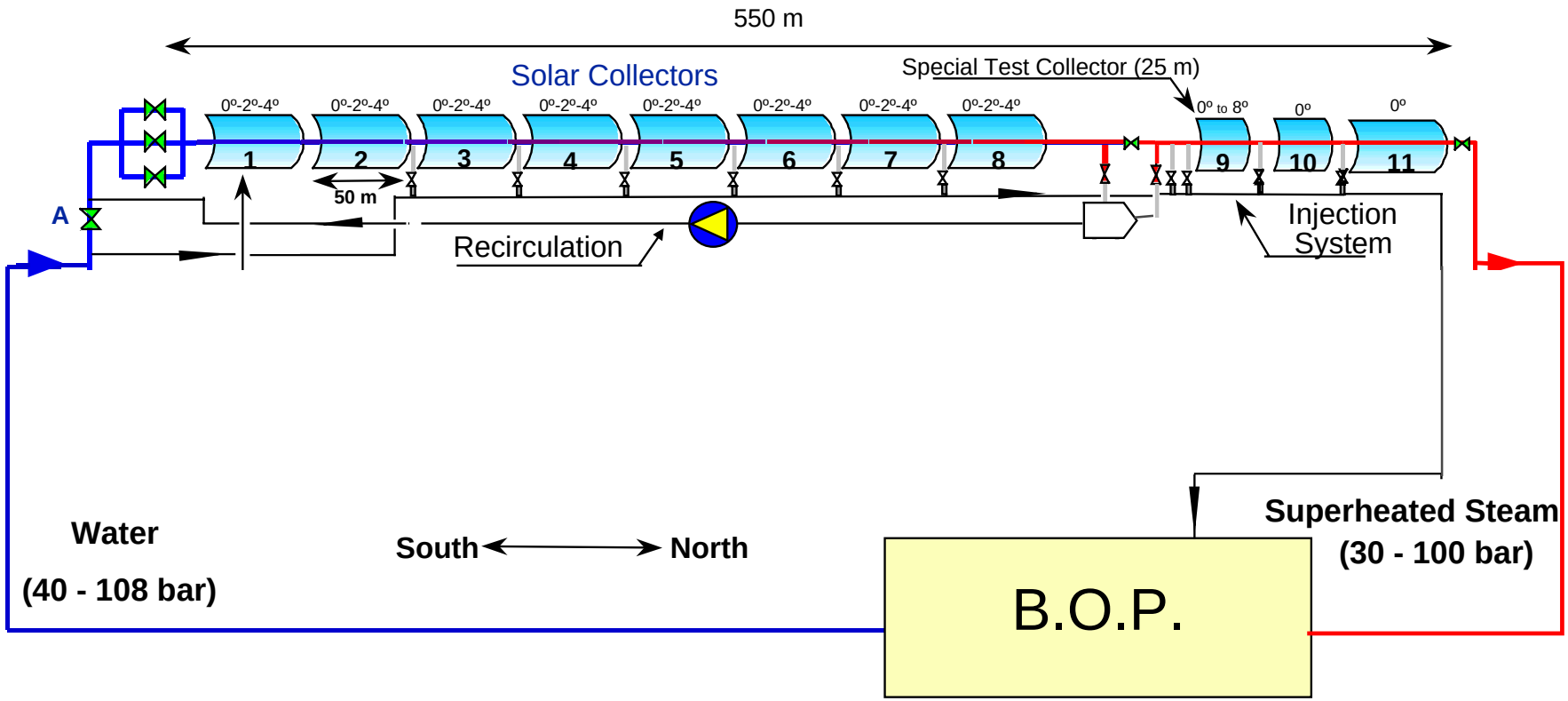
Actual Configuration of the PSA DISS Test Facility



