IMPROVEMENT OF TRANSMISSION, APPLYING CORK PAINT INSIDE HOUSES WITH SUBER-KOLMER INSULATION.

IMPROVEMENT OF TRANSMISSION, APPLYING SUBER- KOLMER CORK PAINT, IN THREE TYPES OF HOUSING

INDEX

GRANADA 2013-2014

ORDER AND BACKGROUND OF MATERIAL

The commission of the research and certification report of new insulating material from KOLMER, was carried out through its General Manager: Mr Angel Ruiz Contreras, dated December 12, 2013, and has a execution time from 8 January to 17 February 2014.

Through contract No. 3376, to provide services to the agency TTO (Technology Transfer Office of Research), University of Granada and the company KOLMER. Professor Dr. José Jesús Guardia Olmedo being responsible for the report

The study involved testing and certifying, the improvements of this new insulation, which is applied by spraying cork shavings, conveyed in support painting and applying several coats by compressor, and relatively thin (generally three coats, about three millimeters thick are given) on any support on the interior surfaces of houses.

The starting point is the result of the material tested in the laboratory of AIDICO (Building Technological Institute) in Paterna, Valencia, and these data of the improved energy transmission have been studied and certifies in three types of existing buildings: one of old building (1970 and before the legislation), and two other current dwellings (post-2006), based on CTE (Technical Building Code) regulatory legislation and UNE-EN, and ISO norms.

.

The implementation and certification of UNE-EN 16001 also takes into account because it allows cost savings and has a differentiating effect in comparison with other standards, and is compatible with the international standard ISO 50001 (under revision) of the Energy Management Systems, which soon will be released and made available for all countries.

This report consists of / / / / / 30 / / / / / / pages..

METHODOLOGY FOLLOWED FOR THIS STUDY OF ENERGY EFFICENCY

For building, Directive 2002/91/EC on energy performance of buildings established guidelines to be followed in all European states.

In Spain, the transposition of this directive is carried out by 3 major regulatory actions:
-The new Regulation of Thermal Installations in Buildings (RITE)
-The procedure adopted in early 2007 on Building Energy Rating and
-The Technical Building Code (obligatory since September 2006) in this section on the basic requirement for energy saving (CTE HE).

And the technical instruments used for data collection were as follows:

- CTE (Technical Building Code)
-Construction Elements catalog CTE
-Energy Efficiency Program: CE-3 -.
-Royal Decree 235/2013 of April 5, approving the basic procedure for the Certification of Energy Efficiency in Buildings
-Regulations: UNE-EN and ISO.

THERMAL CONDUCTIVITY TEST OF MATERIAL

aitex
textile research institute

INFORME DE ENSAYO / *TEST REPORT*

Nº 2013AN1934

FECHA RECEPCIÓN
DATE OF RECEPTION
17/09/2013

FECHA ENSAYOS
DATE TEST
Inicio / *Starting*: 18/09/2013
Finalización / *Ending*: 24/09/2013

SOLICITANTE / *APPLICANT*
AIDICO (INS. TECNOLOGICO CONSTRUCCION)
Parc Tecnologic, s/n - Apdo.98
ES-46980 PATERNA
VALENCIA

Att. JUAN VICENTE SABATER

DESCRIPCIÓN E IDENTIFICACIÓN DE LAS MUESTRAS
DESCRIPTION AND IDENTIFICATION OF SAMPLES

MUESTRAS REFERENCIADAS / *SAMPLES REFERENCED*:
-"SUBER BY KOLMER".

ENSAYOS REALIZADOS
TESTS CARRIED OUT

- DETERMINACIÓN DE LA RESISTENCIA Y CONDUCTIVIDAD TÉRMICA
DETERMINATION OF THE THERMAL RESISTANCE AND CONDUCTIVITY.

Asociación de Investigación de la Industria Textil – C.I.F.: G03182870

SE ADJUNTAN *ATTACHED* --- MUESTRA(S) *SAMPLE(S)* LACRADA(S) *SEALED*

PÁG. *PAGE* 1 DE *OF* 5

Central: Plaza Emilio Sala, 1
E-03801 ALCOY (Alicante) SPAIN
Tel.:+34 96 554 22 00
Fax: +34 96 554 34 94

Unidades Técnicas: Paterna: Tel. 96 131 81 93 Fax: 96 131 81 83
Ontinyent: Tel. 96 291 22 62 Fax: 96 291 20 81
Alcoy: Calle Sant Jordi, 13 Tel.:+34 96 554 22 00

www.aitex.es
www.textil.org
www.observatoriotextil.com
info@aitex.es

INFORME Nº **2013AN1934**
REPORT Nº

RESULTADOS / *RESULTS*

DETERMINACIÓN DE LA RESISTENCIA Y CONDUCTIVIDAD TÉRMICA
DETERMINATION OF THE THERMAL RESISTANCE AND CONDUCTIVITY

Norma
Standard

UNE-EN 12667:2002, equivalente a EN 12667:2001
UNE-EN 12667:2002, equivalent to EN 12667:2001

