



Equipment, Coffee and Food  
41<sup>st</sup> International Hospitality Exhibition  
October 18\_22, 2019 fieramilano



FCSI EAME | Padiglione 2 | Stand A12-B07/9

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**22 Ottobre 2019**

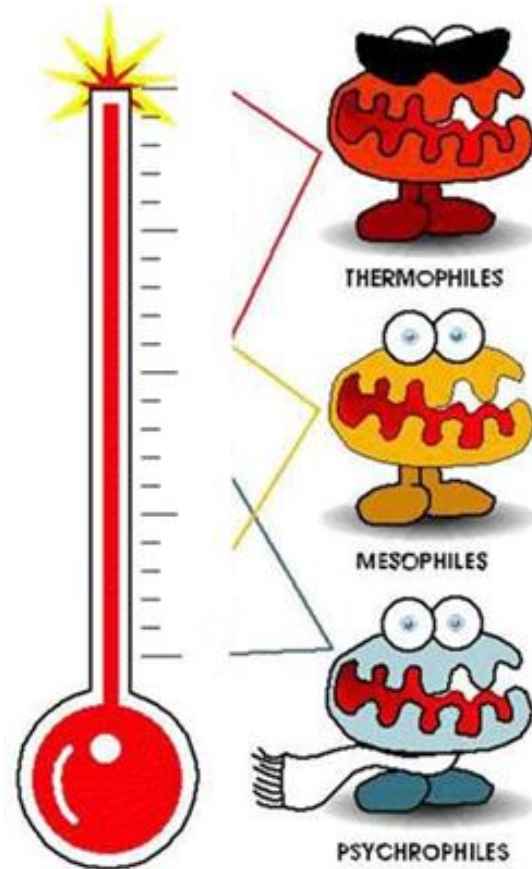
Ore 12,00 – 12,45  
Padiglione 2 Stand A12-B07

# **VALIDATION STUDY ON NEW ISOTHERMAL CONTAINER FOR HOT READY TO EAT FOOD IN CATERING ESTABLISHMENTS: PRELIMINARY RESULTS**

**Marta Castrica**

# INTRODUCTION

THE PRODUCTION METHODS, IN PARTICULAR THE COOK-SERVE METHOD, APPLIED IN HIGH PRODUCTION CATERING ESTABLISHMENTS, EVEN IF INSERTED IN A CORRECT SPATIAL DESIGN, IT IS AFFECTED BY TIME-TEMPERATURE FLOWS CHARACTERIZED BY INADEQUATE DESIGNED MOMENTS DURING WHICH CRITICAL POINTS CAN BE OBSERVED.



THE COOK-SERVE METHOD, IN THEIR APPARENT SIMPLICITY OF PRODUCTION RESERVE FOR OPERATORS IN THE CATERING SECTOR NUMEROUS DISADVANTAGES THAT GIVE RISE TO A POOR-QUALITY PERFORMANCE OF PRODUCTION AND A POTENTIAL AREA OF MICROBIOLOGICAL RISK DURING WHICH CRITICAL POINTS ARE OBSERVED DUE TO A LACK OF KNOWLEDGE OF PRINCIPLES: TIME-TEMPERATURE AND PHYSICS I.E. THE SECOND PRINCIPLE OF THERMODYNAMICS.

# INTRODUCTION

AT PRESENT, FOR THE TRANSPORT OF HOT READY TO EAT FOOD FROM CATERING ESTABLISHMENTS TO REMOTE CONSUMPTION SITES ARE USED ISOTHERMAL CONTAINERS MADE OF EXPANDED POLYPROPYLENE (EPP)



EPP IS SUITABLE FOR FOOD USE:

1. IS NON-TOXIC;
2. DOES NOT GIVE OFF ODORS OR FLAVORS TO FOOD;
3. IS EASILY WASHABLE, AS WELL AS RECYCLABLE.

MOREOVER, EPP HAS HIGH PERFORMANCE IN TERMS OF BOTH THERMAL INSULATION AND MECHANICAL RESISTANCE. THIS MATERIAL ALSO HAS A HIGH RESISTANCE TO CHEMICALS AND HIGH TEMPERATURES (UP TO ABOUT 120 ° C). IN ADDITION, THE HIGH TEMPERATURE RESISTANCE OF EPP ALLOWS CONTAINERS TO BE WASHED IN THE DISHWASHER, MAKING WASHING OPERATIONS COMFORTABLE AND ENSURING HIGH CLEANLINESS AND HYGIENE FOR SUBSEQUENT REUSE, WITHOUT RETAINING ODORS.