The PSA DISS Test Facility

Aerial View of the PSA DISS Test Facility

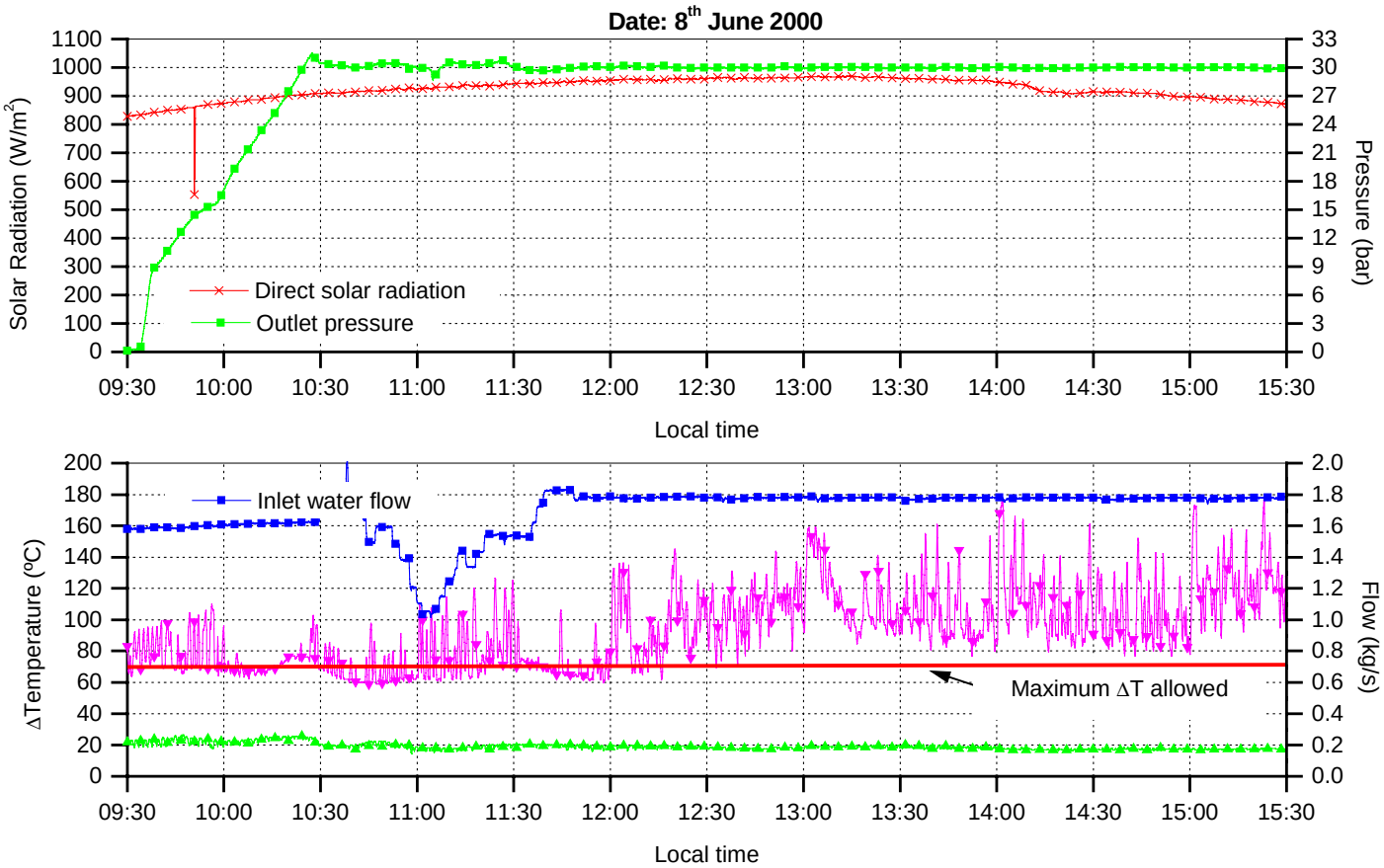
Technical Characteristics of the PSA DISS Test Facility

No. of parabolic-trough modules	40
Module aperture/length:	5.76 m /12 m
No. of solar collectors	11
Total row length:	550 m
Inclination of the tracking axis:	0º,2º,4º,6º,8º
Orientation:	North-South
Absorber pipe inner/outer diameter:	50/70 mm
Mass flow per row (once-through configuration)	1 kg/s
Max. recirculation rate:	4
Max. outlet steam temperat./pressure:	400ºC/100 bar