Método de ensayo utilizado
Test method carried out

Medidor de flujo de calor acorde con la norma ISO 8301:1991
Heat flow meter according to standard ISO 8301:1991

Equipo
Equipment

Medidor de flujo de calor de muestra única, en posición horizontal y plato caliente en parte superior
Single specimen heat flow meter of horizontal orientation and hot plate in top level

Identificación de equipo
Apparatus identification

04129 I 12

Método para reducir las pérdidas de calor en los extremos
Method to reduce the heat losse in the edges

El propio material ensayado hace de aislante
Material itself reacts as an isolator

Norma del producto aplicada
Harmonised standard product applied

Procedimiento de muestreo aplicado
Sampling procedure applied

MATERIAL A ENSAYAR
TEST MATERIAL

Características *Characteristics*	Información del cliente *Customer information*	Dato medio *Determined data*
Referencia *Reference*	SUBER BY KOLMER	---
Especificaciones (composición) *Product specifications (composition)*	Corcho proyectado, según cliente *Project cork, according to client*	---
Aplicación (uso final) *Application (final use)*	No facilitado por el cliente *Not provided by client*	---
Densidad (kg/m^3) *Density*	700 Kg/m^3, según cliente *700 Kg/m^3, according to client*	---
Masa superficial (kg/m^2) *Surface mass*	No facilitado por el cliente *Not provided by client*	---
Espesor total (mm) *Total thickness*	3, según cliente *3, according to client*	---

>>>

PÁG. *PAGE* 2 DE *OF* 5

INFORME Nº 2013AN1934
REPORT Nº

RESULTADOS / *RESULTS*

Acondicionamiento de la muestra
Sample conditioning

Las probetas se acondicionan según punto 7.2.2 de la norma.
Specimens are conditioned according standard point 7.2.2

Determinación de la resistencia y conductividad térmica
Determination of the thermal resistanse and conductivity

Media de la diferencia de temperatura a través de la muestra durante el ensayo / *Average of the temperature diference through the specimen during test:* (ºC)

Probeta / *Specimen* 1	14.98
Probeta / *Specimen* 2	15.00
Probeta / *Specimen* 3	15.01

Temperatura de consigna de ensayo / *State temperature test* (ºC)

Probeta / *Specimen* 1	10.77
Probeta / *Specimen* 2	10.63
Probeta / *Specimen* 3	10.39

Densidad de la relación del flujo de calor a través de la muestra durante el ensayo / *Density of the relationship of the heat flow through the specimen during test* ($q = f\ e_h$):

Probeta / *Specimen* 1	120.41
Probeta / *Specimen* 2	120.87
Probeta / *Specimen* 3	122.43

Resistencia térmica / *Thermal resistance* ($m^2 \cdot$ºK/W) :

Probeta / *Specimen* 1	0.1244
Probeta / *Specimen* 2	0.1241
Probeta / *Specimen* 3	0.1226

Conductividad térmica / *Thermal conductivity* (W/m·ºK)

Probeta / *Specimen* 1	0.0933
Probeta / *Specimen* 2	0.0930
Probeta / *Specimen* 3	0.0938

CONDUCTIVIDAD TÉRMICA MEDIA *Thermal conductivity*	RESISTENCIA TÉRMICA MEDIA *Thermal resistance*
0.0933 W/m ºK	0.1237ºK/W

PÁG. *PAGE* 3 DE *OF* 5

DATA FOR THICKNESS OF 11 mm

TECHNICAL SPECIFICATIONS OF THE COATING WITH AND WITHOUT THE APPLICATION OF THE MATERIAL

STUDY SHEETS TYPE IN DIFFERENT MATERIALS IN THE BUILDING COATING

SHEET: ***LOAD-BEARING WALL. Solid, one piece, without interior insulation***

Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m² K/Watts	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission **U** Watts/m² K	Observations: No insulation inside cavity
filled with mortar	0.030	1.00	0.030			
Solid brick	0.25	0.85	0.294			
Plaster	0.02	0.40	0.050			
			Addition: 0.374	***0.544***	***1. 838***	

Sheet: ***LOAD-BEARING WALL. Solid, one piece,* and cork**: SUBER-KOLMER **projected inside**:

Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m² K/Watts	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission **U** Watts/m² K	Observations: No insulation inside cavity
filled with mortar	0.03	1.0	0.030			
Solid brick	0.25	0.85	0.294			
Plaster	0.02	0.40	0.050			
Suber-Kolmer	0.003	0.093	0.032			
			Addition: 0.406	***0.576***	***1.736***	

In load-bearing wall of solid brick, the loss of value in the transmission coefficient is: U: 1´83- 1.73 = 0´667, with an approximate value of: 5.88 %, when Súber-Kolmer is projected inwards.

