THERMAL SCIENCE TECHNOLOGIES
Saving Energy with Innovative Insulation Solutions

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Expansion & Contraction Study - ConduFill©

CPCU | Paris, France

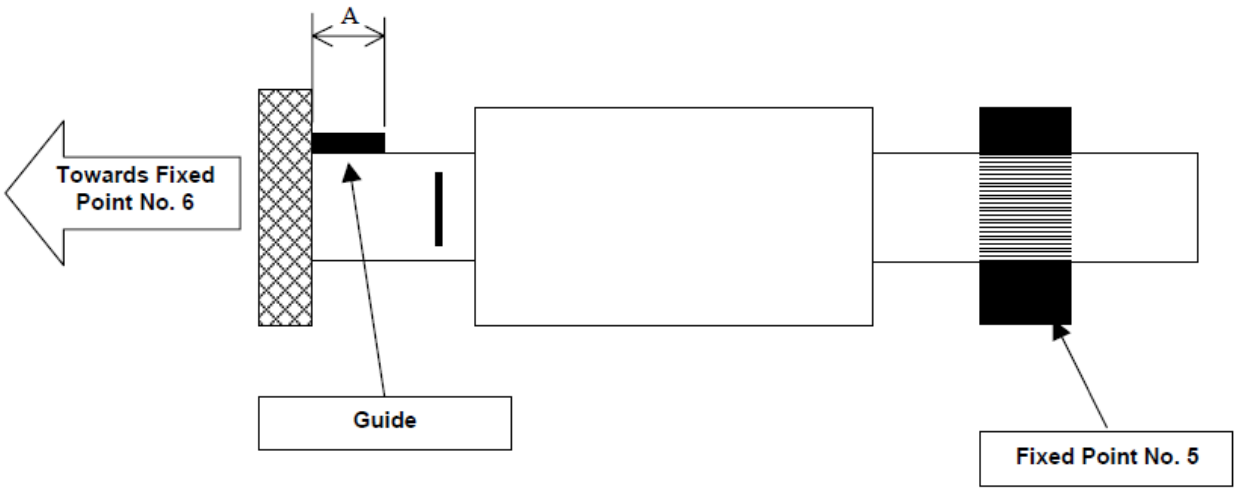
CPCU
Notre réseau renouvelle vos énergies

1. Steam Line Expansion Verification

Measurements were taken prior to the injection of ConduFill© on an expansion joint and a loop when a complete shutdown was performed on CPCU.s steam system in Paris, France. The shutdown took place from Aug. 22nd thru Aug. 25th, 2003.

2. Expansion Joint Motion Verification

This expansion joint is located on the ALSTOM site between fixed point No. 5 and 6.