The DISS Project: experimental results

- The test facility has been operated for more than 1000 hours. Saturated steam at 100bar and superheated steam at 60bar/375ºC have been produced in Recirculation mode.
- The pressure drops at both the boiling and the steam superheating sections in the solar field are much smaller than theoretically predicted by simulation models.
- The high pressure/temperature ball joints are performing very well. No problem has been found so far.
- The circunferential temperature gradient at the absorber pipes of the boiling section is less than 20ºC for I= 950W/m^2 and a flow of 0,8 kg/s, while the temperature gradient at the steam superheated section is of about 40ºC for a steam flow of 0,5 kg/s (see Results I and II)
- The water recirculation pump has repeatedly failed at high pressures (>60 bar). After one year, the pump manufacturer (National Oil Well) is still trying to solve the problem.
- The steam pressure at the solar field outlet is rather stable, even with great solar radiation transients (see Results III and IV for 30 and 60 bar)
- The new local control unit developed by CIEMAT for sun tracking is performing very well

The DISS Project: experimental results (I)

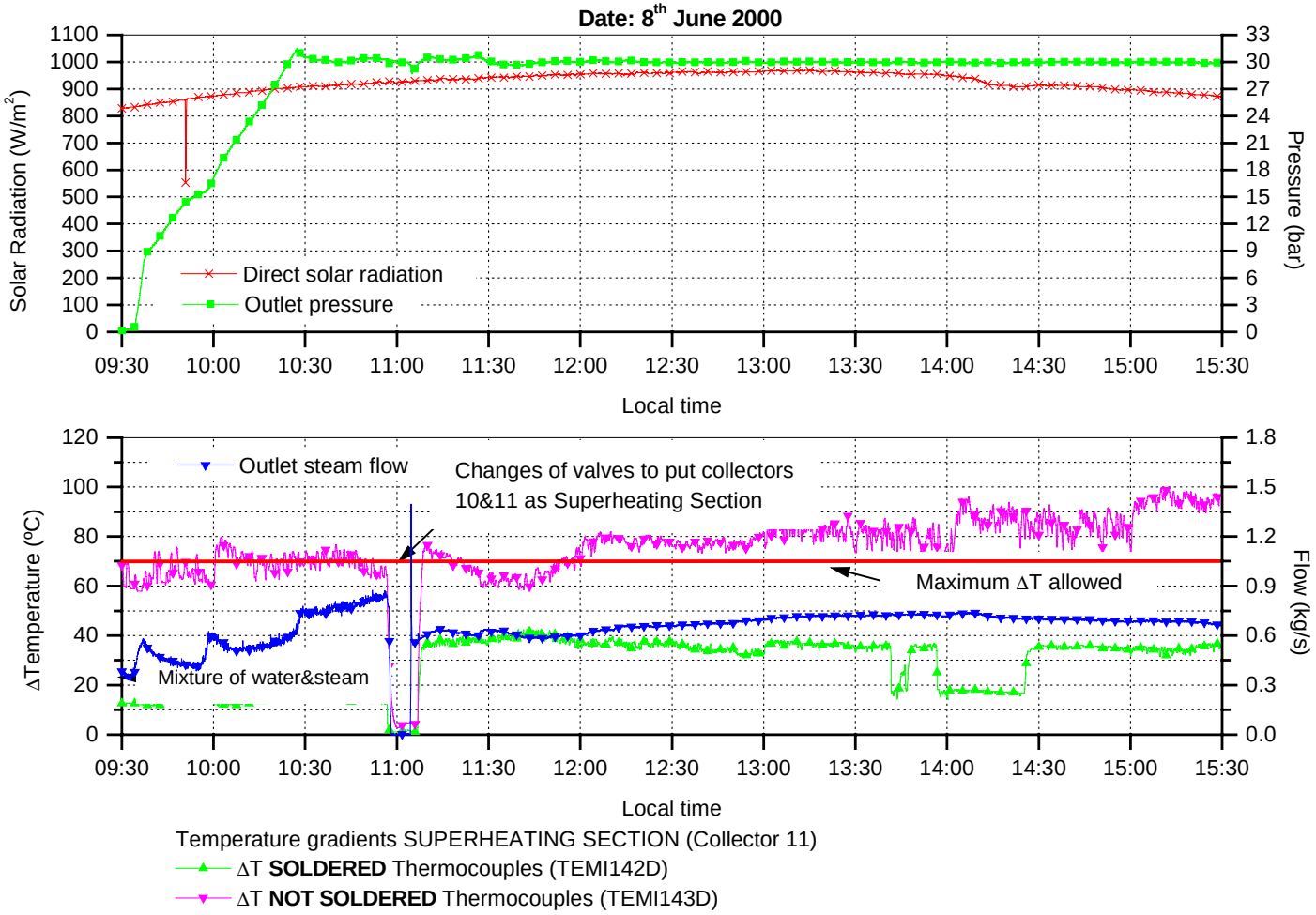


Temperature gradients BOILING SECTION (Collector 5)

