

Materials List for:

Experimental Methodology for Estimation of Local Heat Fluxes and Burning Rates in Steady Laminar Boundary Layer Diffusion Flames

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Materials

Name	Company	Catalog Number	Comments
Thermocouples with connectors and clamps			
Unsheathed Fine Gauge T/C	P13R-002	Omega Engineering, Inc.	Fine wire microthermocouples (R-type)
Unsheathed Fine Gauge T/C	P13R-003	Omega Engineering, Inc.	Fine wire microthermocouples (R-type)
Ceramic 2 hole round - 5 pk	TRX-010364-6	Omega Engineering, Inc.	Ceramic tubes to hold the fine wire thermocouples
Thermocouple extension wire	EXTT-RS-24-100	Omega Engineering, Inc.	Thermocouple extension wire
Male Female Connectors	SHX-R/S-MF	Omega Engineering, Inc.	Connectors for R-type thermocouples
Accessories	MSRT-116-10	Omega Engineering, Inc.	Rubber tubes for maintaining grip for the ceramic tubes at the connectors's end
Traverse mechanism			
X slide, travel = 10 inch, 0.025 in/rev, limits, NEMA 17	XN10-0100-E25-71	Velmex Inc.	Velmex unislide
Vexta type 17, 1.8 deg/step 2phase, single shaft stepper motor	PK245-01AA	Velmex Inc.	Stepper motor
Mounting cleat, standard using 6-32 bolts	XMC-2	Velmex Inc.	Mounting accessories for the given Velmex unislide
6-32 x 7/16 SH Cap Screw for Xslide in X & Y axis	XMB-1	Velmex Inc.	Mounting accessories for the given Velmex unislide
X slide, travel = 10 inch, 0.025 in/rev, limits, NEMA 17	XN10-0100-E25-71	Velmex Inc.	Velmex unislide
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Control, 2 Axis programmable stepping motor control, 1 motor at a time	VXM-2	Velmex Inc.	Stepper motor controller
USB to RS232 DB9 Serial Communication cable 10 ft	RPC-USB-RS232-3M	Velmex Inc.	Serial communication cable between the stepper motor controller and computer
Data acquisition hardware			
NI 9214 16-Ch Isothermal TC, 24-bit C Series Module for high accuracy thermocouple	781510-01	National Instruments	Thermocouple data acquisition card

measurements (includes terminal block)			
Power Cord, AC, U.S., 120 VAC, 2.3 meters	763000-01	National Instruments	Power cord for the 8 slot C-DAQ chassis
cDAQ-9178, CompactDAQ chassis (8 slot USB)	781156-01	National Instruments	C-DAQ chassis for NI 9214 and NI 9239
EMI Suppression Ferrite for NI 9229/39 BNC	782801-01	National Instruments	Accessories for NI 9239 data acquisition card
NI 9239 BNC, 4-Ch +/-10 V, 50 kS/s per channel	780181-01	National Instruments	Data acquisition card for hot wire anemometer system
cDAQ-9171, CompactDAQ chassis (1 slot USB)	781425-01	National Instruments	C-DAQ chassis for NI 9214
Cameras			
Nikon D7100 24.1 MP DX-Format CMOS Digital SLR with 18-105 mm f/3.5-5.6 AF-S DX VR ED Nikkor Lens	Nikon D7100	Amazon	Digital SLR camera for taking top-view flame photographs
Canon EOS Rebel T5 DSLR CMOS Digital SLR Camera and DIGIC Imaging with EF-S 18-55 mm f/3.5-5.6 IS Lens	Canon EOS Rebel T5 DSLR	Amazon	Digital SLR camera for taking side-view flame photographs
Mass balance			
Mettler-Toledo, MS32001L Balance Prec 32,200 g x 0.1 g	97035-654	VWR	Precision electronic mass balance for measuring average mass burning rate
Mini CTA system			
MiniCTA Anemometer Package for wire- and film-probes	9054T0461	Dantec Dynamics	Hot wire system for measuring velocities and turbulence intensity at the wind tunnel outlet
Wind tunnel equipment			
1/2 in. x 4 ft. x 8 ft. C-3 Whole Piece Birch Domestic Plywood	Model # 833185	Home Depot	Used to make the laboratory scale wind tunnel
Woodgrain Millwork WM 206 11/16 in. x 11/16 in. x 96 in. Wood Pine Corner Moulding	Model # 109610	Home Depot	Used to make the laboratory scale wind tunnel
Extension Spring, Loop Ends, 6.562" Overall Length, Pack of 6	1330K26	McMaster-Carr	Used to make the laboratory scale wind tunnel
Strainer Grade Wire Cloth, 30x30 Mesh, 0.0130" wire diameter. 12"x12" sheet	9241T41	McMaster-Carr	Used to make the laboratory scale wind tunnel
Strainer Grade Wire Cloth, 40x40 Mesh, 0.0065" wire diameter. 12"x12" sheet	9241T42	McMaster-Carr	Used to make the laboratory scale wind tunnel
Mobile Lift Table Foot-Operated, 600# Capacity, 10" - 33" Table Height	2791T22	McMaster-Carr	Table to hold the experimental setup
ebm-papst p/n: G3G250-MW75-05 (EC Centrifugal blower, 200-240 V, 3-phase, 50/60 Hz, M3G112-EA motor, 2.2 kW)	G3G250-MW75-05	Ebm papst	Blower for the wind tunnel
ebm-papst p/n: HX0C-003-000-04 (Controller)	HX0C-003-000-04	Ebm papst	Pulse width modulation controller for controlling the speed of the blower
8020 1" X 1" T-SLOTTED PROFILE	8020-1010	80/20 (Rankin Automation)	Used to create a framework for the wind tunnel

