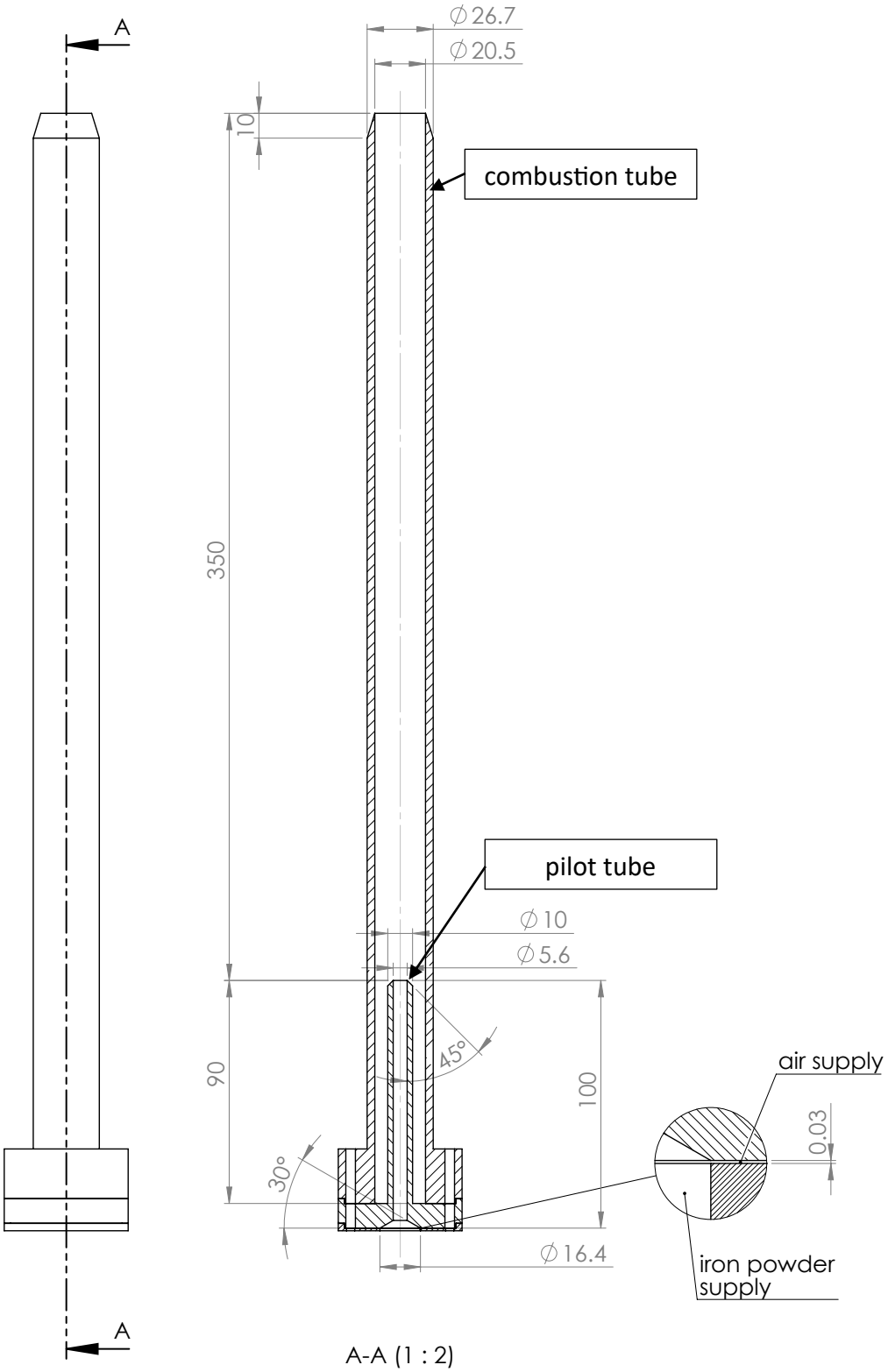
KIT Iron-Air Bunsen Flame

Version 1.0 – 20.10.2023

Burner schematics:
(all dimensions in mm)



A-A (1 : 2)

Main flow (at the combustion tube outlet):

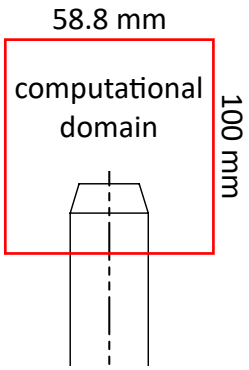
Mean velocity: 0.25 m/s
Mass flow air: 9.773e-05 kg/s
Mass flow iron: 5.277e-05 kg/s ($\phi_{Fe_2O_3} = 1$)
Temperature: 298 K
Gas composition: 21 vol% O_2, 79 vol% N_2

Co-flow:

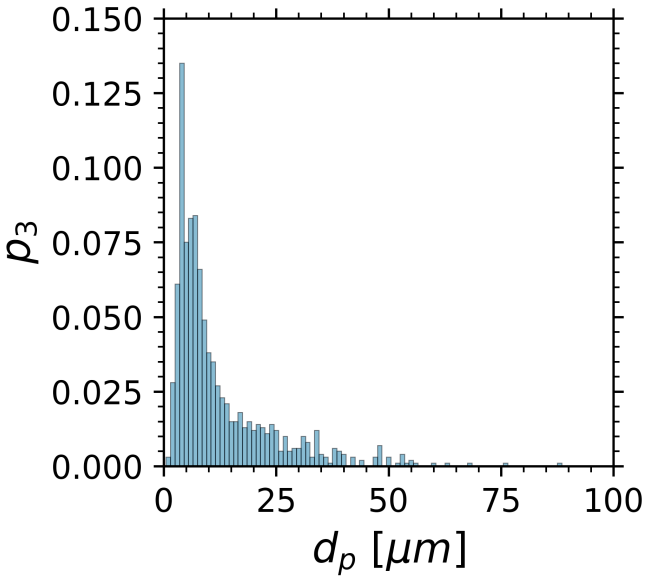
Issued from an outer tube around the combustion tube (not explicitly shown in schematics)
Nozzle diameter: 58.8 mm
Mean velocity: 0.25 m/s
Temperature: 298 K
Gas composition: 21 vol% O_2, 79 vol% N_2

Recommended boundary conditions for numerical simulations:

	T	U	p
Combustion pipe	fixed value (298 K)	fixed value (exp. data)	zero gradient
Co-flow	fixed value (298 K)	fixed value (25 cm/s)	zero gradient
Wall	zero gradient	no slip	zero gradient
Surroundings	zero gradient	inlet/outlet	wave transmissive (1 atm)



Particle size distribution (measured with a Camsizer X2):



The csv-file of the particle size distribution is available on request (see contacts below).

Contacts:

Michal Fedoryk (michal.fedoryk@kit.edu) for the experimental data
Daniel Braig (braig@stfs.tu-darmstadt.de) for the numerical setup

References:

M. Fedoryk, B. Stelzner, S. Harth, and D. Trimis, “Experimental investigation of the laminar burning velocity of iron-air flames in a tube burner,” *Applications in Energy and Combustion Science*, vol. 13, p. 100111, Mar. 2023, doi: 10.1016/j.jaecs.2022.100111.