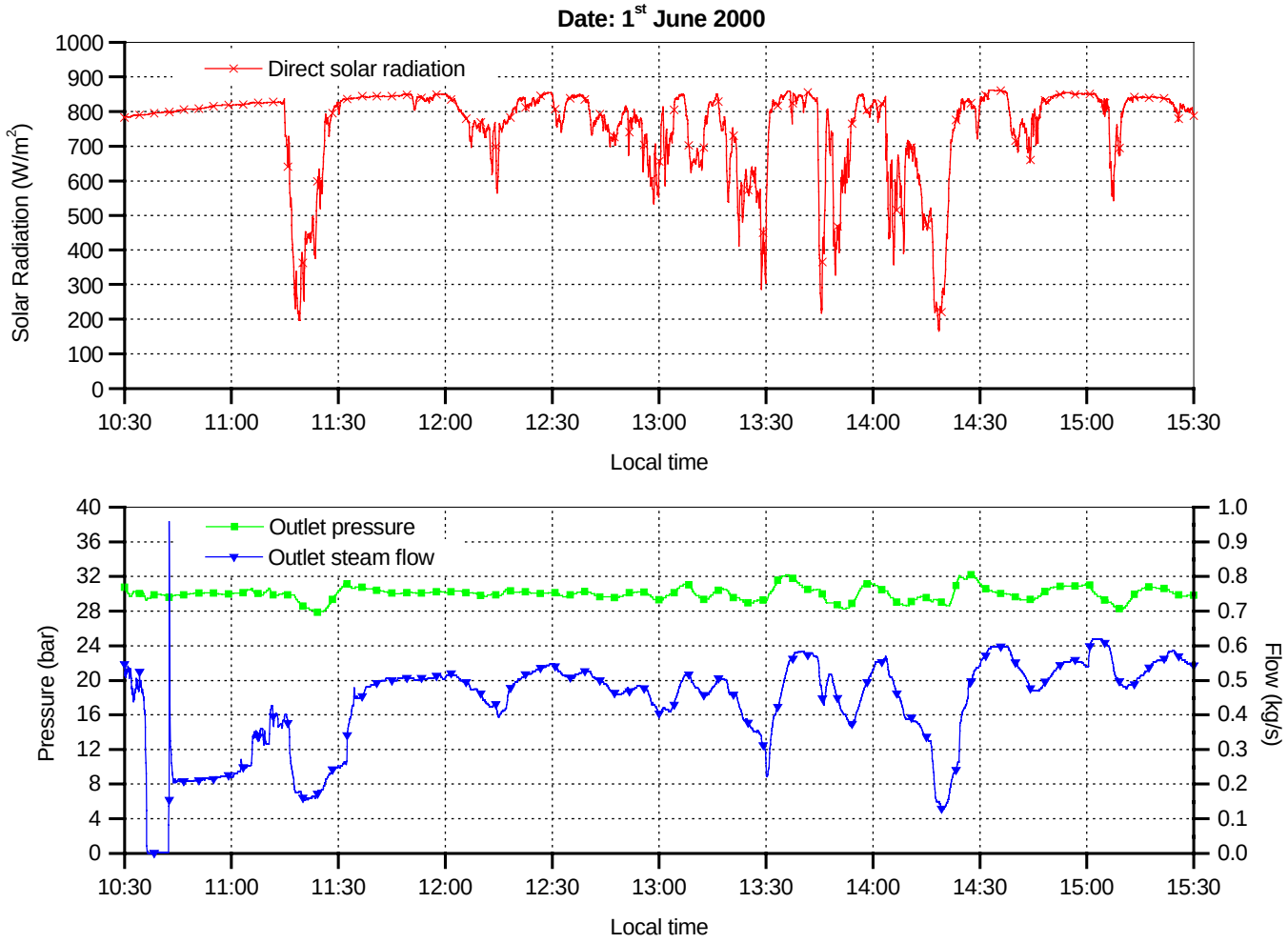
ΔT **SOLDERED** Thermocouples (TEMI118D)