***Sheet:* Cavity wall without insulation:**

Material	Thickness meters	Conductivi Ty Watts/m K	Resistance m² K/Watts Ri+Re= 0.17	Transmission **U** Watts/m² K	Observations: No insulation inside cavity
filled with mortar	0.03	1.00	0.030		
Half brick wall	0.115	0.85	0.135		
Air	0.03	0.022	1.364		
H/D Brick	0.09	0.56	0.160		
Plaster	0.02	0.40	0.05		
			Σ: 1´909	***0.523***	

The Suber-Kolmer material decreases transmission(U = 0.047), through the cavity wall without inner insulation, fourteen eighty-one percent: (1´52 %).

In other enclosures of the cavity walls, with internal insulation: Polyurethane projected Transmission: U is decreased by 0.209 to 39.90%

Sheet: ***Cavity walls without insulation*** and projected SUBER-KOLMER:

Material	Thickness meters	Conductivity Watts/m K	Resistance m² K/Watts Ri+Re= 0.17	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission : **U** Watts/m² K	Observations : No insulation inside in cavity
filled with mortar	0.03	1.000	0.030			
Half brick wall	0.115	0.850	0.135			
Air	0.03	0.022	1.364			
H/D brick	0.09	0.560	0.160			
Plaster	0.02	0.40	0.050			
Suber-Kolmer	0.003	0.093	0.032			
			Σ: 1´771	***1´ 941***	***0.515***	

Sheet : **cavity walls with inside insulation** and SUBER-KOLMER cork projected:

Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m² K/Watts	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission: **U** Watts/m² K	Observations: No insulation inside the cavity
filled with mortar	0.03	1.000	0.030			
Half brick wall	0.115	0.850	0.135			
Insulation	0.050	0.040	1.250			
Aire	0.03	0.022	1.364			
H/D brick	0.09	0.560	0.160			
Plaster	0.02	0.40	0.050			
Suber-Kolmer	0.003	0.093	0.032			
			Addition: 3´017	***3´180***	***0´314***	

A value of approximately U: 44.5 % is lost with respect to the initial walls without inside insulation in the cavity

Data summary for closing the cavity walls with air chamber without inside insulation, with inside insulation and with Suber-Kolmer inside insulation

U: 0.503……STARTING DATUM……ZERO: (0%)

U: 0.515……ONE POINT FIFTY THREE PER CENT: (1´53 %)

U: 0.314………………THIRTY NINE POINT NINE PER CENT:(39´90%)

Sheet : **Covering roof with tiles,** ***without inside insulation***, WITHOUT PROJECTED CORK

Material	Thickness meters	Conductivity ≠ Watts/m K	Resistance: R m² K/Watts	Superficial Resistance, inside+ outside *Ri+Re= 0.14*	Transmission: U Watts/m² K	Observations: insulation inside cavity
Covering with tiles	0.015	1.00	0.015			
Mortar	0.10	1.0	0.10			
H/D bricks	0.09	0.37	0.243			
Insulation	0.05	0.039	1.282			
Air	0.05	0.022	2.272			
Forged	0.250	0.830	0.300			
Plaster	0.02	0.40	0.050			
			Addition: 4.26	***4.40***	***0.227***	

Sheet : **Covering roof with tiles,** ***with inside insulation***, WITH PROJECTED SUBER-KOLMER CORK

Material	Thickness meters	Conductivity ≠ Watts/m K	Resistance: R m² K/Watts	Superficial Resistance, inside+ outside *Ri+Re= 0.14*	Transmission: U Watts/m² K	Observations: No insulation inside the cavity
Covering with tiles	0.015	1.00	0.015			
Mortar	0.10	1. 00	0.100			
H/D bricks	0.09	0.550	0.243			
Insulation	0.05	0.039	1.282			
Air	0.250	0.830	0.300			
Forged	0.05	0.022	2.272			
Plaster	0.02	0.40	0.050			
Suber-Kolmer	0.003	0.093	0.032			
			Addition: 4.292	***4.432***	***0.225***	

The covering of curved or terraced roofs, in zone c·3 of Granada, transmission values: U, must not be greater than 0´41W/m ²K.
In consequence, without inside insulation and with insulation, it respects CTE

Sheet **Flat Accessible roof,** ***with inside insulation*** and WITHOUT projected cork

Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m^2 K/Watts	Superficial Resistance, inside+ outside ***Ri+Re= 0.14***	Transmission: **U** Watts/m^2 K	Observations: inside insulation in cavity
Ceramic covering	0.015	0.100	0.015			
Mortar	0.03	1.0	0.03			
H/D brick	0.09	0.550	0.163			
Insulation	0.05	0.039	1.282			
Forged	0.250	0.830	0.300			
Plaster	0.02	0.40	0.050			
			Addition: 1.84	***1.98***	***0.505***	

This does not meet the provisions of CTE, for zone C-3 of Granada

Sheet: **Flat Accessible roof,** ***with inside insulation*** and WITH projected cork

Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m^2 K/Watts	Superficial Resistance, inside+ outside ***Ri+Re= 0.14***	Transmission: **U** Watts/m^2 K	Observations: insulation inside the cavity
Ceramic covering	0.015	1.00	0.015			
Mortar	0.03	1.0	0.03			
H/D brick	0.09	0.550	0.163			
Insulation	0.05	0.039	1.282			
Forged	0.250	0.830	0.300			
Plaster	0.02	0.40	0.050			
Suber-Kolmer	0.003	0.093	0.032			
			Addition: 1.872	***2.012***	***0.497***	

Pierde un valor de U: 0.505 -0.430 = de 0.075, resultando un: 14´86 %

LOAD BEARING WALL PINE WOOD average density: (0´5):

Sheet	Material	Thickness meters	**Conductivity** ≠ Watts/m K	**Resistance: R** m² K/Watts	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission: **U** Watts/m² K	Observations: No insulation inside the cavity wall
	Pine board	0.15	0.14	1.070			
	Plaster sheets	0.02	0.40	0.050			
				1. 120	1.29	**0.775**	Valor

LOAD BEARING WALL PINE WOOD average density: (0´5): ***and*** SUBER-KOLMER projected interior cork:

Sheet -	Material	Thickness meters	**Conductiviity** ≠ Watts/m K	**Resistance: R** m² K/Watts	Superficial Resistance, inside+ outside Ri+Re= 0.17	Transmission: **U** Watts/m² K	Observations: No insulation inside the cavity wall
	Pine board	0.15	0.14	1.070			
	Plaster sheets	0.02	0.40	0.050			
	Suber-Kolmer	0.003	0.0933	0´032			
				1´152	1´322	0´756	

Loss of Transmission, approximately 2´5 %, with cork.

CONCLUSIONS

In old buildings with solid walls, is where most transmission loss is noted , so it is most appropriate for replacement and thermally improved interior comfort .

The values being:

A value of 5.88 % for load-bearing walls of solid brick. From 1.53% to 39.90 % for cavity enclosures.

A lower value of 1.09 % % for pitched roofs, and flat roofs (without insulation which does not meet the CTE) .

A value of 19'87 % in enclosures with solid pine (medium density) .

In general, BUILDINGS lose Transmission of approximately 14.40 % , AVERAGE , being a detached house with cork or not having it.

In load bearing walls of solid brick, the loss in the Transmission coefficient has a value close to 6% , when projected inside with Suber - Kolmer . In these cases the application of cork insulation is strongly recommended.

The Suber - Kolmer material, in a cavity without inner insulation, decreases Transmission U by thirty -nine percent (39%). The U values passing from 0'523 to 0'314.

In other cavities, with internal insulation of projected Polyurethane , the Transmission U decreases by 9%. The U values passing from 0'523to 0.515.

For wooden enclosures the values of U Transmission are:

From a value of 0’775 to 0'621 dropping by 0’154 , that is 19'87 %

With these data from the catalog of CTE Construction Elements , Energy Performance Certificate (EEC) , studying three cases of housing in Granada have been granted:

EXISTING CONSTRUCTION: Penthouse : Build 1970.

EXISTING CONSTRUCTION: Semi-Detached House , built between 2000-2007.
NON EXISTING CONSTRUCTION wood houses:, under new regulation.

Assuming that a closure of 120 mm in solid pine wood has a thermal transmission of 0.91 W/m2K , if we add 3 mm of EPS with thermal conductivity 0.038 W / mk , new thermal transmission becomes 0.85 W / m2 K . Although, in Granada, it will not comply with the Transmission, because it is small thicknesses without insulation, and with low thermal inertia, the projected materials will improve by 6'59 %

