

GRADUA: Industria Teknologiaren Ingeniaritza

GRADU AMAIERAKO LANA

HONDAKINEN ANALISI TERMOGRATIMETRIKOA

2. DOKUMENTUA – ERANSKINA

Ikaslea: Achutegui, del Valle, Ainhoa

Zuzendaria: López, Urionabarrenechea, Alexander

Ikasturtea: 2017-2018

Data: Bilbo, 2018, ekaina, 19

Taulen zerrenda

Taula 1. Grafikoen nomenklatura	7
Taula 2. FCPM21 emaitzak	23
Taula 3. FCCA emaitzak	23

Grafikoen zerrenda

Grafika 1.Erretxina_1	4
Grafika 2.Erretxina_2	4
Grafika 3.Erretxina_3	5
Grafika 4.FCCA_1	5
Grafika 5.FCCA_2	6
Grafika 6.FCCA_3	6
Grafika 7.FCCA_MMP_1	7
Grafika 8. FCCA_MMP_2	8
Grafika 9.FCCA_MMP_3	8
Grafika 10.FCPM21_MMP_1	9
Grafika 11.FCPM21_MMP_2	9
Grafika 12.FCPM21_MMP_3	10
Grafika 13.FCCA_MPP_1(AIRE).....	10
Grafika 14.FCCA_MPP_3(AIRE).....	11
Grafika 15.FCCA_MPP_2(AIRE).....	11
Grafika 16. FCPM21_MMP_1(AIRE)	12
Grafika 17.FCPM21_MMP_2(AIRE)	12
Grafika 19.FCPM21_MMP_3(AIRE)	13
Grafika 18.FCCA_MPP_1(N2)	13
Grafika 20.FCCA_MPP_2(N2)	14
Grafika 21.FCCA_MPP_3(N2)	14
Grafika 22.FCPM21_MPP_1(N2).....	15
Grafika 23.FCPM21_MPP_2(N2).....	15
Grafika 24.FCCA_PMP_1	16



2. Dokumentua - ERANSKINA

Grafika 25.FCPM21_MPP_3(N2).....	16
Grafika 26.FCCA_PMP_2	17
Grafika 27.FCCA_PMP_3	17
Grafika 28.FCPM21_PMP_2	18
Grafika 29.FCPM21_PMP_1	18
Grafika 30.FCCA_PPP_1.....	19
Grafika 31.FCPM21_PMP_3	19
Grafika 32.FCCA_PPP_2.....	20
Grafika 33.FCCA_PPP_3.....	20
Grafika 34.FCPM21_PPP_2.....	21
Grafika 35.FCPM21_PPP_1.....	21
Grafika 36.FCPM21_PPP_3.....	22
Grafika 37.FCCA_2	24
Grafika 38.FCCA_1	24
Grafika 39.FCCA_3	25
Grafika 40.FCPM21_1	25
Grafika 41.FCPM21_3	25
Grafika 42.FCPM21_2	25



Universidad del País Vasco Euskal Herriko Unibertsitatea

BILBOKO INGENIARITZA ESKOLA ESCUELA DE INGENIERÍA DE BILBAO

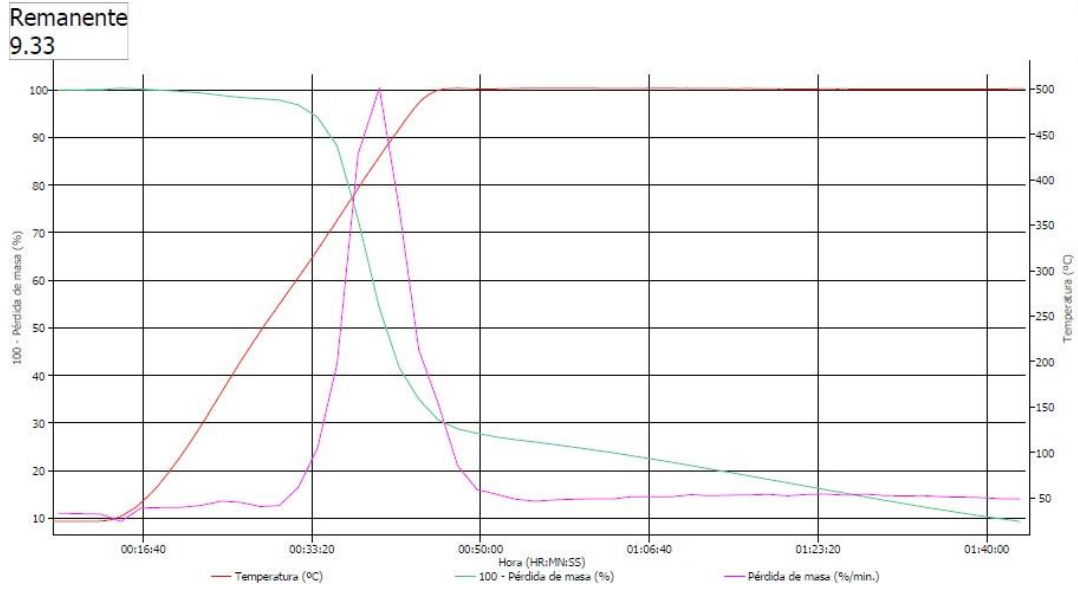
2. Dokumentua - ERANSKINA

Aurkibidea

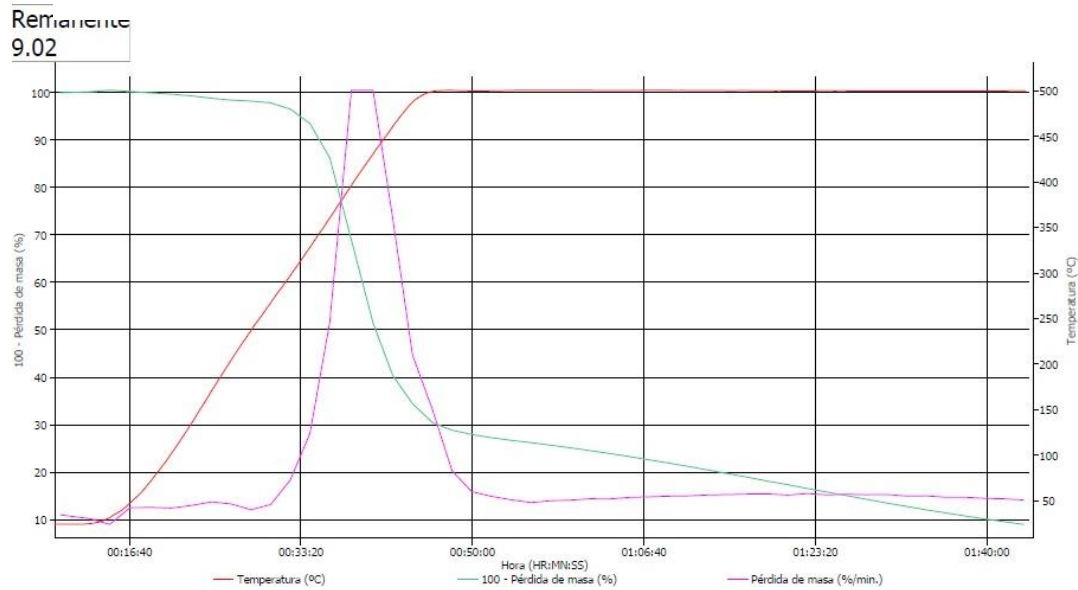
Taulen zerrenda	1
Grafikoen zerrenda	1
Aurkibidea	3
I. Konposite Onduaren Konposizioa Grafikak	4
II. Puntako Entseguak.....	7
A. Grafikoak.....	7
B. Taulak.....	23
III. Balio optimoen berrespena	24



