pressure	The He recovery line of the spoke linac CDS shall supply helium to the He recovery line of the elliptical linac CDS at a maximum pressure of 1.1 bara	Requirement valid during the nominal operation phase as well as during the cool-down and warm-up of a single cryomodule phases
Max. flow rate at the SV Relief Line (MS)	The SV relief line of the elliptical linac CDS shall take helium from the SV relief line of the spoke linac CDS at a maximum mass flow rate of 170 g/s	
Helium temperature at the SV relief Line	The SV relief line of the spoke linac CDS may return helium to the SV relief line of the elliptical linac CDS at a minimum operating temperature of 4.5 K	
SV relief line maximum operating pressure	The SV relief line of the spoke linac CDS shall supply helium to the SV relief line of the elliptical linac CDS at a maximum pressure of 1.1 bara	
Max. flow rate at the HP Line (MH)	The HP line of the elliptical linac CDS shall supply helium to the HP line of the spoke linac CDS at a maximum mass flow rate of 25 g/s	
HP line maximum nominal operating pressure+C31e	The HP line of the elliptical linac CDS shall supply helium to the HP line of the spoke linac CDS at a maximum pressure 3 bara	

## ❖ Requirements

Safety valve relief outlet lines (BS2) maximum operating pressure	CM safety valve relief lines (BS2) shall return helium at a maximum operating pressure of 1.1 bara
Safety valve relief outlet lines (BS2) maximum mass-flow	CM safety valve relief lines (BS2) shall return helium at a maximum operating mass-flow of 2,6 g/s
Power-coupler return line (SR1) maximum operating pressure	Power-coupler return line (SR1) shall return helium at a maximum operating pressure of 1.1 bara
Power-coupler return line (SR1) maximum mass-flow	Power-coupler return line (SR1) shall return helium at a maximum operating mass-flow of 0,16 g/s
Cavity purge return line (SP) maximum operating pressure	Cavity purge return line (SP) shall return helium at a maximum operating pressure of 1.1 bara



Thank you for your attention