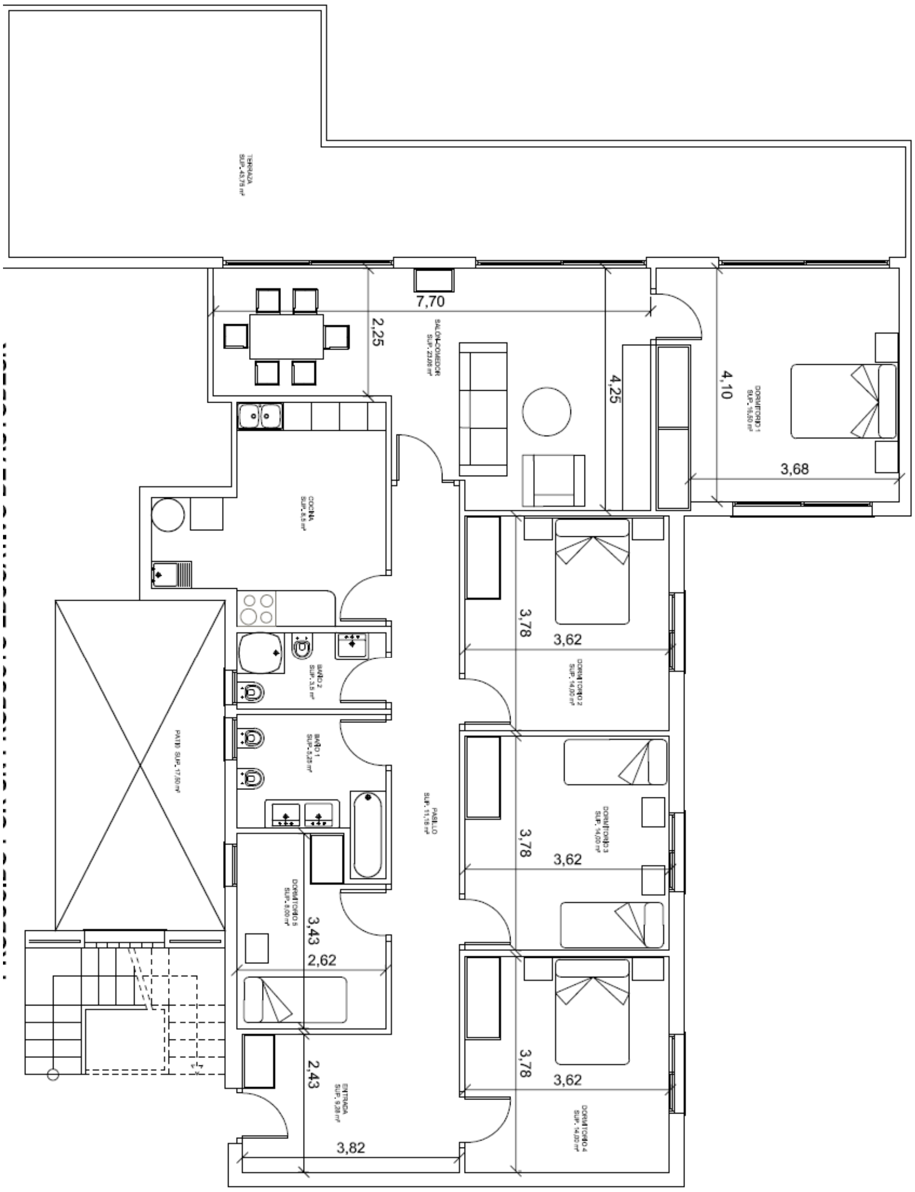
Although it is a good average value, because the thickness of the enclosure is small : 12 cm , when the section and the thickness of the insulation between the wood and the interior finish is increased, if the value of the Transmission is lowered, it now complies with area C of Granada and area E - 1 of the Alpujarra .

The countries which most use wood in buildings are : Scandinavians , Canada and North America, being therefore a highly recommended market to introduce this material, because of its versatility in application and improvement of thermal conditions inside houses . -

CERTIFICATION OF ENERGY EFFICENCY IN THREE TYPES OF HOUSINGS

PENTHOUSE IN CITY CENTER OF GRANADA, BUILT 1970S

FLOOR PLAN PENTHOUSE IN CITY CENTER OF GRANADA, 1970S



CERTIFICATION OF APARTMENT BUILDING PENTHOUSE IN GRANADA, 1.970S

CERTIFICADO DE EFICIENCIA ENERGÉTICA DE EDIFICIOS EXISTENTES

IDENTIFICACIÓN DEL EDIFICIO O DE LA PARTE QUE SE CERTIFICA:

Nombre del edificio	PISO ÁTICO 8º G, EDIFICIO CERVANTES		
Dirección	Plaza del Campillo nº 5		
Municipio	Granada	**Código Postal**	18005
Provincia	Granada	**Comunidad Autónoma**	Andalucía
Zona climática	C3	**Año construcción**	1970
Normativa vigente (construcción / rehabilitación)	Anterior a la NBE-CT-79		
Referencia/s catastral/es	7044301VG4174C0088FM		

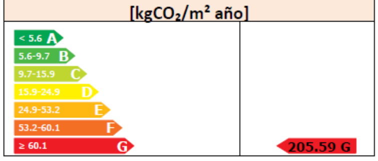
Tipo de edificio o parte del edificio que se certifica:	
● Vivienda ○ Unifamiliar ● Bloque ○ Bloque completo ● Vivienda individual	○ Terciario ○ Edificio completo ○ Local

DATOS DEL TÉCNICO CERTIFICADOR:

Nombre y Apellidos	José Jesús Guardia Olmedo	**NIF**	24280487
Razón social	Arquitecto Técnico	**CIF**	24280487 P
Domicilio	Cª Sª Nevada nº 64		
Municipio	Cenes vega	**Código Postal**	18190
Provincia	Granada	**Comunidad Autónoma**	Andalucía
e-mail	jguardia@ugr.es		
Titulación habilitante según normativa vigente	Arquitecto Técnico		
Procedimiento reconocido de calificación energética utilizado y versión:	CE^{3}X v1.1		

CALIFICACIÓN ENERGÉTICA OBTENIDA:

CALIFICACIÓN ENERGÉTICA GLOBAL
EMISIONES DE DIÓXIDO DE CARBONO
[$kgCO_2/m^2$ año]



El técnico certificador abajo firmante certifica que ha realizado la calificación energética del edificio o de la parte que se certifica de acuerdo con el procedimiento establecido por la normativa vigente y que son ciertos los datos que figuran en el presente documento, y sus anexos:

Fecha: 28/1/2014

Firma del técnico certificador

Anexo I. *Descripción de las características energéticas del edificio.*
Anexo II. *Calificación energética del edificio.*
Anexo III. *Recomendaciones para la mejora de la eficiencia energética.*
Anexo IV. *Pruebas, comprobaciones e inspecciones realizadas por el técnico certificador.*

Registro del Órgano Territorial Competente:

Fecha 28/1/2014
Ref. Catastral 7044301VG4174C0088FM Página 1 de 6

CERTIFICATION TWO-STOREY TERRACE HOUSE IN GRANADA, 2.000

CERTIFICATION TWO-STOREY TERRACE HOUSE IN GRANADA, 2.000

CERTIFICADO DE EFICIENCIA ENERGÉTICA DE EDIFICIOS EXISTENTES

IDENTIFICACIÓN DEL EDIFICIO O DE LA PARTE QUE SE CERTIFICA:

Nombre del edificio	VIVIENDA ADOSADA		
Dirección	CALLE ZAHAREÑA Nº10		
Municipio	Granada	**Código Postal**	18009
Provincia	Granada	**Comunidad Autónoma**	Andalucía
Zona climática	C3	**Año construcción**	2006
Normativa vigente (construcción / rehabilitación)	NBE-CT-79		
Referencia/s catastral/es	8239801VG4183G0018KB		

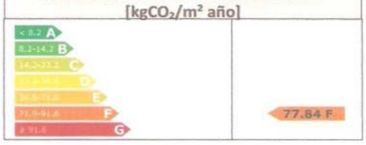
Tipo de edificio o parte del edificio que se certifica:	
● Vivienda ● Unifamiliar ○ Bloque ○ Bloque completo ○ Vivienda individual	○ Terciario ○ Edificio completo ○ Local

DATOS DEL TÉCNICO CERTIFICADOR:

Nombre y Apellidos	JOSÉ GUARDA OLMEDO	**NIF**	24280487P
Razón social	JOSÉ GUARDIA OLMEDO	**CIF**	24280487P
Domicilio	C/ ZAHAREÑA Nº10		
Municipio	GRANADA	**Código Postal**	18009
Provincia	Granada	**Comunidad Autónoma**	Andalucía
e-mail	jguardia@ugr.es		
Titulación habilitante según normativa vigente	ARQUITECTO TÉCNICO		
Procedimiento reconocido de calificación energética utilizado y versión:	CE^3X v1.1		

CALIFICACIÓN ENERGÉTICA OBTENIDA:

CALIFICACIÓN ENERGÉTICA GLOBAL
EMISIONES DE DIÓXIDO DE CARBONO
[$kgCO_2/m^2$ año]



El técnico certificador abajo firmante certifica que ha realizado la calificación energética del edificio o de la parte que se certifica de acuerdo con el procedimiento establecido por la normativa vigente y que son ciertos los datos que figuran en el presente documento, y sus anexos:

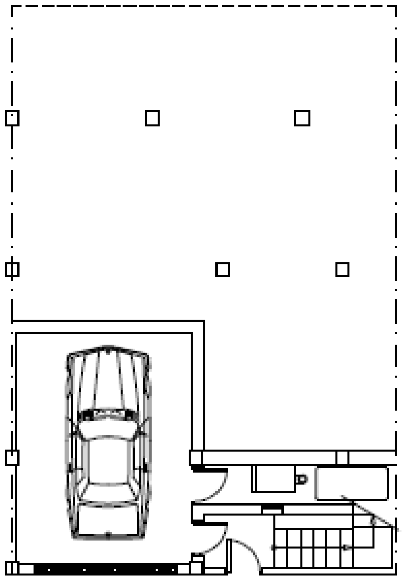
Fecha: 9/7/2013

Firma del técnico certificador

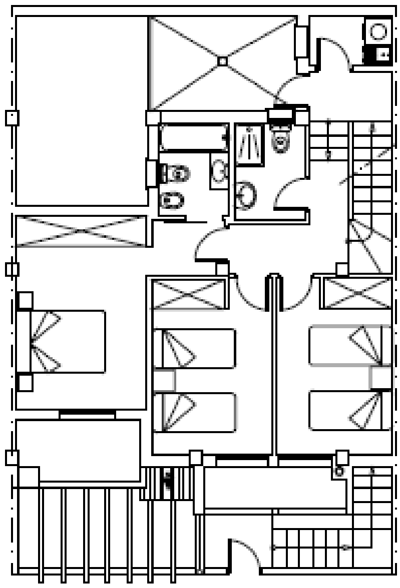
Anexo I. *Descripción de las características energéticas del edificio.*
Anexo II. *Calificación energética del edificio.*
Anexo III. *Recomendaciones para la mejora de la eficiencia energética.*
Anexo IV. *Pruebas, comprobaciones e inspecciones realizadas por el técnico certificador.*