I. Konposite Onduaren Konposizioa Grafikak

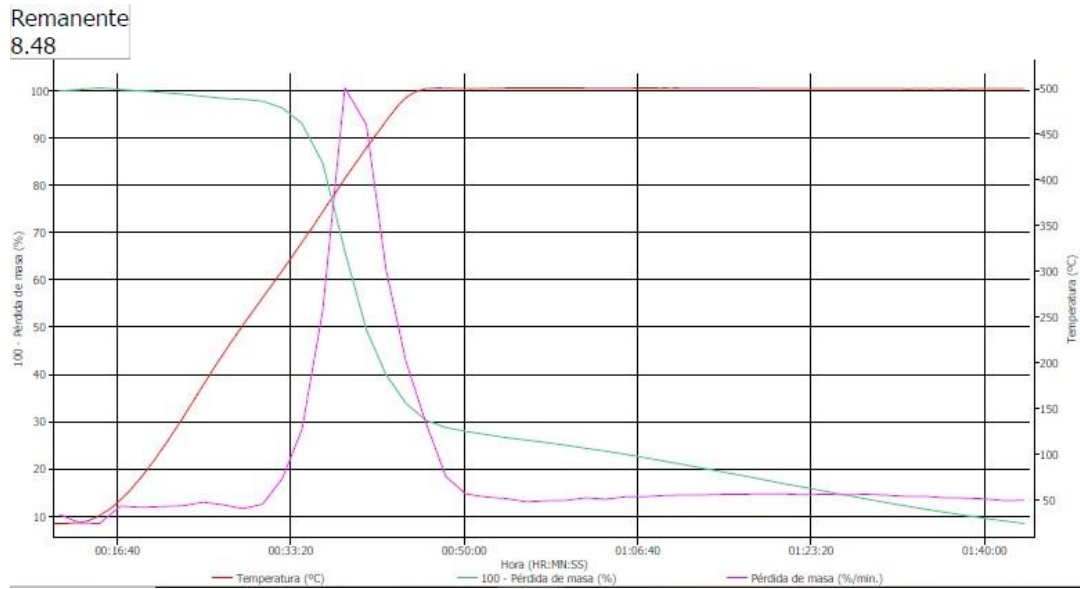


Grafika 1.Erretxina_1

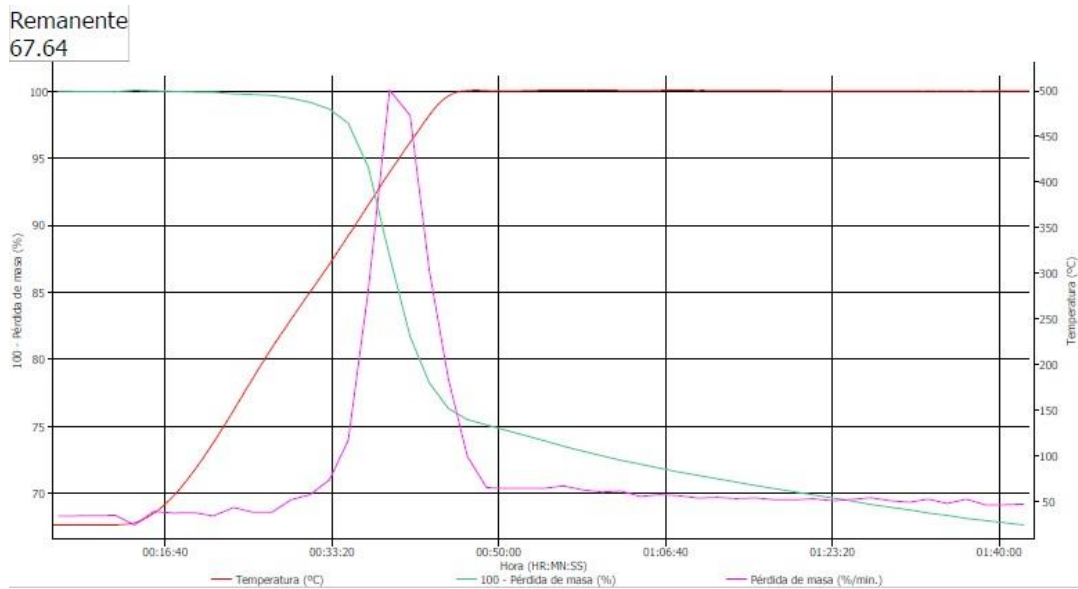


Grafika 2.Erretxina_2

2. Dokumentua - ERANSKINA



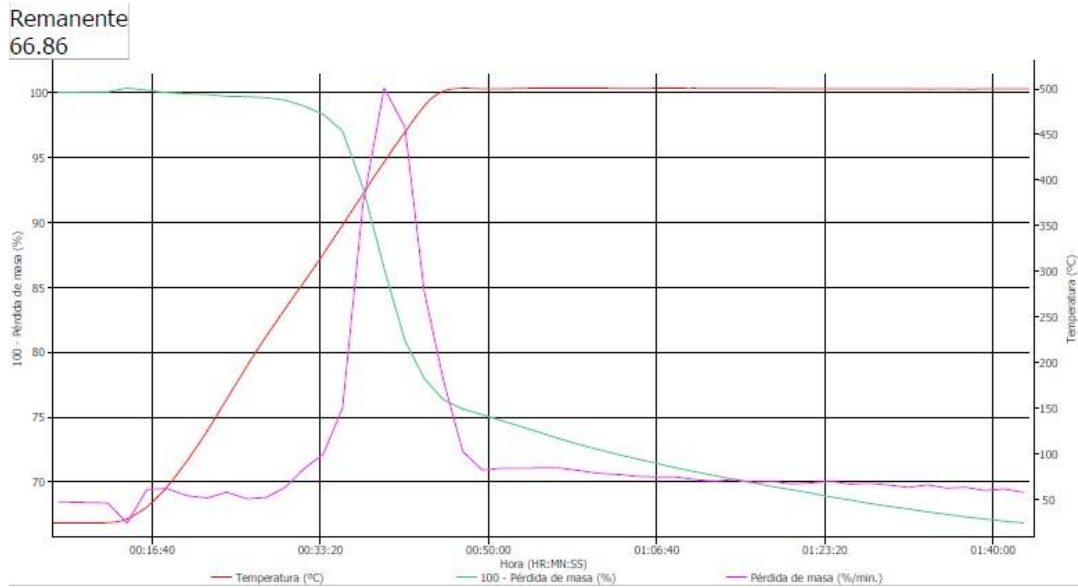
Grafika 3.Erretxina_3



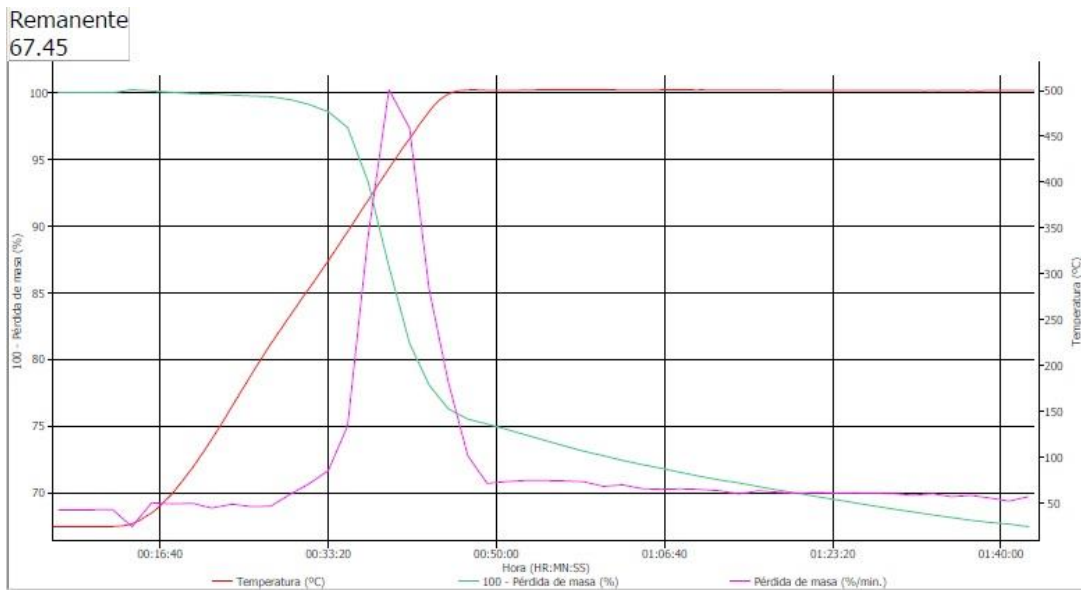
Grafika 4.FCCA_1



2. Dokumentua - ERANSKINA



Grafika 5.FCCA_2



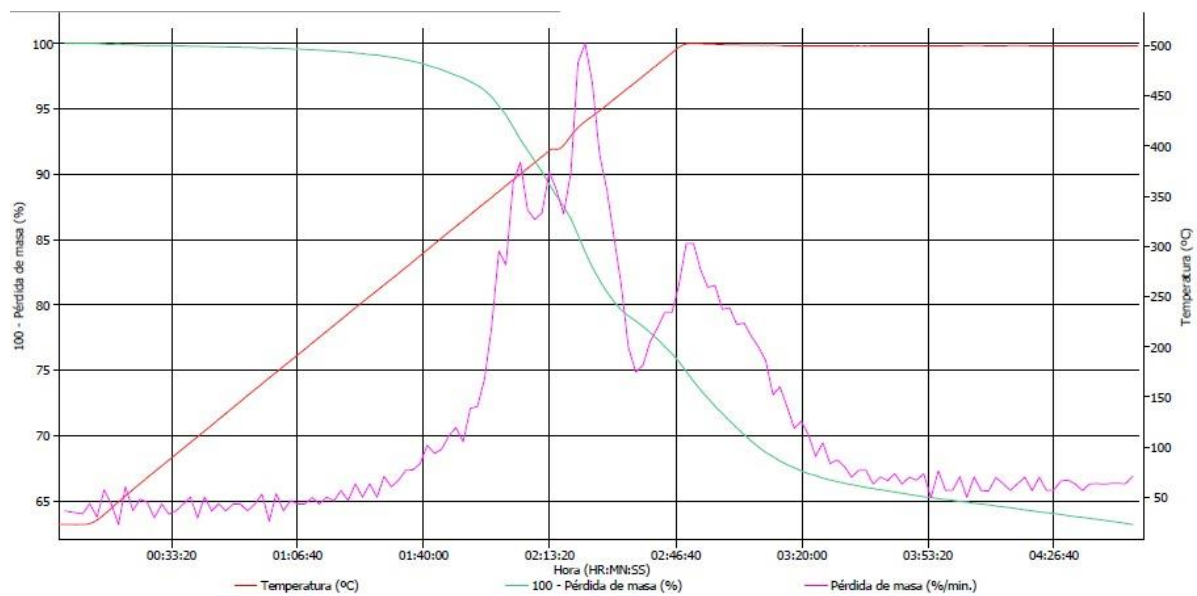
Grafika 6.FCCA_3

II. Puntako Entseguak

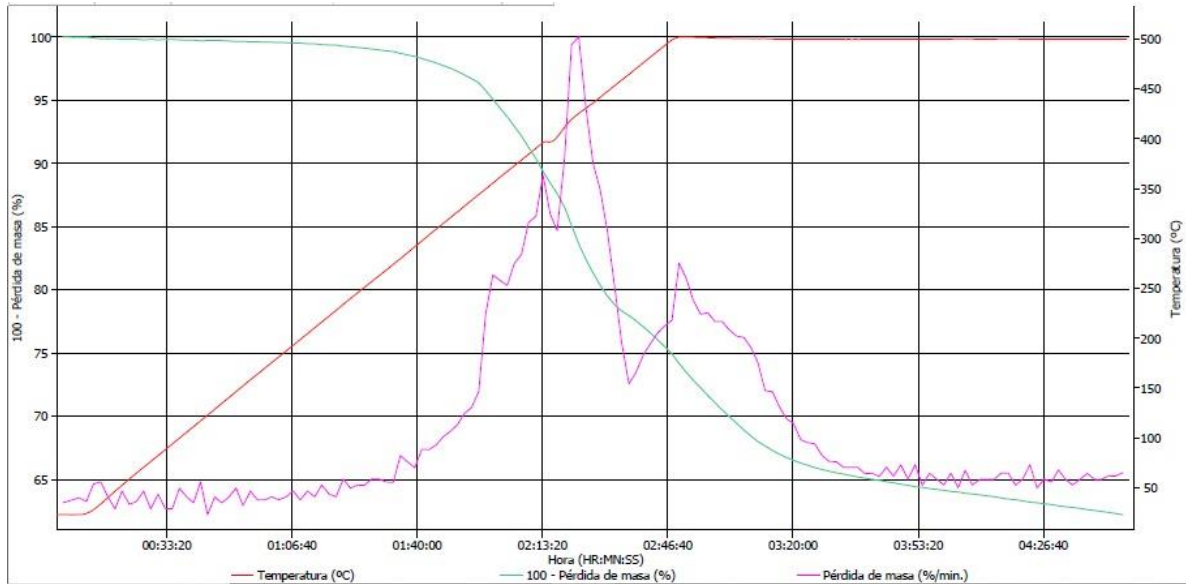
A. Grafikoak

Taula 1. Grafikoen nomenklatura

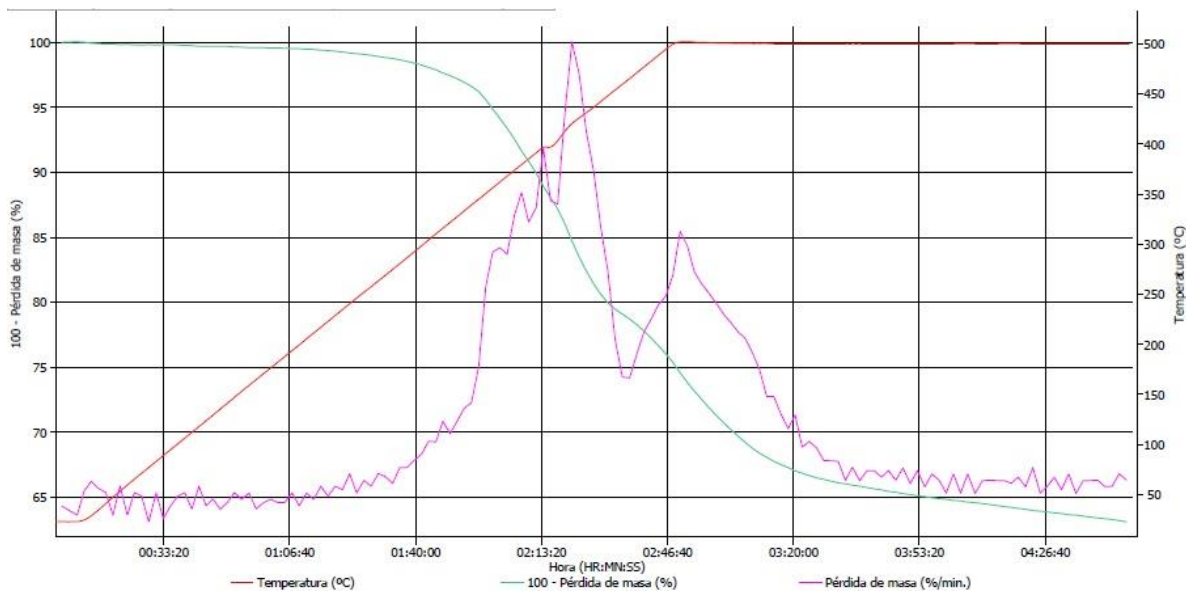
	T_p (°C)		T_o (°C)	
	400	600	500	600
MMP	x		x	
MPP	x			x
PPP		x		x
PMP		x	x	