ΔT **NOT SOLDERED** Thermocouples (TEMI119D)

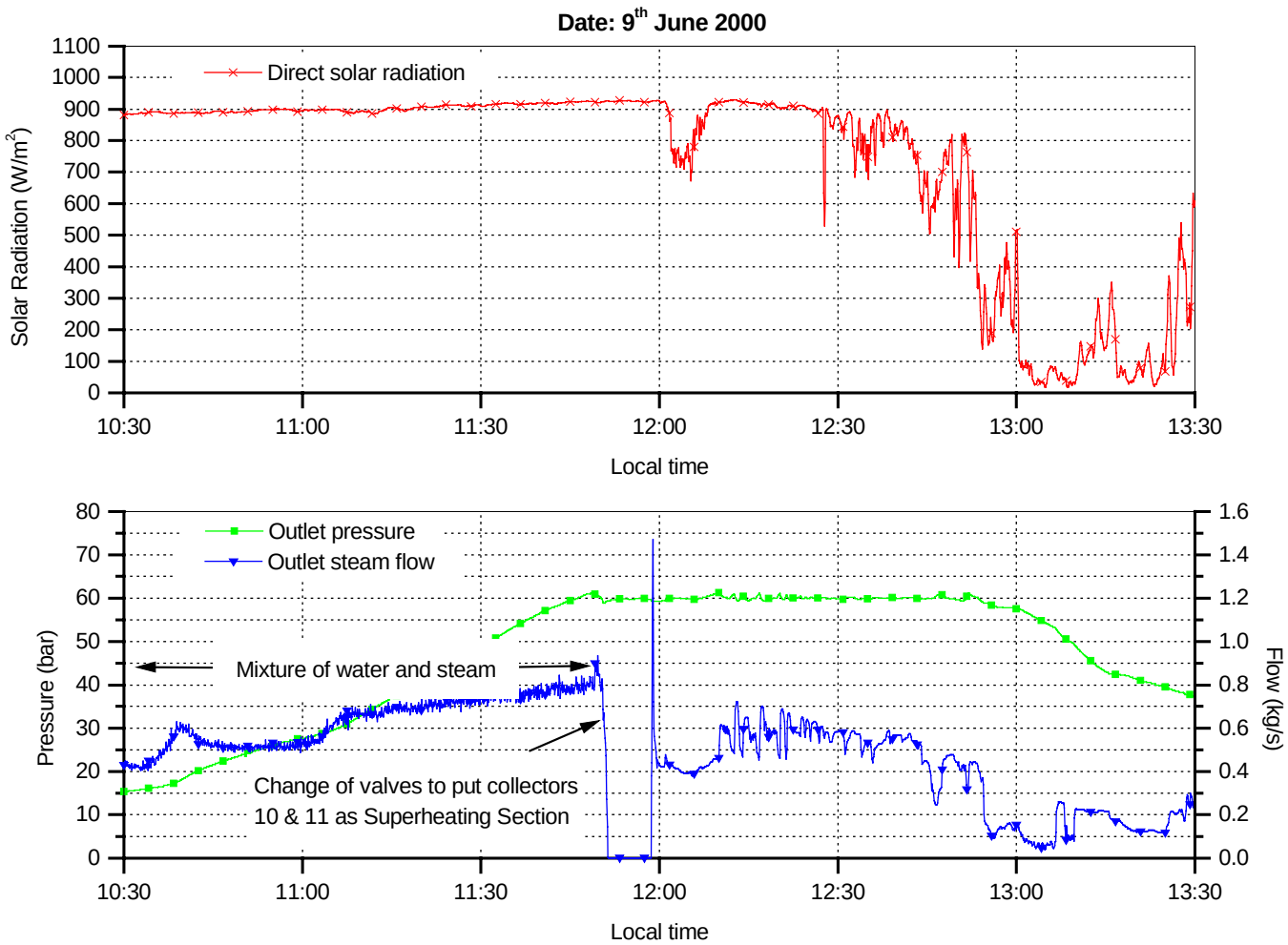
The DISS Project: experimental results (I)