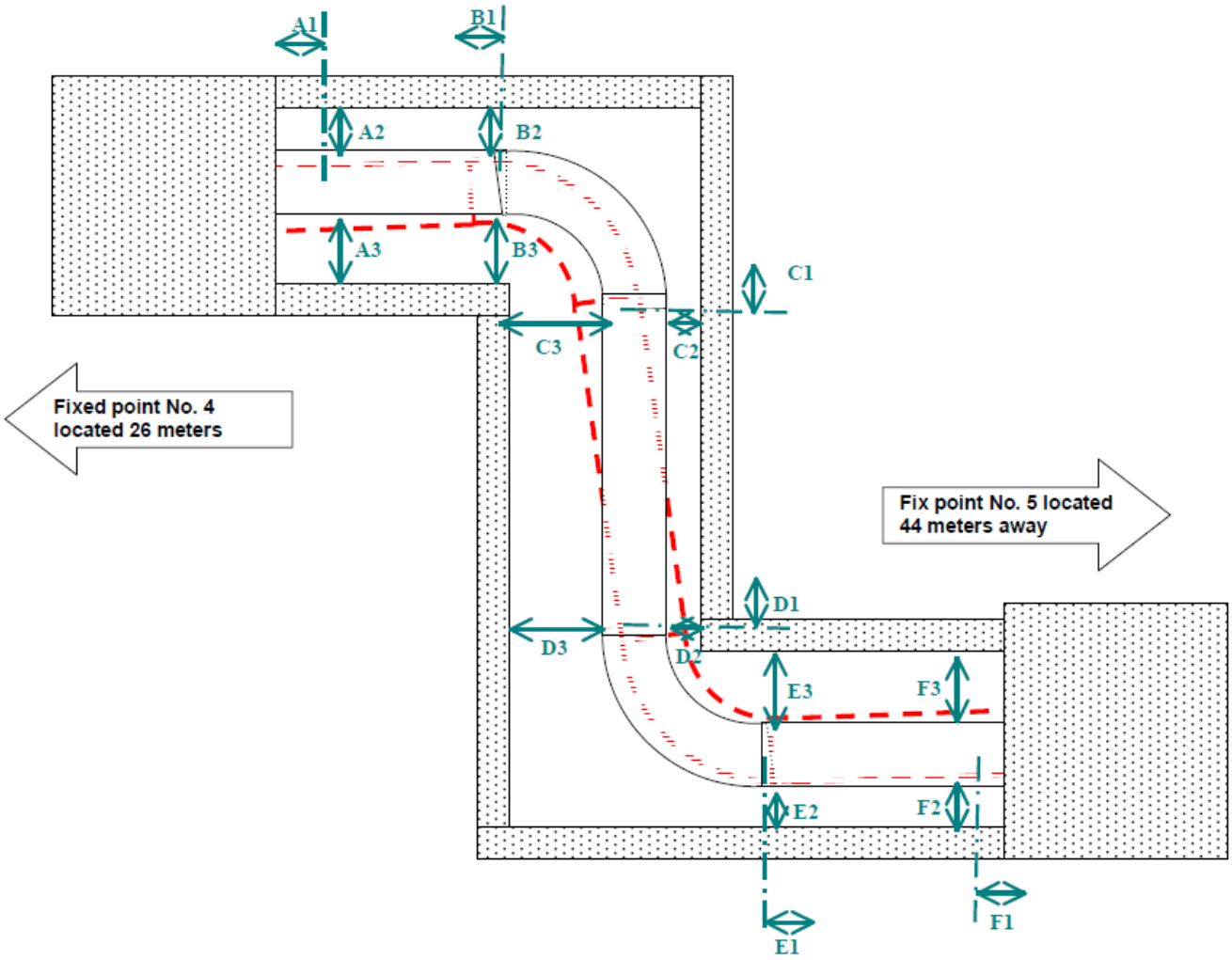


Data Prior to ConduFill℠ Injection	Technical data prior to system shut down	Technical data after system shut down	Delta for before and after
Distance for A	245mm	130mm	115 mm
Steam line temperature	195°C	35°C	160°C

Data After ConduFill℠ Injection	Technical data prior to system shut down	Technical data after system shut down	Delta for before and after
Distance for A	245mm	130mm	115 mm
Steam line temperature	195°C	35°C	160°C

3. Loop Control

This loop is located on the ALSTOM site between the fixed points No. 4 and 5.



*When the system was shut down, the temperature of the carrier pipe was 35°C.

	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3	E1	E2	E3	F1	F2	F3
Position prior to shut down		240	140		205	145		270	150		262	168		125	255		125	255
Position after shut down	dèp 60	265	115	Dèp 60	235	115	Dèp 0	325	90	Dèp 0	180	250	Dèp 80	145	230	Dèp 85	150	230
Difference		25	25		20	20		55	60		82	82		20	25		25	25

4. Control - ConduFill© Post Injection

The system was shut down from Friday, September 19th 2003 at 10h00 am until Monday, September 22nd, 2003 at 10h00 am. The temperature was registered at 35°C. The entire loop located between fixed point No. 4 and fixed point No. 5 was completely filled with ConduFill©. The displacement of the expansion joint and the loop are identical to the displacement

measured in August when we shut down the pre-foamed system. We verified the movement of the loop by cutting the foam (see photos below).

In photo #1 below, the void between the steam pipe and the insulation was generated by the displacement of the cooling steam pipe. When the system was turned back on, the steam pipe moved back to its original location as shown in photos 2 and 3 when the system is reaching 2 bars and 15 bars respectively. Also note that in all three photos, the ConduFill© and the existing mineral wool (dark brown) appear to be compressed.

Photo #1 Cold **Photo #2 @ 2 bars** **Photo #3 @ 15 bars**