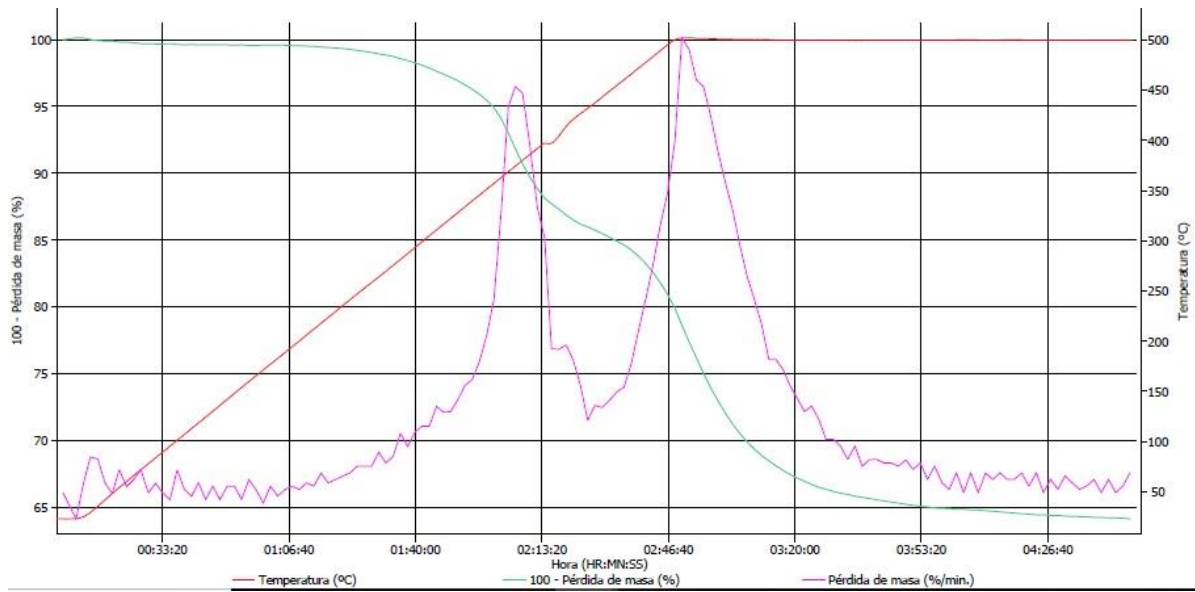
Grafika 7.FCCA_MMP_1



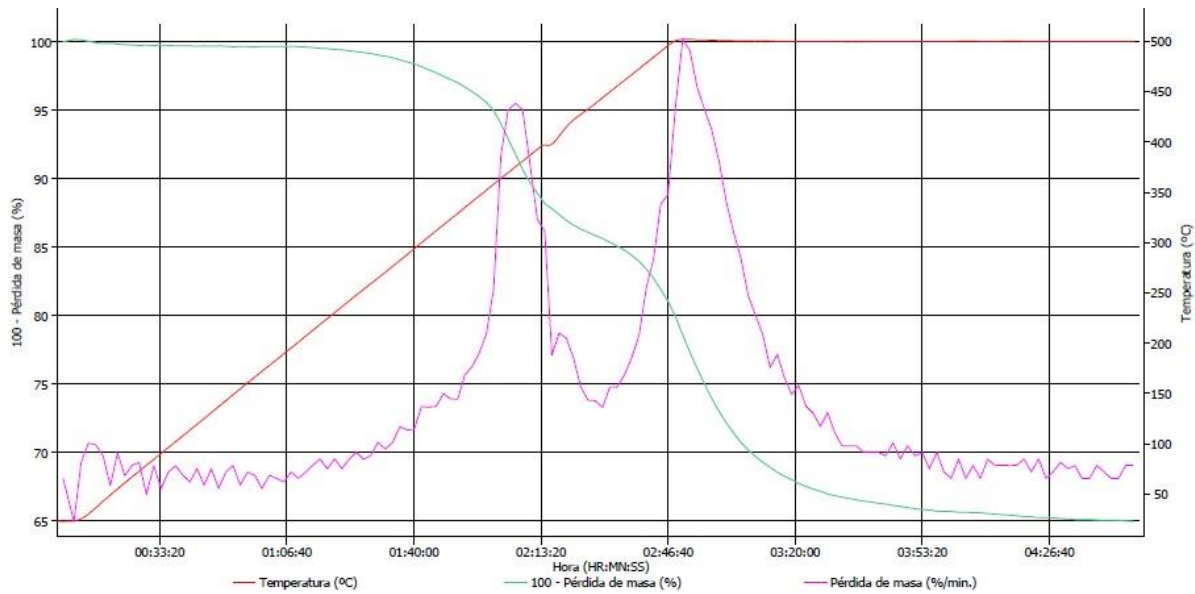
Grafika 8. FCCA_MMP_2



Grafika 9.FCCA_MMP_3

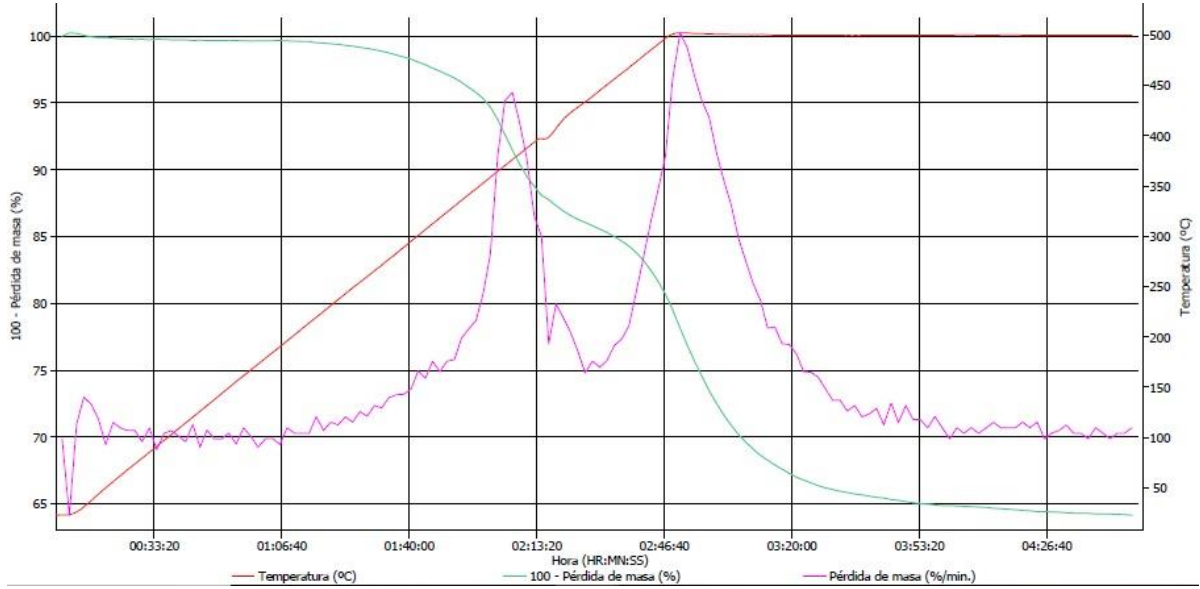


Grafika 10.FCPM21_MMP_1

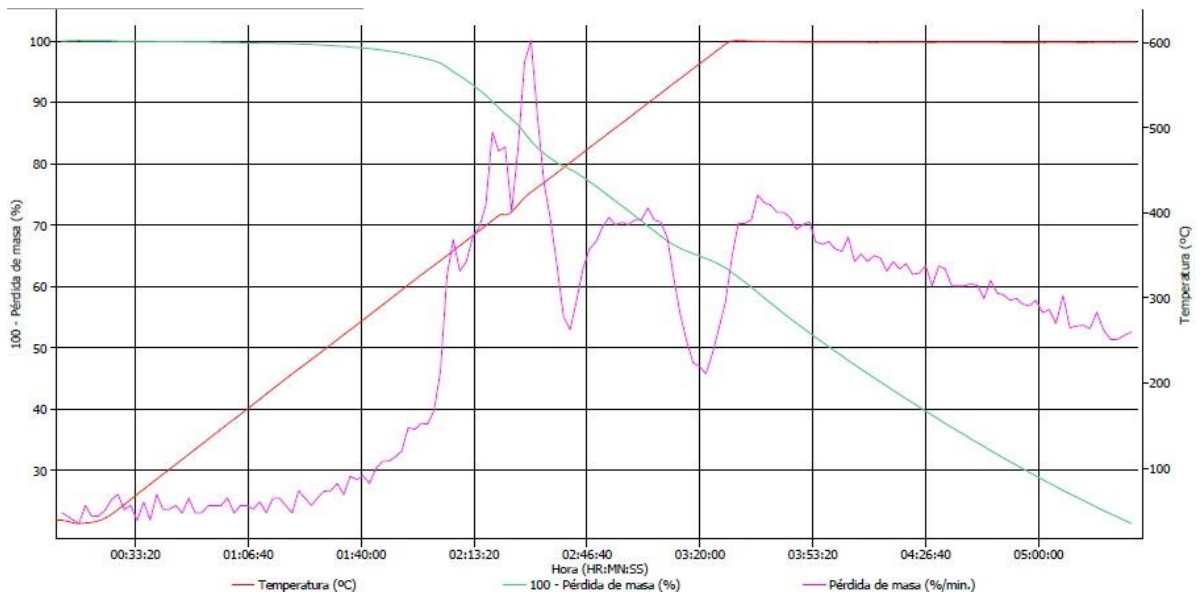


Grafika 11.FCPM21_MMP_2

2. Dokumentua - ERANSKINA



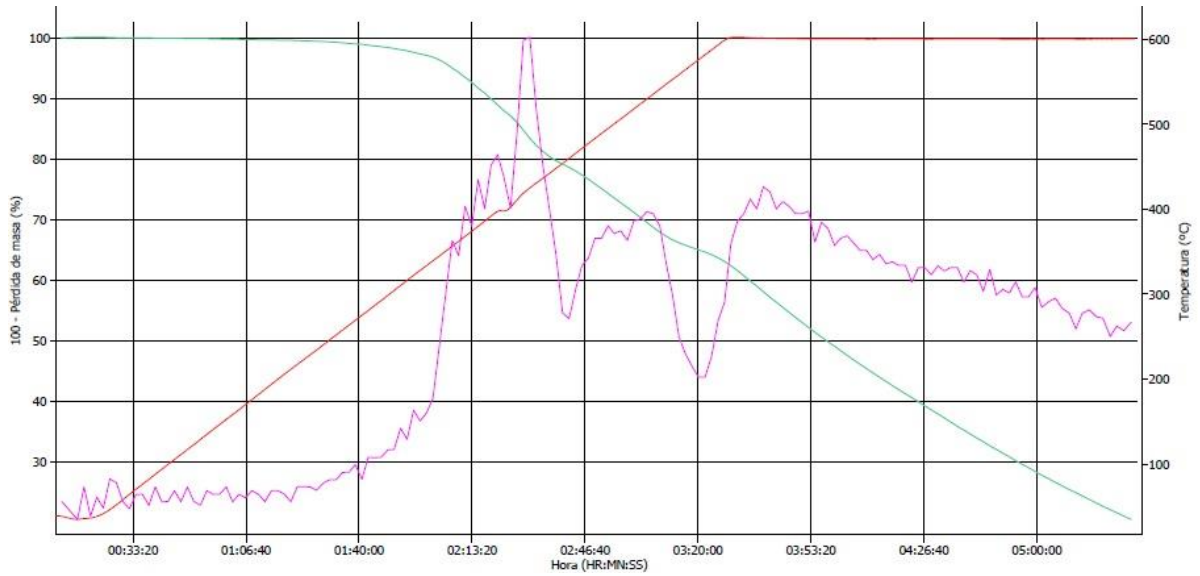
Grafika 12.FCPM21_MMP_3



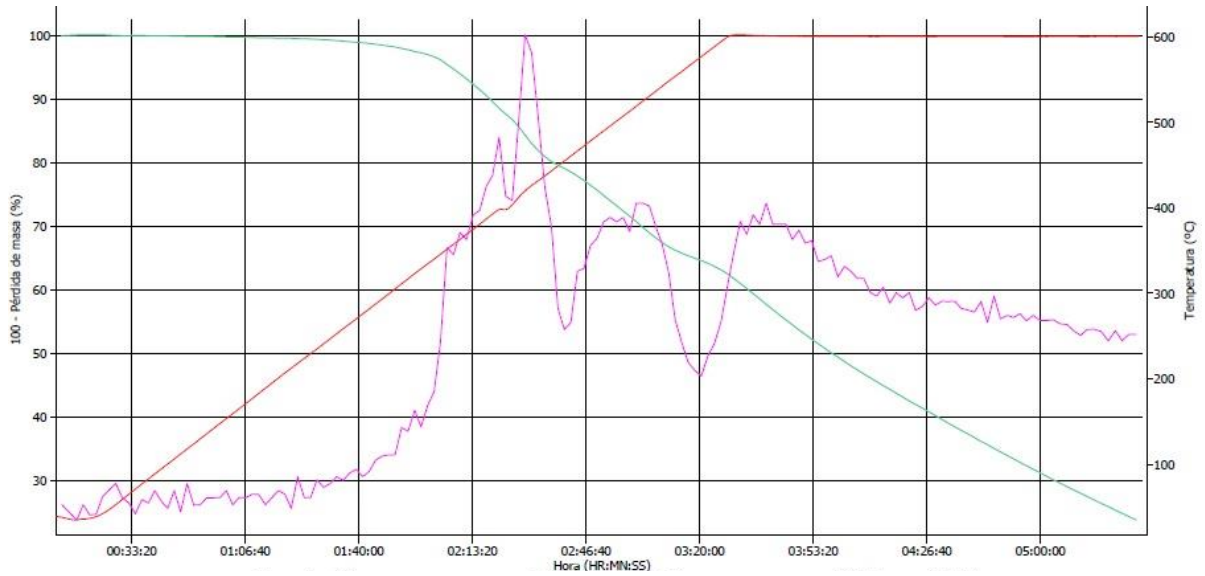
Grafika 13.FCCA_MPP_1(AIRE)



2. Dokumentua - ERANSKINA

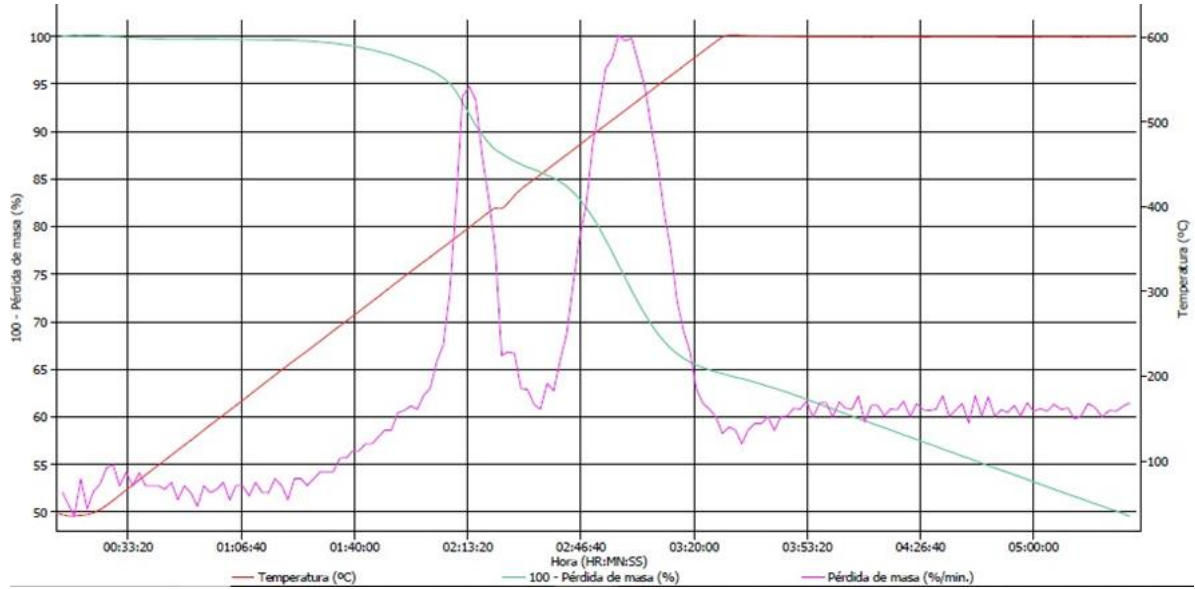


Grafika 15.FCCA_MPP_2(AIRE)