# AIM OF THE STUDY



THE AIM OF THIS STUDY WAS TO TEST AND VALIDATE IN THE PRELIMINARY PHASE AN INNOVATIVE MODEL OF ISOTHERMAL CONTAINERS IN EPP THAT HAS SEVERAL ADVANTAGES OVER EXISTING ONES, IN ORDER TO INCLUDE NEW TECHNOLOGIES IN THE SUPPLY CHAIN TO SUPPORT PRODUCTION PROCESSES. THE DESIGN OF THE FLOWS SHOULD ALWAYS BE IN FUNCTION OF THE TECHNICAL CHARACTERISTICS OF THE EQUIPMENT, THE TIME-TEMPERATURE PARAMETERS AND THE PHYSICAL PRINCIPLES THAT GOVERN THE THERMAL BALANCE.

# MATERIALS & METHODS

**AN ISOTHERMAL CONTAINER IN EPP FOR THE TRANSPORT OF HOT READY TO EAT FOOD WAS EXAMINED, EQUIPPED WITH AN INNOVATIVE SYSTEM (PATENT PENDING) FOR THE ACCUMULATION OF ACTIVE/PASSIVE HEAT.**

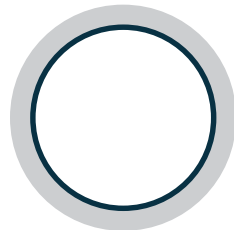


**THE SYSTEM CALLED "SMART HEATER" CONSISTS OF MODULATING AND SELF-REGULATING ELECTRIC HEATERS, COUPLED WITH CERAMIC-PLASTIC ACCUMULATORS AND AN ANODIZED-ALUMINIUM RADIATING SURFACE CERTIFIED FOR FOOD CONTACT.**

**THERMAL ACCUMULATORS STABILIZE THE TEMPERATURE INSIDE THE CONTAINER AT 65°C.**

# MATERIALS & METHODS

EACH SH WAS IDENTIFIED BY A SPECIFIC ID NUMBER, THE CONTAINERS USED IN THE EXPERIMENT CONTAINED THREE STEEL GASTRONORM, 10 CM DEEP. THE EXPERIMENTAL DESIGN WAS DIVIDED INTO FOUR DIFFERENT TRIALS:

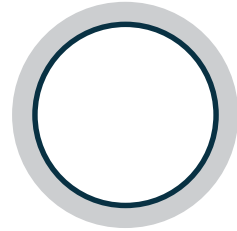


## TRIAL 1

VERIFICATION OF CONFORMITY TO TECHNICAL CHARACTERISTICS



# MATERIALS & METHODS



## TRIAL 2

**HEAT-TIGHTNESS TESTS WITHOUT FOOD  
TO VERIFY THE THERMAL INSULATION CAPACITY**

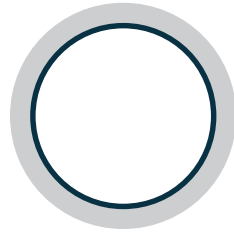


**RECORDING EVERY 15 MINUTES**



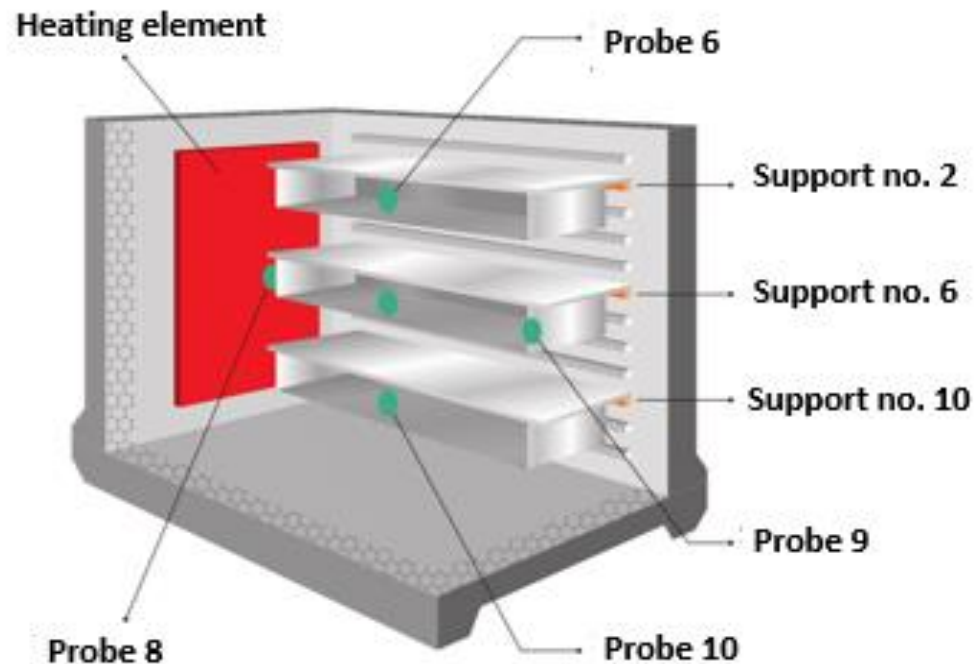
**STEEL GASTRONORM, 10 CM DEEP**

# MATERIALS & METHODS



## TRIAL 3

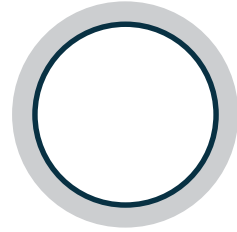
VACUUM AND LOAD THERMOGRAPHIC SURVEY  
MECHANICAL/PROJECT PERFORMANCE



POSITION OF THE TEMPERATURE TRANSDUCERS FOR THE  
THERMOGRAPHIC SURVEY.  
DATA COLLECTION EVERY 10 MINUTES



# MATERIALS & METHODS



## TRIAL 4

HEAT-TIGHTNESS TESTS WITHOUT FOOD  
TO VERIFY THE THERMAL INSULATION CAPACITY



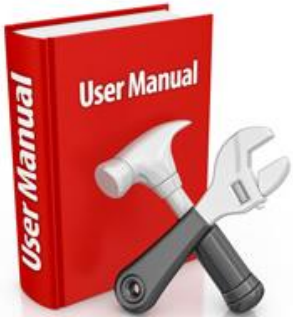
STEEL GASTRONORM, 10 CM DEEP WITH FOOD



RECORDING EVERY 1,5 MINUTES

# RESULTS

Energia		Condizionatore d'aria
Costruttore		CU....
Unità esterna		CS....
Unità interna		
Bassi consumi		A
A		
B		
C		
D		
E		
F		
G		
Alti consumi		
Consumo annuo di energia, kWh in modalità raffreddamento		xxx
Potenza refrigerante kW		xxx
Indice di efficienza elettrica		xxx
Tipo		
Solo raffreddamento		—
Raffreddamento/ riscaldamento		←
Raffreddamento ad aria		←
Raffreddamento ad acqua		—
Potenza di riscaldamento kW		xxx
Efficienza energetica in modalità riscaldamento		A B C D E F G
Rumore		xx



## TRIAL 1

### CONFORMITY TO TECHNICAL CHARACTERISTICS

WHEN THE OPERATING TEMPERATURE IS REACHED, THE ENERGY CONSUMPTION IS 30-40 WATTS.