The DISS Project: experimental results (III)



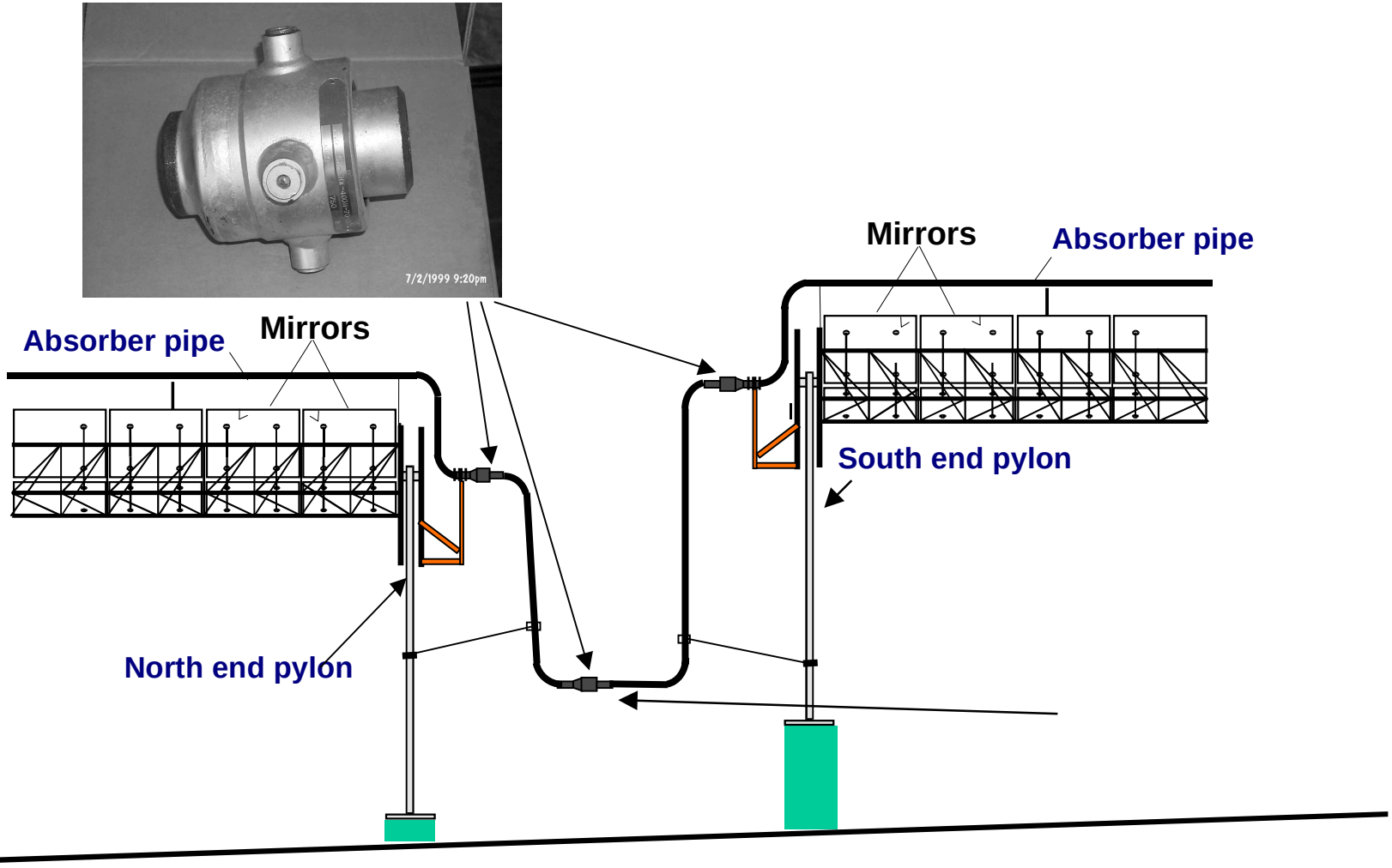
The DISS Project: experimental results (IV)



DISS test facility: water recirculation pump

detail of a damaged plunger

damaged graphite sealings

The PSA DISS Test Facility

Ball-joints installed at the DISS collectors