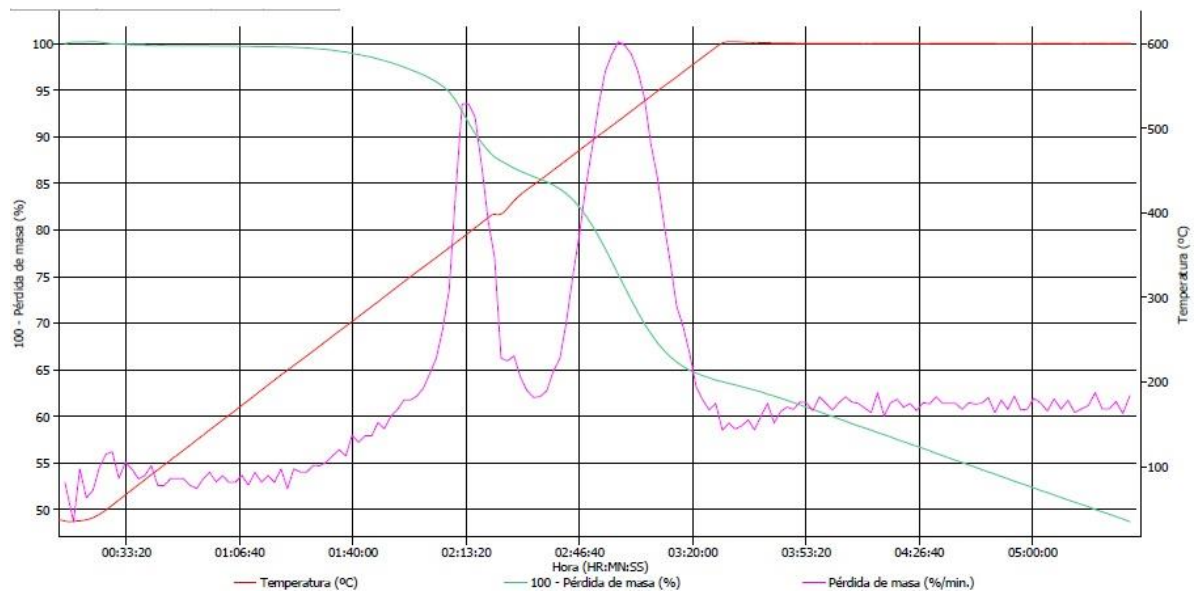


Grafika 14.FCCA_MPP_3(AIRE)

2. Dokumentua - ERANSKINA



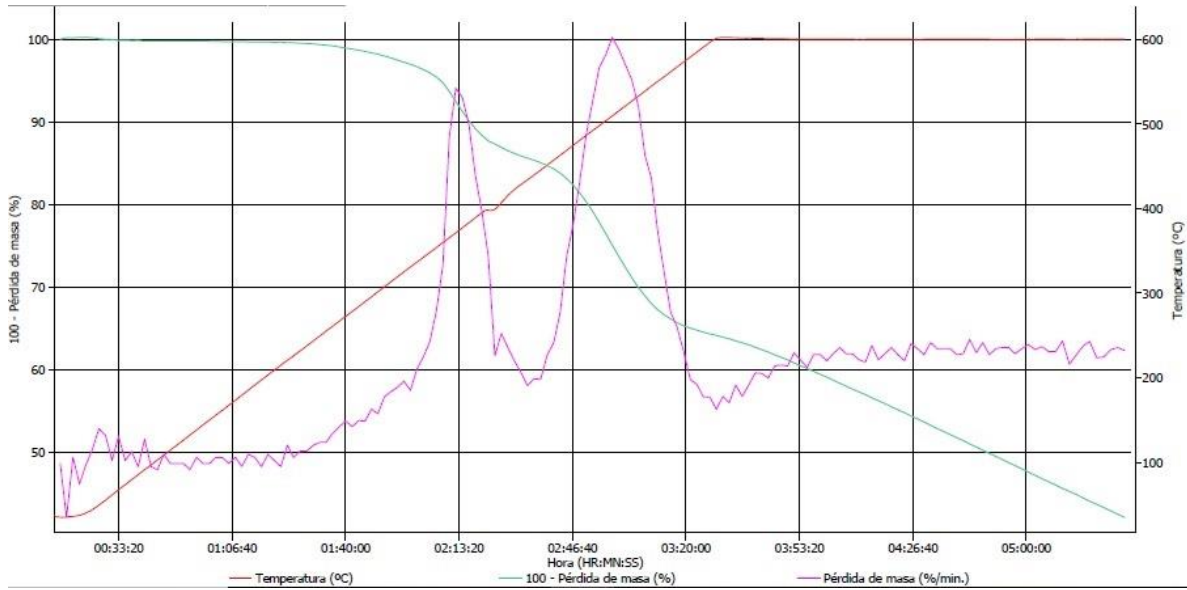
Grafika 16. FCPM21_MMP_1(AIRE)



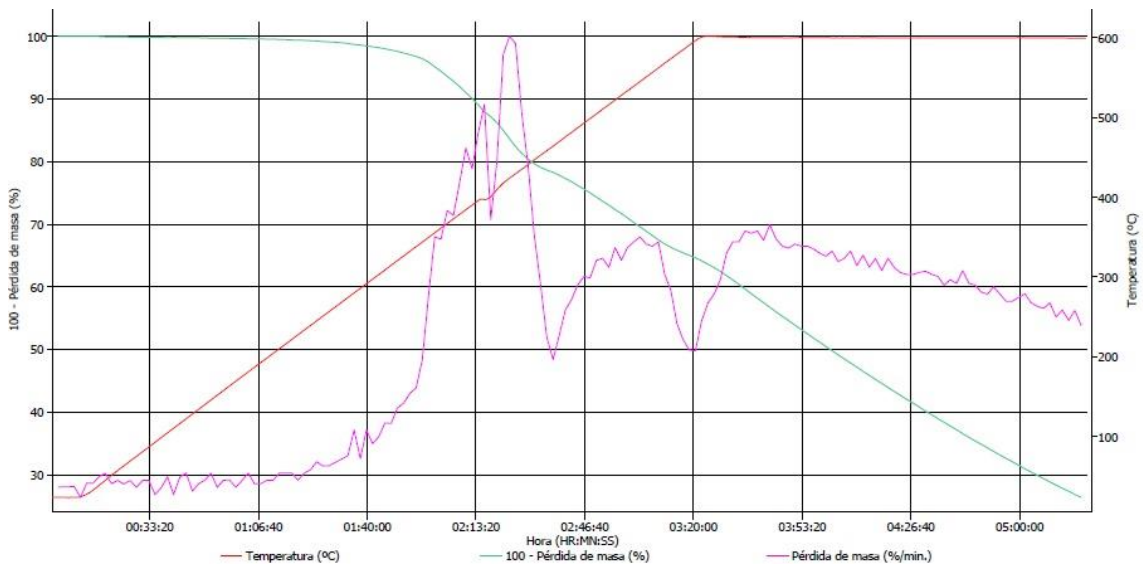
Grafika 17.FCPM21_MMP_2(AIRE)



2. Dokumentua - ERANSKINA

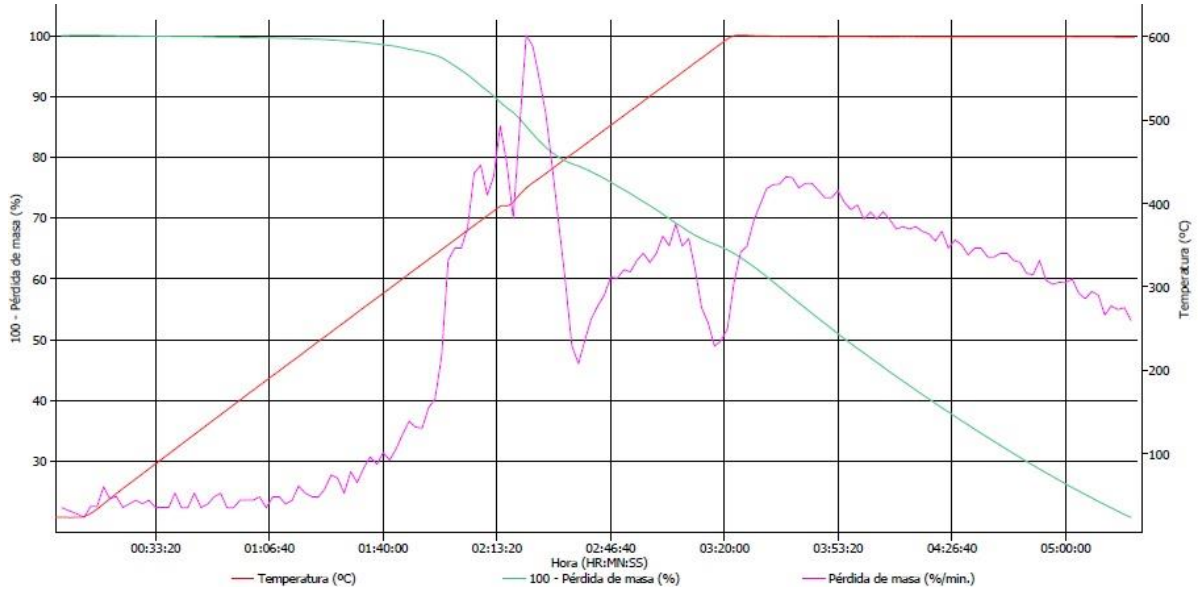


Grafika 19.FCPM21_MMP_3(AIRE)

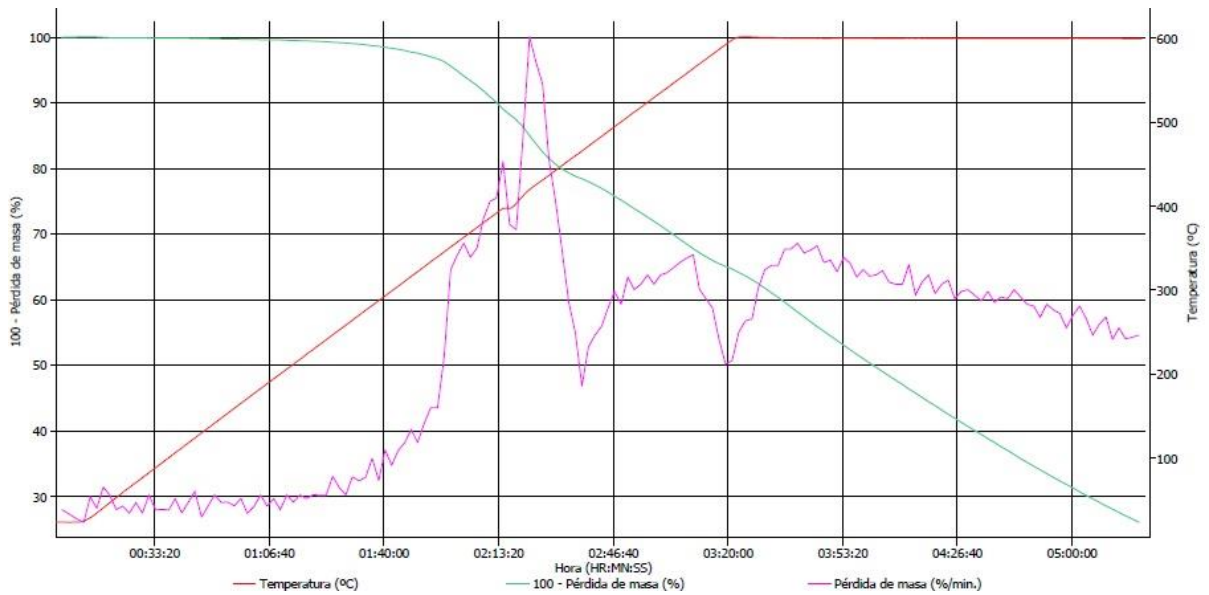


Grafika 18.FCCA_MPP_1(N2)