Registro del Órgano Territorial Competente:

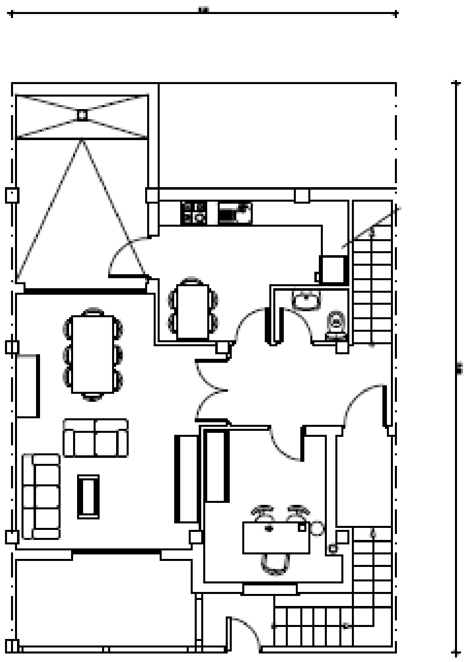
CERTIFICATION TWO-STOREY TERRACE HOUSE IN GRANADA, 2.000



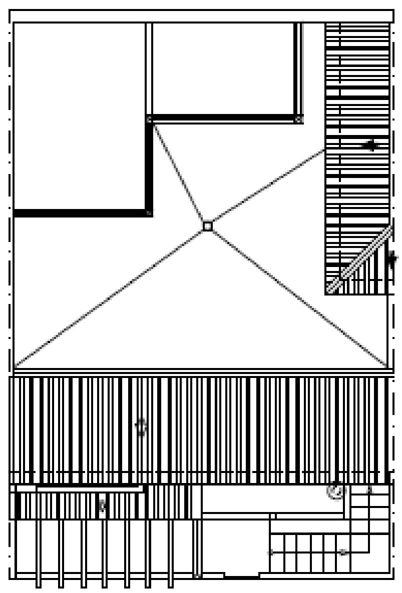
PLANTA SOTANO



PLANTA ALTA

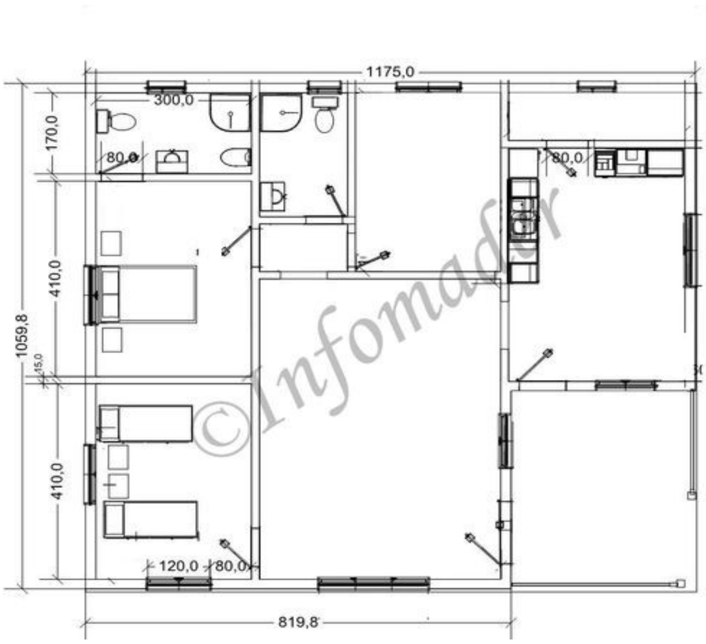


PLANTA BAJA



CUBIERTA

CURRENT WOOD HOUSE. 2.000



Ana Model 78 m2 useful square meters

CERTIFICADO DE EFICIENCIA ENERGÉTICA DE EDIFICIOS EXISTENTES

IDENTIFICACIÓN DEL EDIFICIO O DE LA PARTE QUE SE CERTIFICA:

Nombre del edificio	CASA DE MADERA		
Dirección	ALPUJARRA		
Municipio	Baza	**Código Postal**	18416
Provincia	Granada	**Comunidad Autónoma**	Andalucía
Zona climática	C3	**Año construcción**	2014
Normativa vigente (construcción / rehabilitación)	C.T.E.		
Referencia/s catastral/es	1803A005002120001ZR		

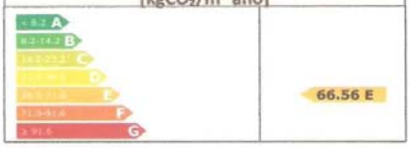
Tipo de edificio o parte del edificio que se certifica:	
● Vivienda ● Unifamiliar ○ Bloque ○ Bloque completo ○ Vivienda individual	○ Terciario ○ Edificio completo ○ Local