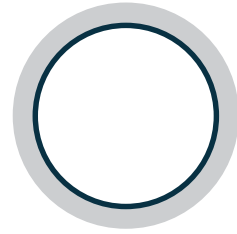
## TRIAL 2

### EXCELLENT THERMAL RESISTANCE

WITH SLIGHT THERMAL DIFFERENCE BETWEEN TOP AND BOTTOM



# RESULTS

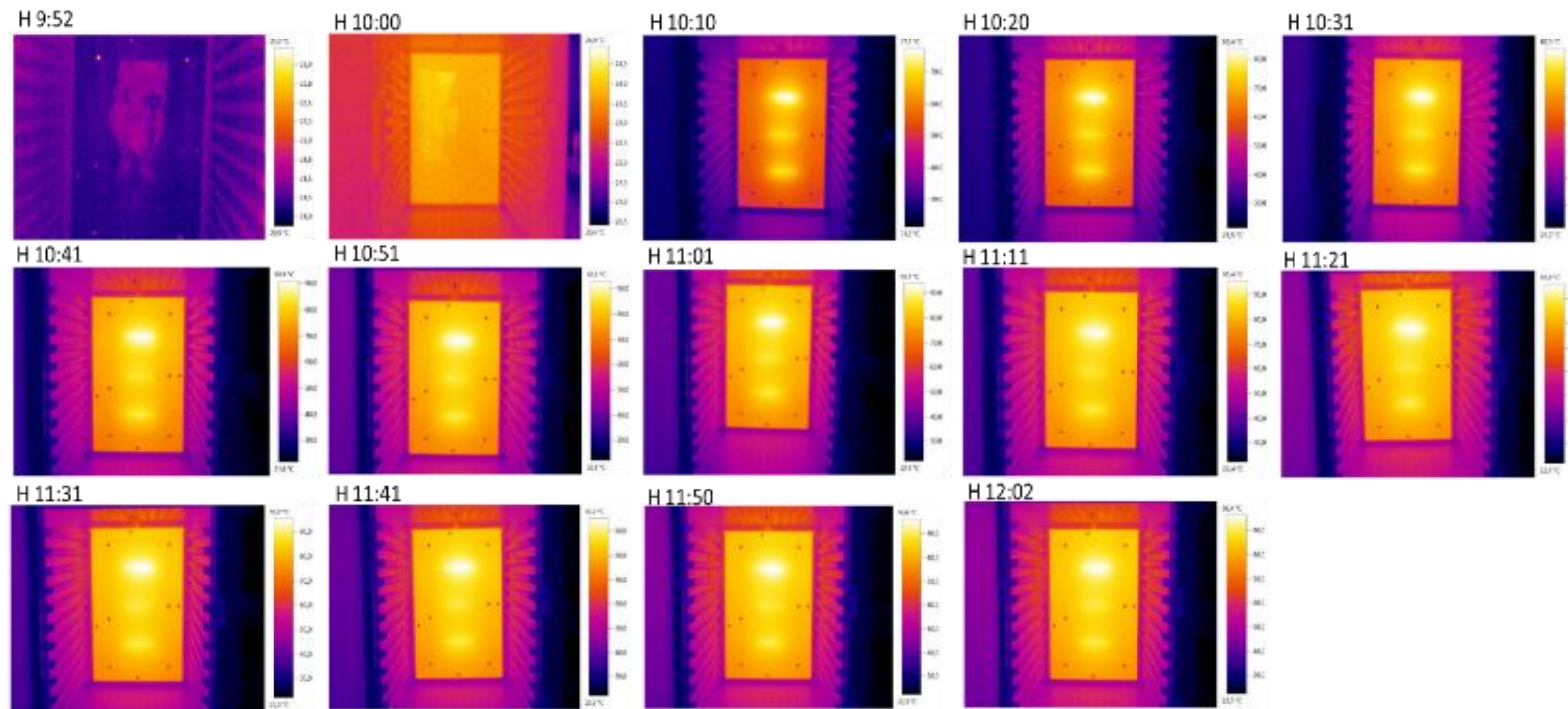


## TRIAL 3

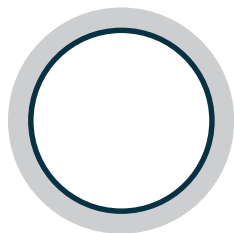
HE SHOWED:

THE EFFICIENCY OF COUPLING BOILERS / THERMAL  
ACCUMULATORS / RADIATING PLATE

EXCELLENT THERMODYNAMIC HEAT TRANSFER.



# RESULTS



## TRIAL 4

**SH ARE HIGH-PERFORMANCE THERMAL CONTROLLERS CAPABLE OF MAINTAINING A STABLE TEMPERATURE OVER A PERIOD OF 3 HOURS IN COMPLIANCE WITH CURRENT STANDARDS (UNI EN 12571:2009).**

Detection Time	Highest Position (T °C)	Medium Position (T °C)	Lowest Position (T °C)
11:45:00	67,1	64,4	58,3
12:45:00	78,1	65,5	58,7
13:45:00	74,6	64,3	58
14:45:00	71,6	62,6	56,3

**RESULTS OF THERMAL SEAL TEST WITH FOOD "STANDARD USE"**



# CONCLUSIONS



THE RESULTS SHOWED THAT:

**SH IS AN EXCELLENT TEMPERATURE MAINTAINER THAT GUARANTEES CONSISTENT THERMAL STABILITY AND GREATER THAN 65° C, CONSISTENT WITH CURRENT REGULATIONS.**

**LOW POWER CONSUMPTION** WITH ADVANTAGES FROM BOTH AN ECONOMIC AND ENVIRONMENTAL SUSTAINABILITY POINT OF VIEW.

**SUSTAINABILITY** SINCE EXPANDED POLYPROPYLENE FOR ITS INTRINSIC CHARACTERISTICS AS WELL AS ENSURING HIGH PERFORMANCE IN TERMS OF THERMAL INSULATION, IMPACT PROTECTION AND IS **RECYCLABLE**.

# CONCLUSIONS

**IN CONCLUSION, THE PRODUCTION CHAIN OF CATERING ESTABLISHMENTS SHOULD USE THIS HIGHLY INNOVATIVE TECHNOLOGY IN ORDER TO BENEFIT FROM PERFORMANCE CONSISTENT WITH THE HYGIENE SAFETY AND SENSORY CRITERIA, THUS OFFERING END USERS HIGHEST QUALITY FOOD.**

**HAVING SAID THAT, IT SHOULD BE CONSIDERED THAT THE DESIGN OF THE FLOWS SHALL TAKE INTO ACCOUNT THE SPECIFICS OF THE PRODUCTION SITE AS WELL AS THE TECHNICAL CHARACTERISTICS OF THE EQUIPMENT IN USE AND THE TIME-TEMPERATURE PARAMETERS ASSOCIATED WITH THE PHYSICAL PRINCIPLES THAT GOVERN THE THERMAL BALANCE.**