2. Dokumentua - ERANSKINA

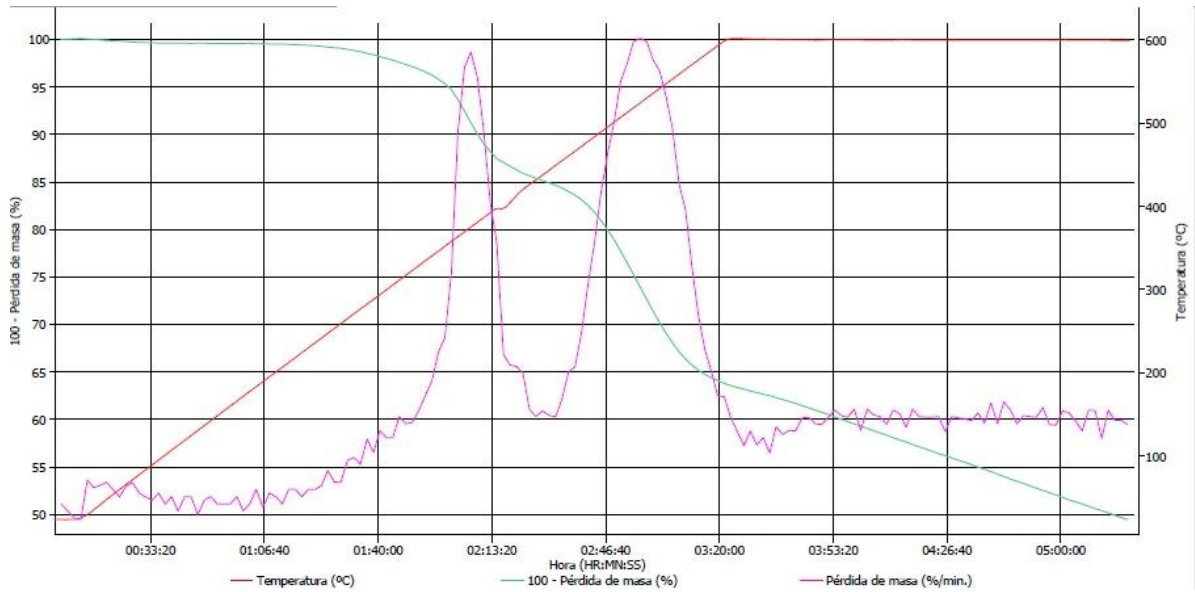


Grafika 20.FCCA_MPP_2(N2)

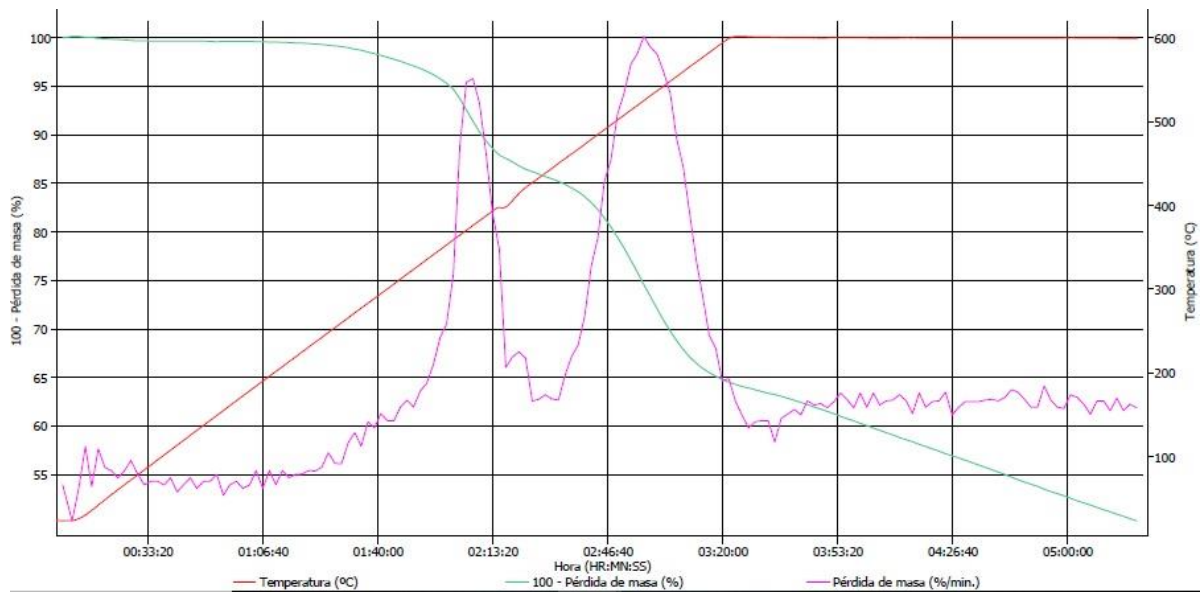


Grafika 21.FCCA_MPP_3(N2)

2. Dokumentua - ERANSKINA

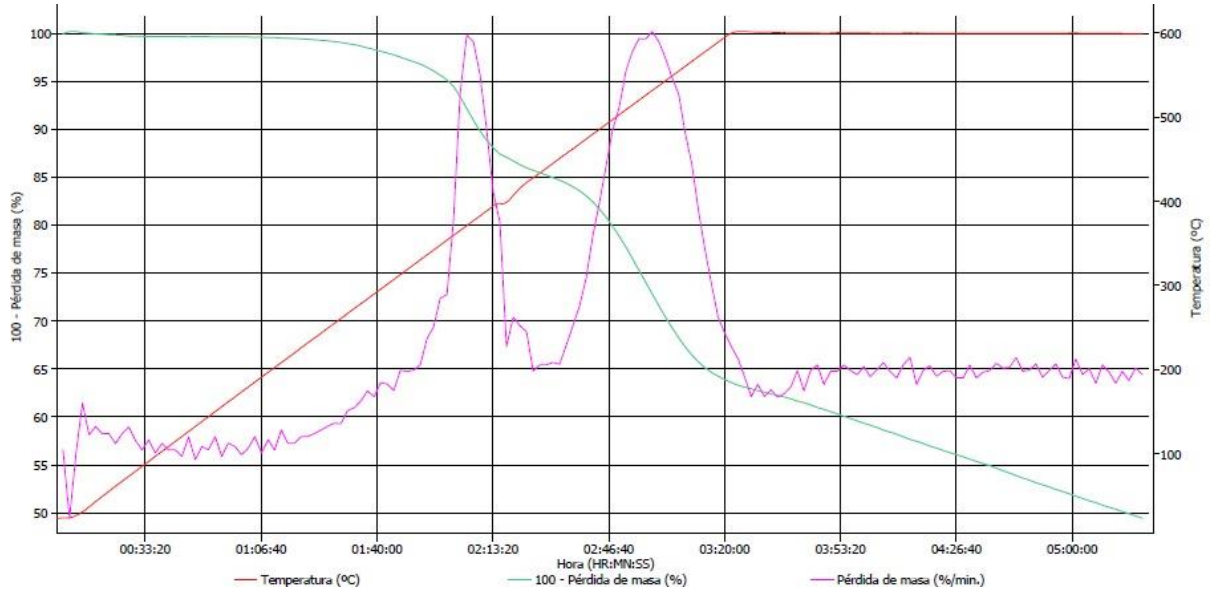


Grafika 22.FCPM21_MPP_1(N2)

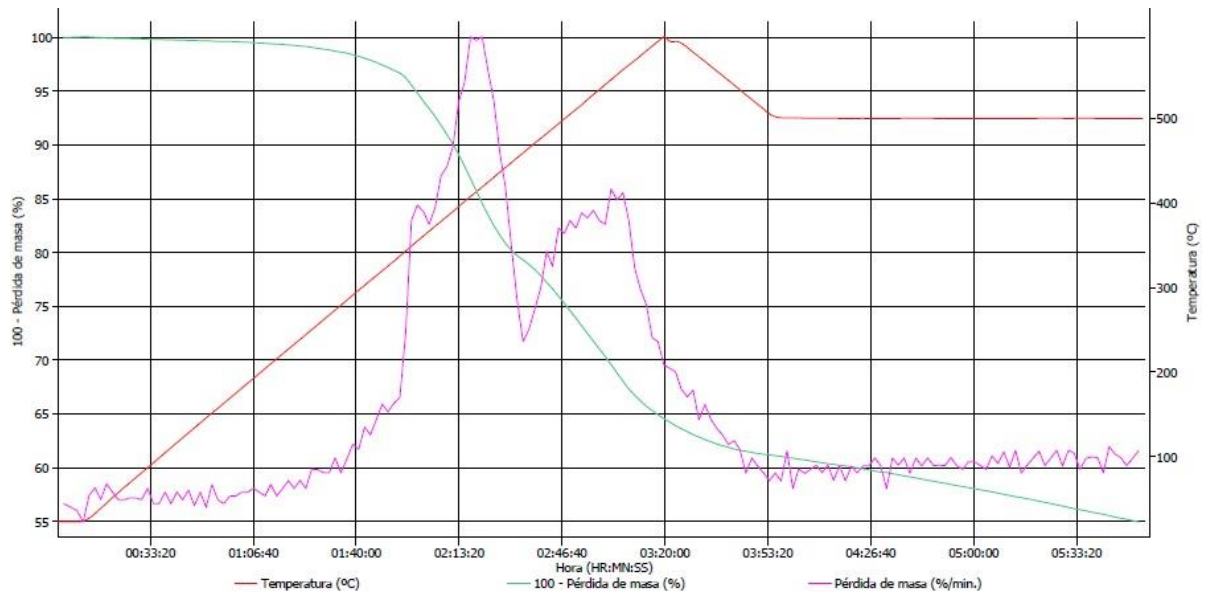


Grafika 23.FCPM21_MPP_2(N2)

2. Dokumentua - ERANSKINA



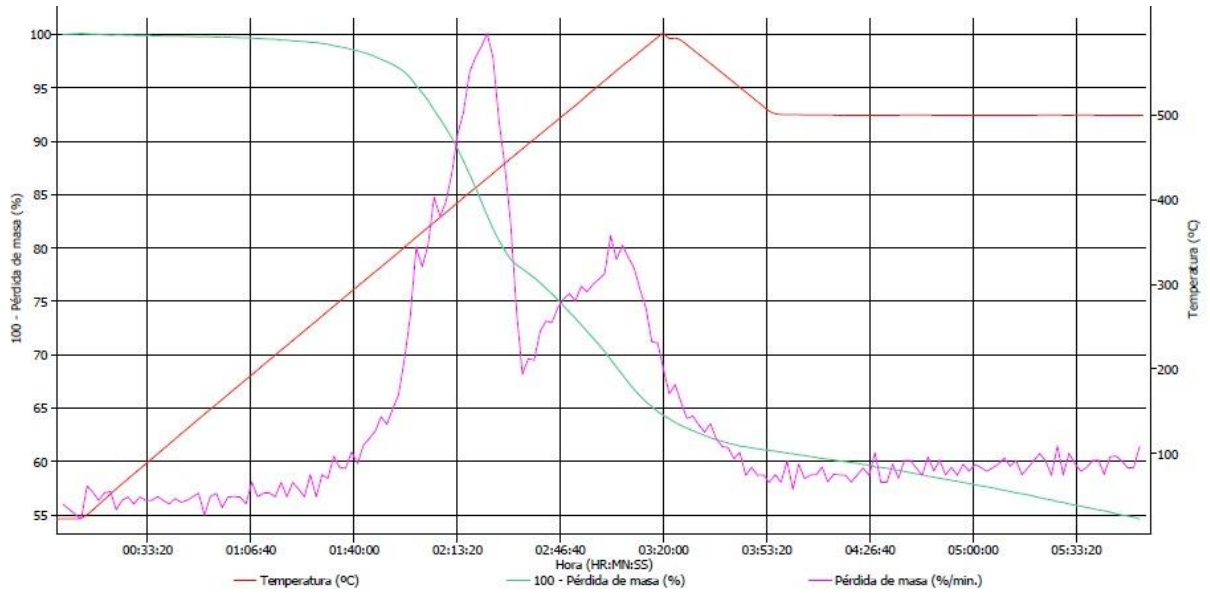
Grafika 25.FCPM21_MPP_3(N2)