Momentive/GE Silicone Sealant RTV108, 10.1-oz Cartridge, Semi-Clear	7545A472	McMaster Carr	Sealant for the wood
Software			
LabVIEW	Contact vendor	National Instruments	Used for continuous temperature data acquisition and analysis. Alternatively used for positioning the thermocouple.
Mettler Toledo mass balance software	Contact vendor	Mettler Toledo	Used for measuring the mass loss rate of the condensed fuel wick / solid plate with time
ImageJ	Free download	NIH, http://imagej.nih.gov/ij/	Used for measuring the flame standoff distance and surface regression of the solid fuel plate
Matlab	Contact vendor	Mathworks	Used for post-processing of data
Fortran 90/95	Contact vendor	The Fortran company	Used for post-processing of data
Materials			
Methanol	UMD Chem Store	NA	Liquid fuel
Ethanol	UMD Chem Store	NA	Liquid fuel
safety glasses	UMD Chem Store	NA	Used for safety purpose
spray bottle	UMD Chem Store	NA	Used for carrying water in case of emergency
Syringe 60 cc	UMD Chem Store	NA	Used for soaking the liquid fuel wick with liquid fuels
Optically Clear Cast Acrylic Sheet, 1/8" Thick, 24" x 48"	Mc master carr	8560K262	Solid fuel PMMA
Loctite Proxy Pak (Hi-temp adhesive)	Mc master carr	7556A33	Used for covering the sides of the wick with aluminum foil
Hi-Temp Aerosol Spray Paint (Black)	Mc master carr	7832T1	Used for painting the insulation
Self-Igniting Economy Propane Gas Torch Adjustable Flame, 4,179 Btu/hr	Mc master carr	78245A3	Propane torch for igniting the solid fuel plate
Heat-Resistant Cotton Glove W/ Nitrile Coating, 400 Deg F Max Temp, 10" Lg, Large	Mc master carr	56025T1	Used for safety purpose
Modular Protective Screen with Tie-on Curtain, 6' Height x 4' Width Abrasion-Resistant Fiberglass	Mc master carr	9145T84	Fire-resistant curtain for the background
Multipurpose Aluminium Alloy 6061 .125" thick, 12" x 24"	Mc master carr	89015K28	Used for holding the insulation
Marine grade plywood 1/2" thick, 12" x 24"	Mc master carr	1125T32	Used for holding the experimental setup
Multipurpose Aluminium Alloy 6061 U-channel, 2" base x 1-1/4" legs, 1' length	Mc master carr	1630T473	Used for holding the aluminum plate, insulation and wick
Architectural Anodized Aluminium (Alloy 6063) 90 deg angle, 1/8" Thk, 1/2" x 1/2" legs, 6' L	Mc master carr	4630T21	Used for holding the aluminum plate, insulation and wick
Aluminium Inch T-Slotted Framing System Concealed 90 degree connector, for 1" extrusion	Mc master carr	47065T155	Used for holding the aluminum plate, insulation and wick
Aluminium Inch T-Slotted Framing System Extended 90 degree bracket, Single, 4 Hole, for 1" extrusion	Mc master carr	47065T175	Used for holding the aluminum plate, insulation and wick

Aluminium Inch T-Slotted Framing System Four-Slot single, 1" solid extrusion, 4' length	Mc master carr	47065T101	Used for holding the aluminum plate, insulation and wick
1/2" x 48" x 36" (Superwool 607 insulation board) 1 carton containing 12 sheets	Mccormick Insulation	Superwool 607	Insulation material for making the wick and the wick holder