

**CD 3045 total gas emissions calculations**

item 1)	HNO3 Used ml/min	HNO3 Used g/hr	NO2 Used g/hr	N2 Used l/min	N2 Used l/hr	NO2 Released g/m <sup>3</sup>	NO2 Released g/min	Used for Material
	3.4	310.1	226.4	70.0	4200.0	53.9	3.8	general
	5.1	465.1	339.6	70.0	4200.0	80.9	5.7	BASF 17-4PH A

**Assumptions** Max. Load Capacity 5.8 kg /Shelf  
3.5 kg/shelf

Primary Binder Formula POM (CH <sub>2</sub> O) <sub>n</sub>	Full Load kg	Total Primary Binder kg	Mol.Wt. 1170	CO2 Generated kg/load	Avg. CO2 Generated g/min	H2O Generated kg/load	Avg. H2O Generated g/min	Assumptions
	255.2	25.5		37.4	103.9	15.3	42.5	n=39, 10%POM 6 hr debind time
	154.0	15.4		22.6	94.2	9.2	38.4	4 hr debind time

**Afterburner total gas emissions**

**Afterburner** Capacity 78,400 BTU + 3,900 BTU Pilot

1 cu. ft./hr  
natural gas  
= 1,000  
BTU

82.3 cu.ft/hr = 38.84 l/min

Natural gas  
usage

Natural gas is approximately 95% Methane, 2.5% Ethane, + .....= Approx 95% Methane + 5% Ethane

Hydrocarbon	Formula	Mol. Wt.	Gas Used l/min	Gas Generated	
				CO2 g/min	H2O g/min
Methane 95%	CH4	16	36.9	72.5	59.3
Ethane 5%	C2H6	30	1.94	7.6	4.7
<b>Total</b>				<b>80.1</b>	<b>64</b>

**Total gas emissions for CD 3045 & Afterburner**

	max CO 2 released g/min	max H2O released g/min	max NO 2 released g/min
	80.1	64	
<b>Combined Total</b>	<b>184</b>	<b>79.3</b>	<b>5.7</b>

**MIM 3045 Furnace; BASF Feedstock**

Assumptions	Max. Load Capacity			H2 max based on 35 l/min through hot zone/35l/min thru retort		H2O Max		Assumptions
	5.8 kg /Shelf 3.5 kg/shelf			70 l/min	56.25 g/min			
	Binder Residue Formula	Full Load kg	Total Binder kg	Binder Exiting g	Mol.Wt.	CO2 Generated g/load	Binder H2O Generated g/load	
based on 5.8 kg/shelf	Wax  CH3-(CH2)29-CH3	255.2	4.40	132.07	436	828	350	3% binder exits the stack
				5.72 g/m3 without Afterburner		With Afterburner	With Afterburner	
based on 3.5 kg/shelf		154	2.66	79.70		500	211	
				3.45 g/m3 without Afterburner				

**Binder exiting in g/m3 is based on typical gas flow of 35 l/min combined for hot zone and retort for 22 hours per run.**