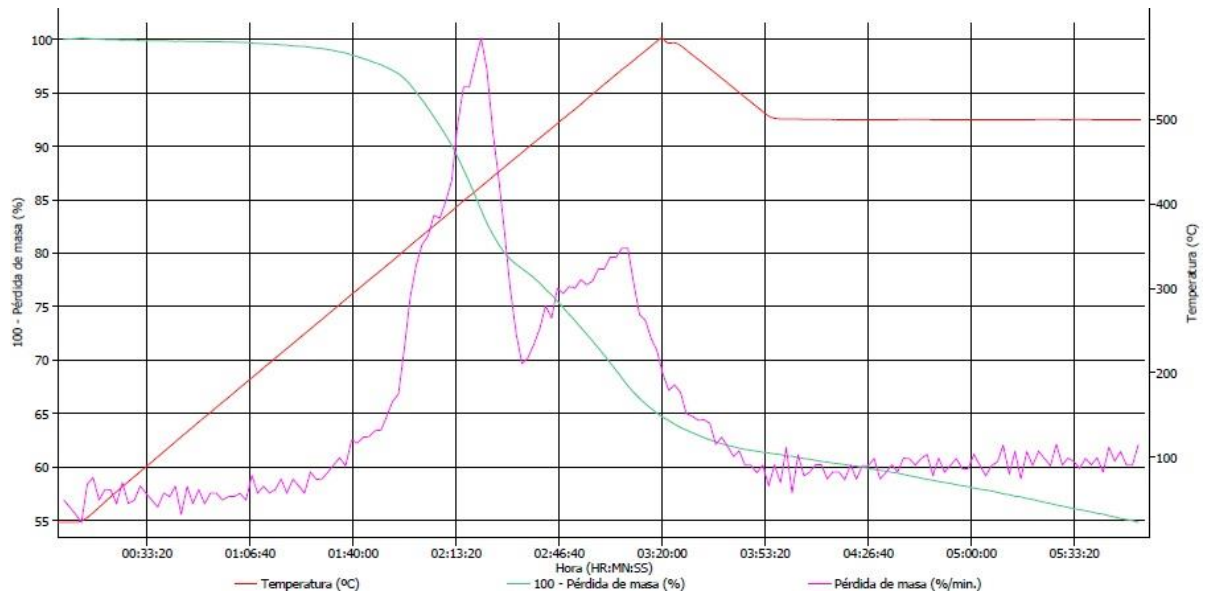
Grafika 24.FCCA_PMP_1



2. Dokumentua - ERANSKINA

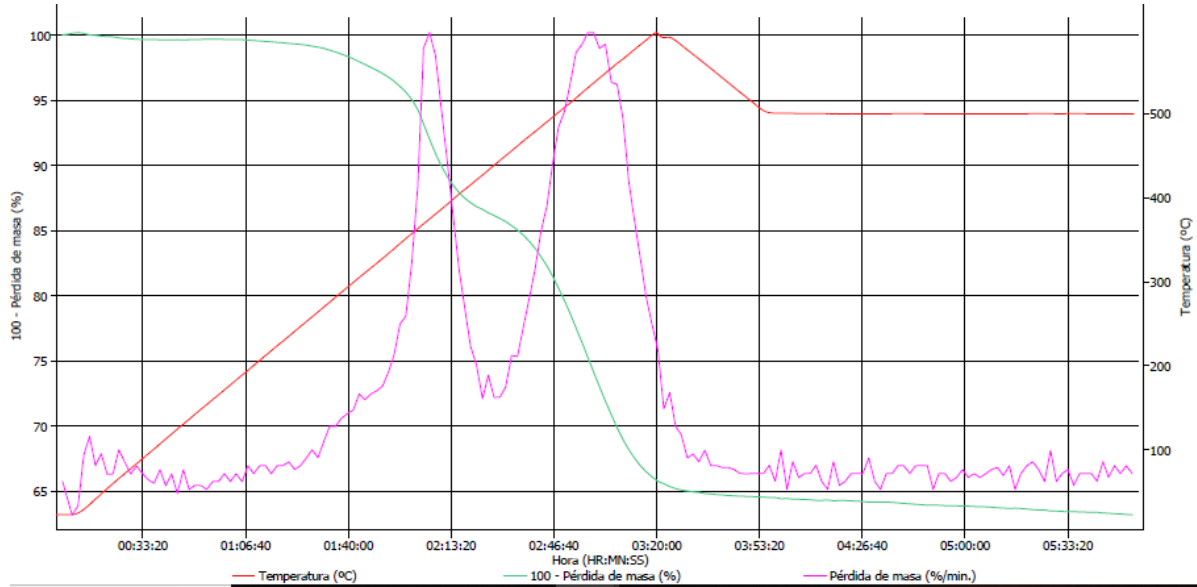


Grafika 26.FCCA_PMP_2

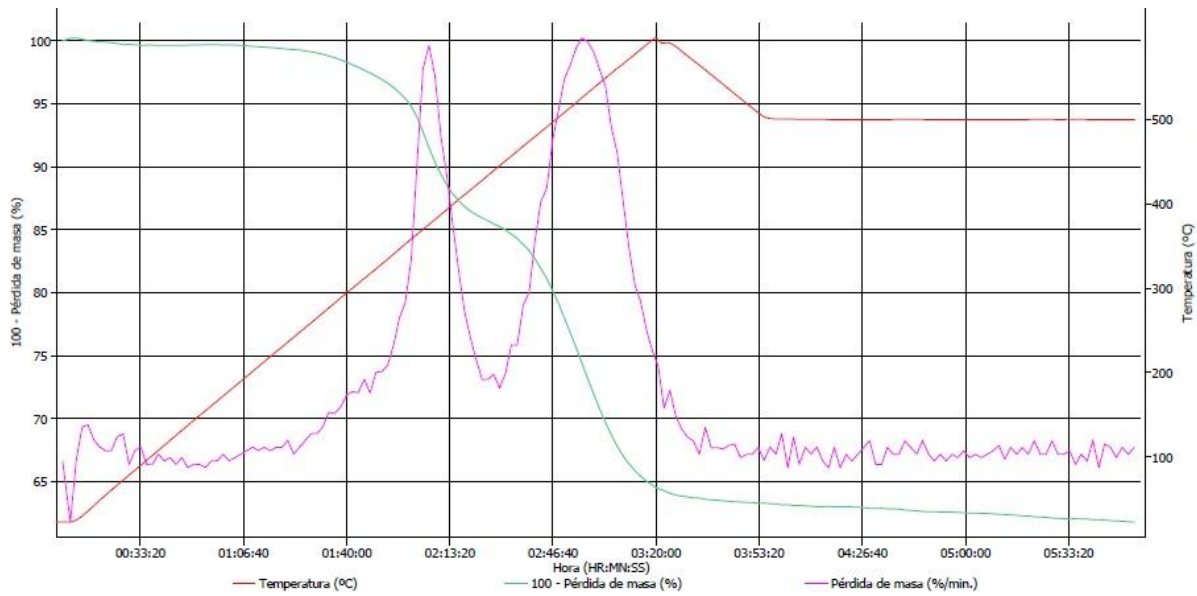


Grafika 27.FCCA_PMP_3

2. Dokumentua - ERANSKINA

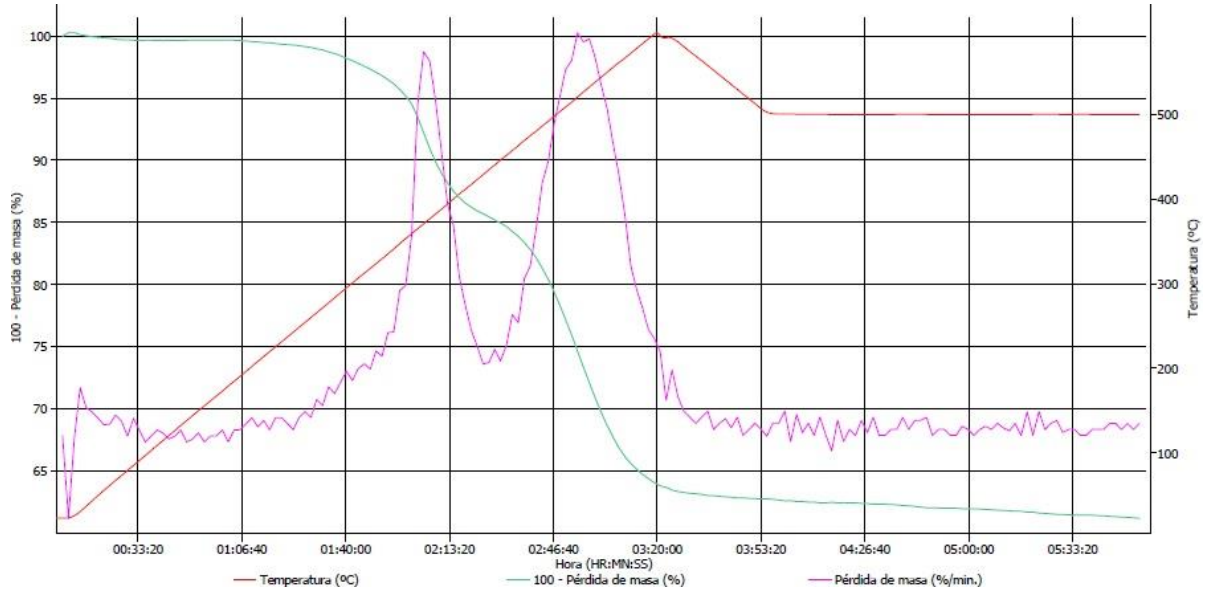


Grafika 29.FCPM21_PMP_1

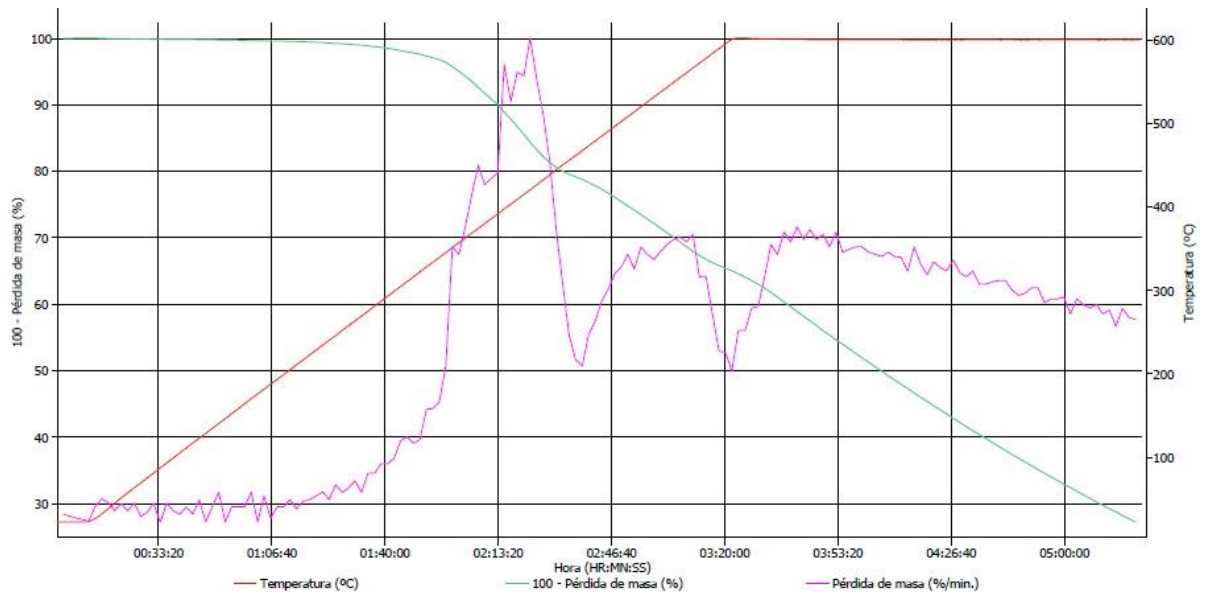


Grafika 28.FCPM21_PMP_2

2. Dokumentua - ERANSKINA



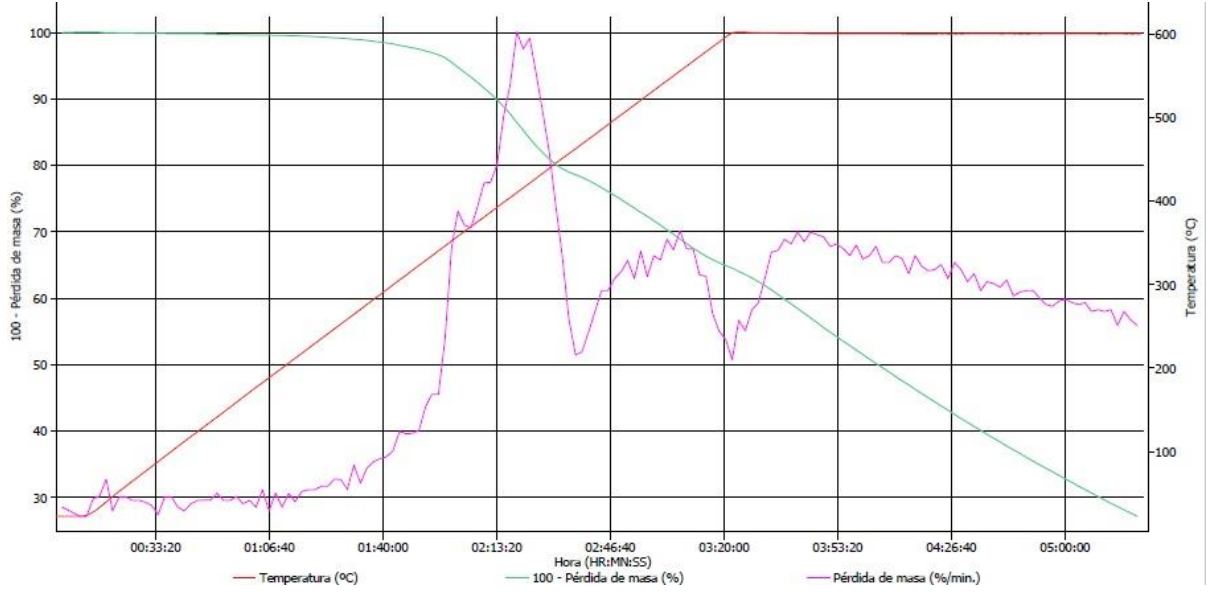
Grafika 31.FCPM21_PMP_3



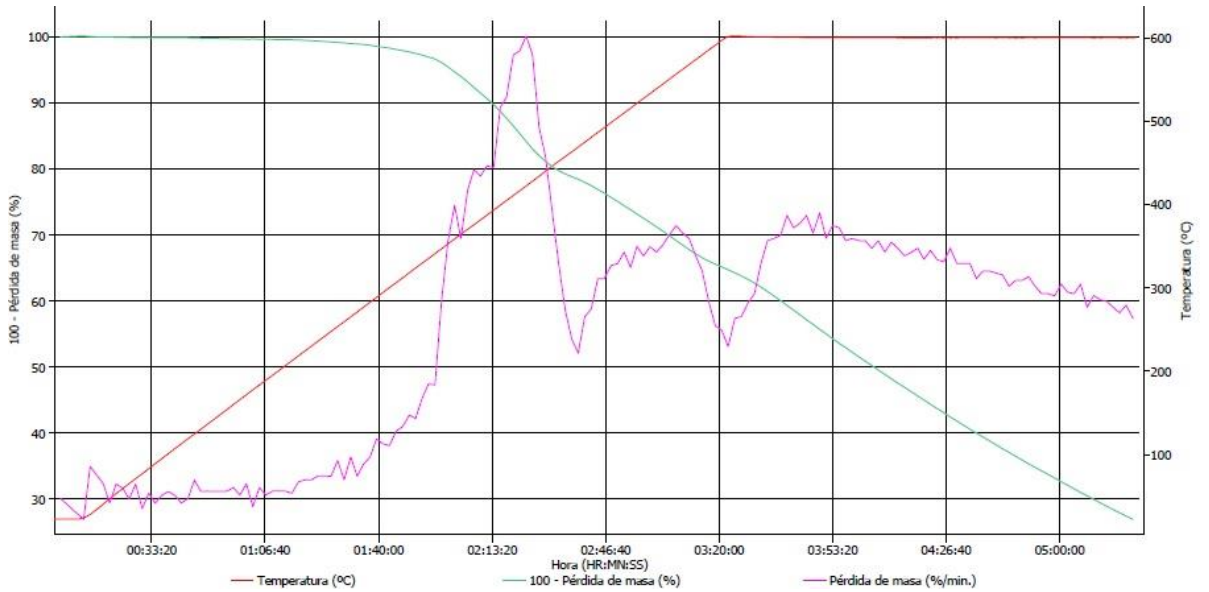
Grafika 30.FCCA_PPP_1



2. Dokumentua - ERANSKINA



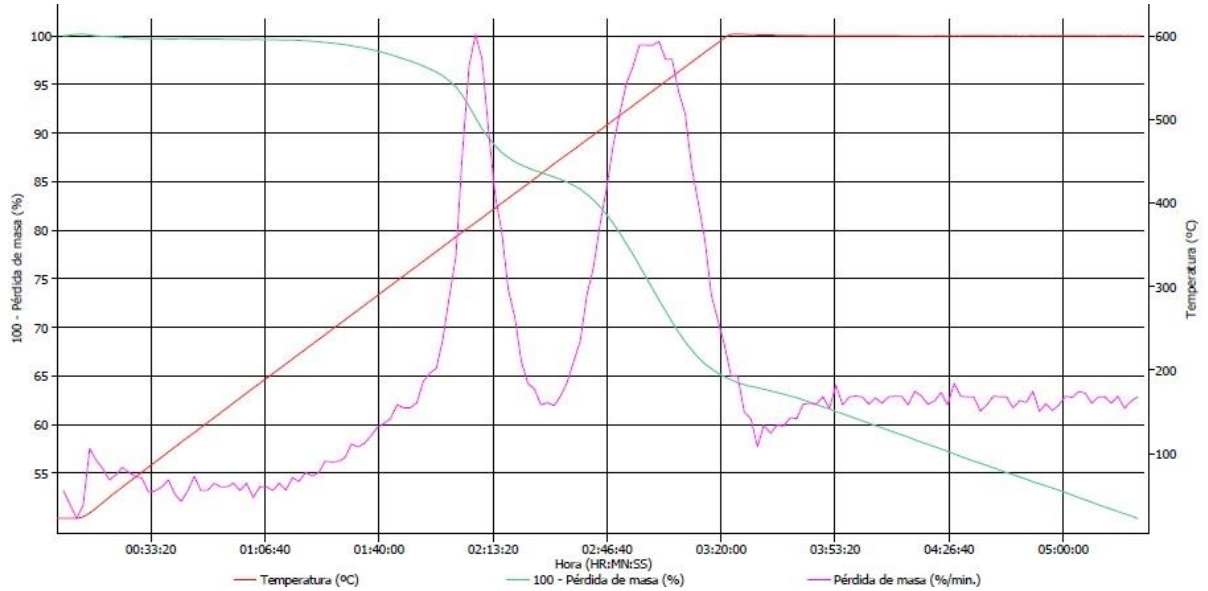
Grafika 32.FCCA_PPP_2



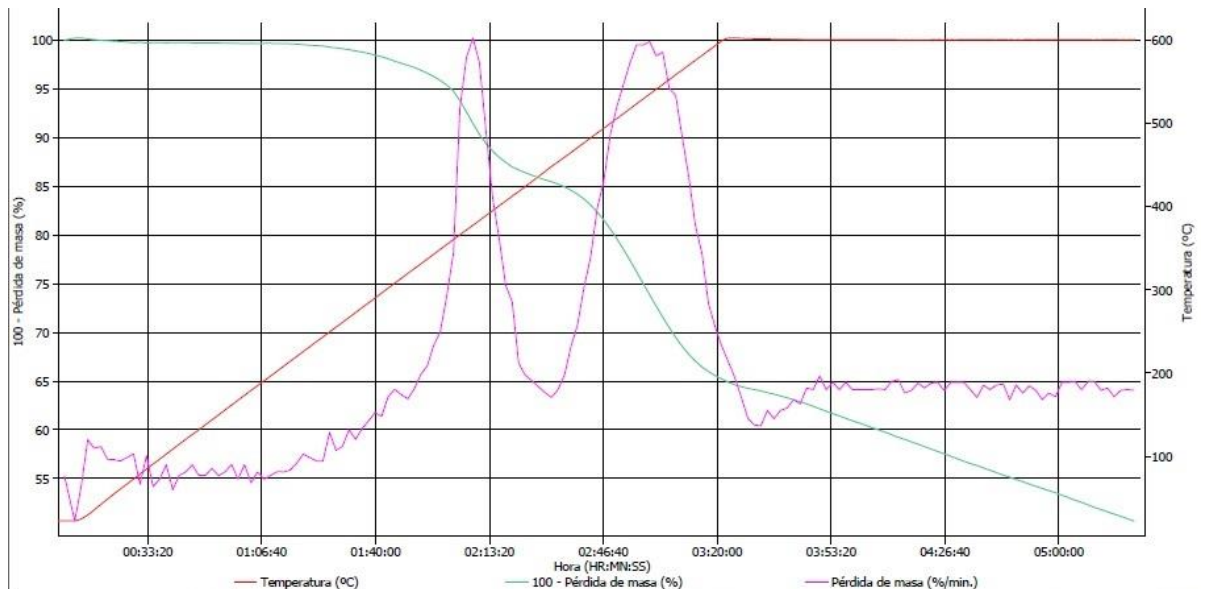
Grafika 33.FCCA_PPP_3



2. Dokumentua - ERANSKINA



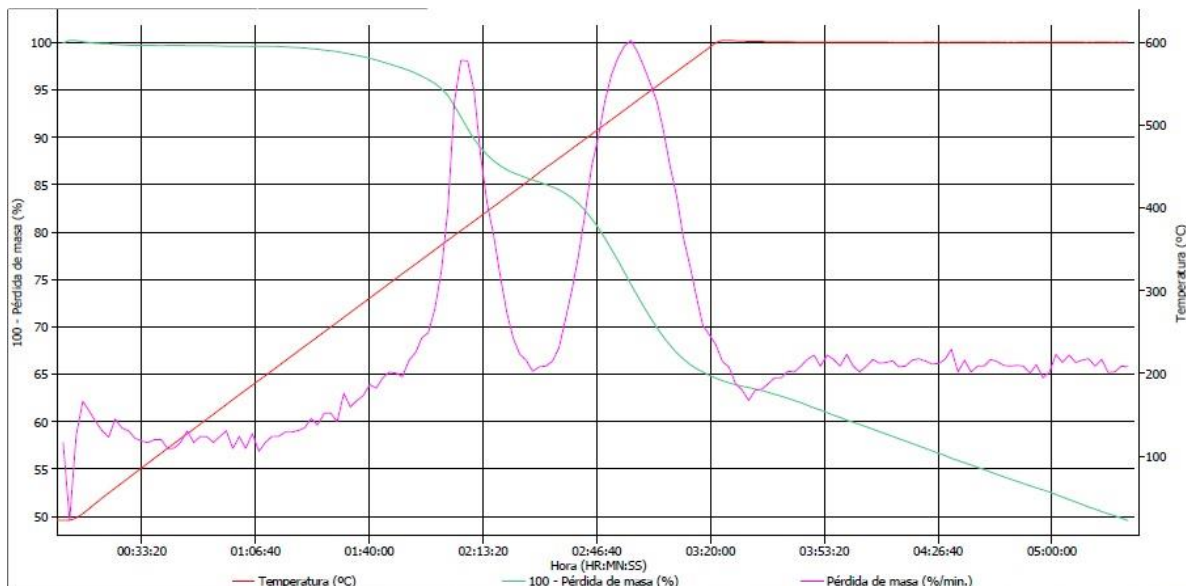
Grafika 35.FCPM21_PPP_1



Grafika 34.FCPM21_PPP_2



2. Dokumentua - ERANSKINA



Grafika 36.FCPM21_PPP_3



B. Taulak

FCCA										
	Saiakuntzen matrizea			Esperimentazio-plana			Emaizta	Efektuen kalkulua		
	X ₁	X ₂	X ₃	T _p (°C)	T _o (°C)	t _o (min)		Efektua		Balorea
1	-	-	-	400	500	0	75,94	Batez-bestekoa	b ₀	54,60
2	+	-	-	600	500	0	61,25	T _p (°C)	b _{TP}	-5,05
3	-	+	-	400	600	0	64,97	T _o (°C)	b _{TO}	-18,22
4	+	+	-	600	600	0	65,14	t _o (min)	b _{to}	-24,45
5	-	-	+	400	500	120	62,84	T _p x T _o	b _{TPxTo}	6,32
6	+	-	+	600	500	120	54,81	T _p x t _o	b _{TPxto}	2,21
7	-	+	+	400	600	120	24,74	T _o x t _o	b _{TOxto}	-14,68
8	+	+	+	600	600	120	27,10	T _p x T _o x t _o	b _{TPxToxto}	-1,12

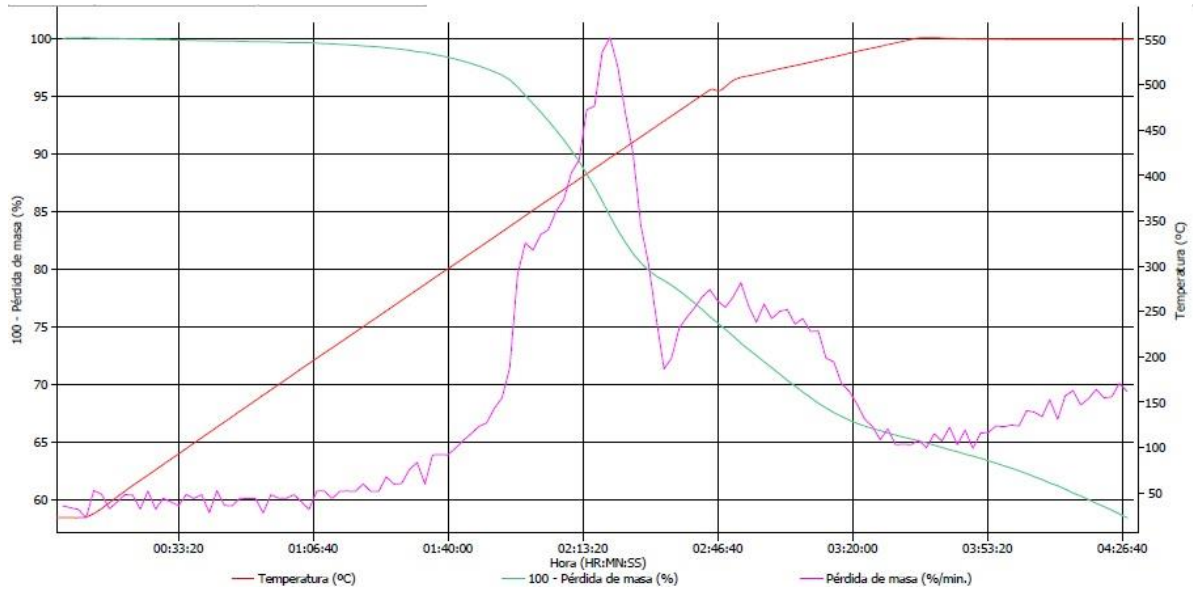
Taula 3. FCCA emaitzak

FCPM21										
	Saiakuntzen matrizea			Esperimentazio-plana			Emaizta	Efektuen kalkulua		
	X ₁	X ₂	X ₃	T _p (°C)	T _o (°C)	t _o (min)		Efektua		Balorea
1	-	-	-	400	500	0	80,90	Batez-bestekoa	b ₀	62,38
2	+	-	-	600	500	0	63,99	T _p (°C)	b _{TP}	-4,20
3	-	+	-	400	600	0	62,93	T _o (°C)	b _{TO}	-10,93
4	+	+	-	600	600	0	64,90	t _o (min)	b _{to}	-11,59
5	-	-	+	400	500	120	64,43	T _p x T _o	b _{TPxTo}	5,44
6	+	-	+	600	500	120	62,07	T _p x t _o	b _{TPxto}	3,28
7	-	+	+	400	600	120	49,67	T _o x t _o	b _{TOxto}	-2,39
8	+	+	+	600	600	120	50,19	T _p x T _o x t _o	b _{TPxToxto}	-4,00

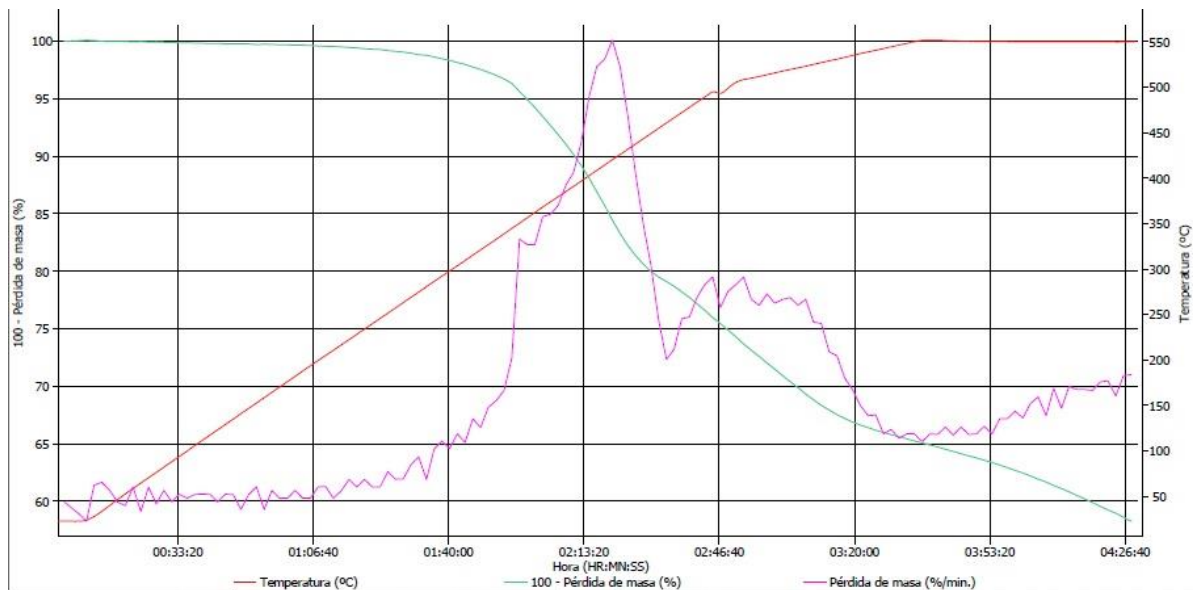
Taula 2. FCPM21 emaitzak



III. Balio optimoen berrespena



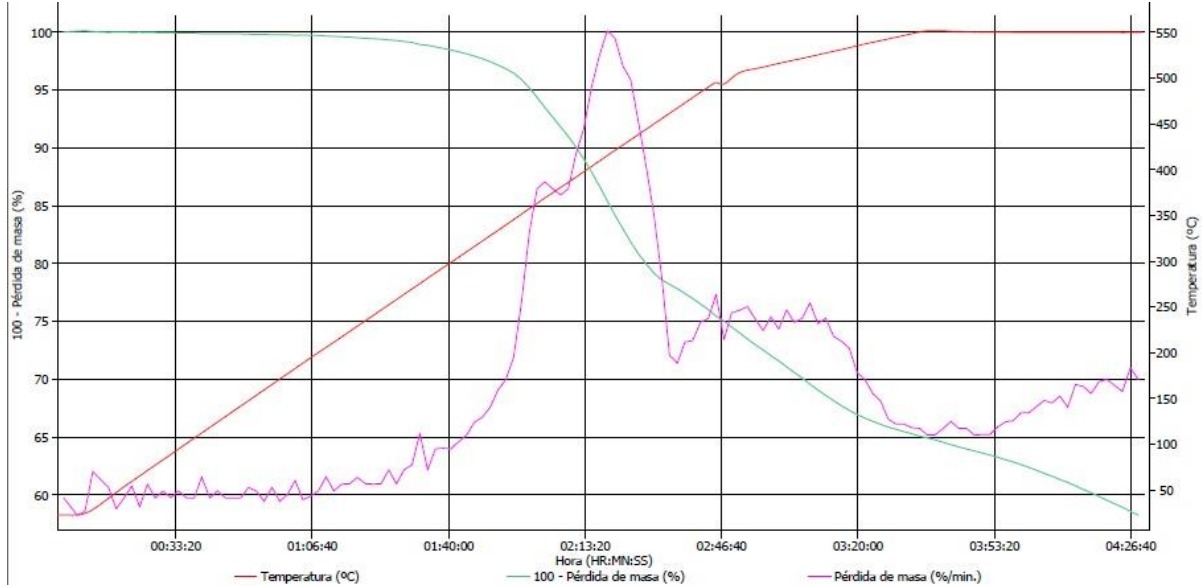
Grafika 38.FCCA_1



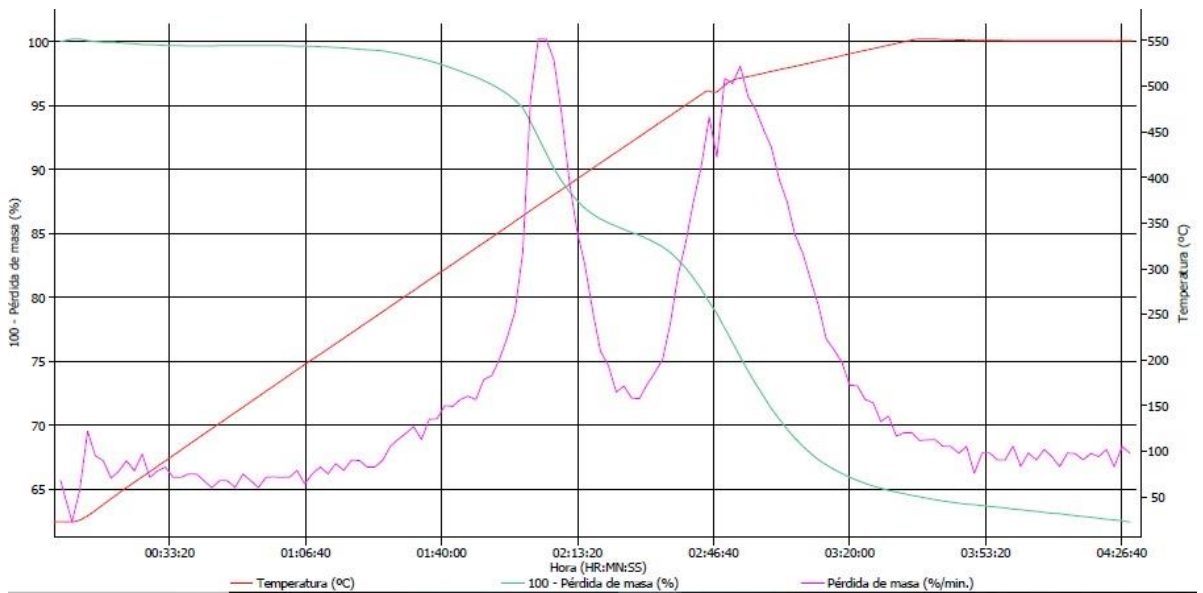
Grafika 37.FCCA_2



2. Dokumentua - ERANSKINA



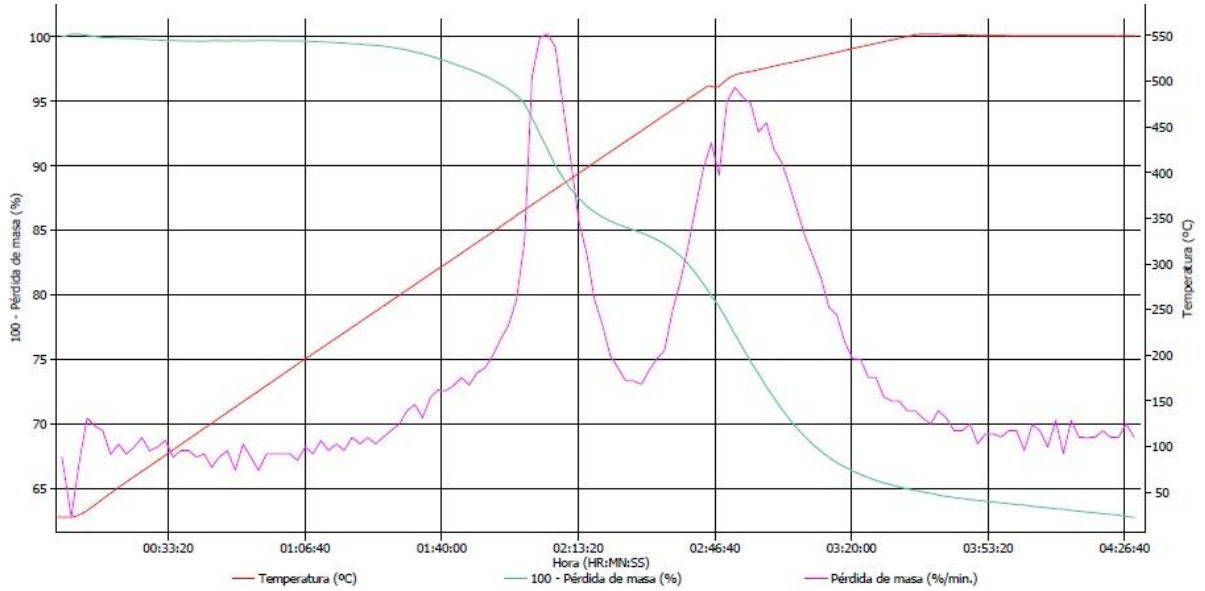
Grafika 39.FCCA_3



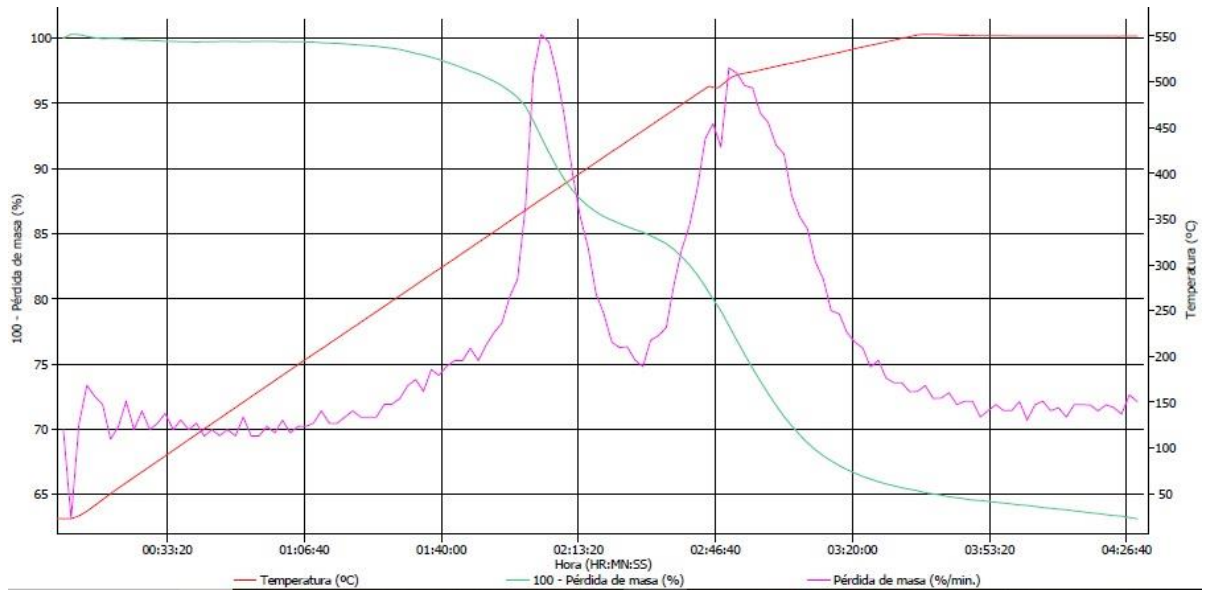
Grafika 40.FCPM21_1



2. Dokumentua - ERANSKINA



Grafika 42.FCPM21_2



Grafika 41.FCPM21_3