DATOS DEL TÉCNICO CERTIFICADOR:

Nombre y Apellidos	JOSE GUARDIA OLMEDO	**NIF**	24280487
Razón social	Particular	**CIF**	24280487 P
Domicilio	Cª Sª NEVADA 64		
Municipio	CENES VEGA	**Código Postal**	18190
Provincia	Granada	**Comunidad Autónoma**	Andalucía
e-mail	jguardia@ugr.es		
Titulación habilitante según normativa vigente	Arquitecto T.		
Procedimiento reconocido de calificación energética utilizado y versión:	CE^3X v1.1		

CALIFICACIÓN ENERGÉTICA OBTENIDA:

CALIFICACIÓN ENERGÉTICA GLOBAL
EMISIONES DE DIÓXIDO DE CARBONO
[$kgCO_2/m^2$ año]



El técnico certificador abajo firmante certifica que ha realizado la calificación energética del edificio o de la parte que se certifica de acuerdo con el procedimiento establecido por la normativa vigente y que son ciertos los datos que figuran en el presente documento, y sus anexos:

Fecha: 29/1/2014

Firma del técnico certificador

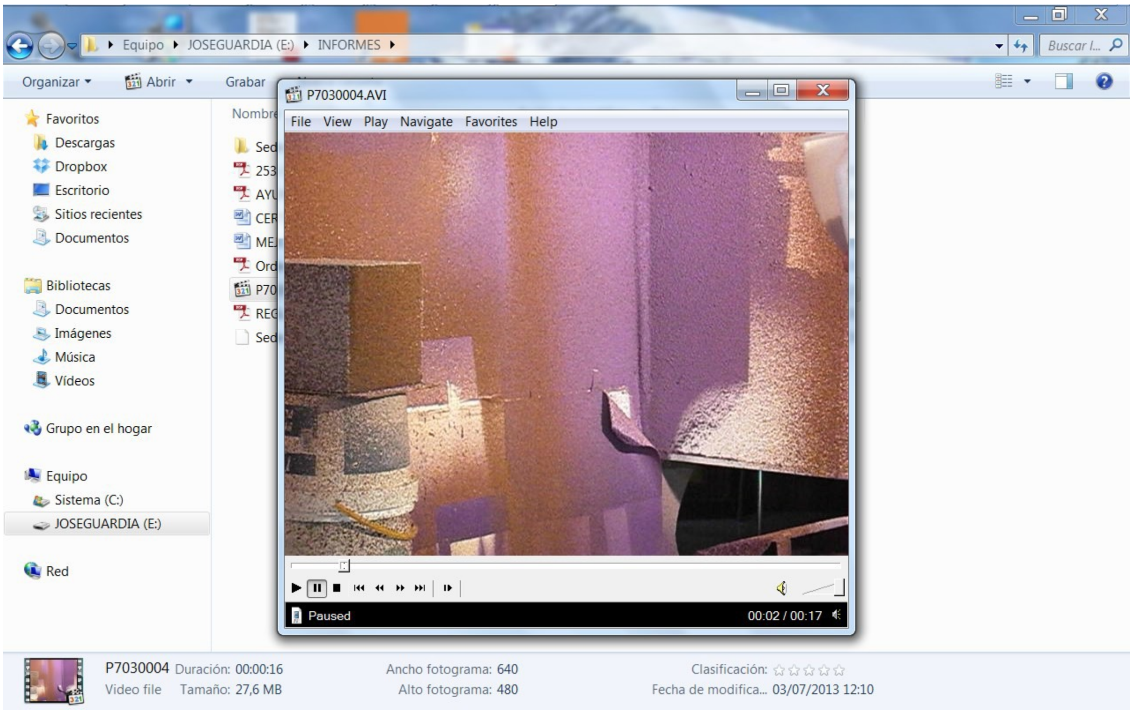
Anexo I. *Descripción de las características energéticas del edificio.*
Anexo II. *Calificación energética del edificio.*
Anexo III. *Recomendaciones para la mejora de la eficiencia energética.*
Anexo IV. *Pruebas, comprobaciones e inspecciones realizadas por el técnico certificador.*

Registro del Órgano Territorial Competente:

Fecha 29/1/2014
Ref. Catastral 1803A005002120001ZR

Página 1 de 6

PHOTOGRAPHS OF MATERIAL: APLICATION AND DETAILS OF TEXTURE



CONCLUSIONS AND FINAL RESULTS

Based on laboratory test: AIDICO (Technological Institute Building), Valencia, concerning the Conductivity of Suber-Kolmer material, we proceeded to check with the CE3-x program of the Ministry of Industry, the effect of improving thermalTransmission t, (U), in three different housing types and demonstrated the enhancement of its value.

The recommended application is three millimeters thick cork, on the surface of interior walls of any material.

U values, in these houses which have declined in all examples, especially in the old buildings of solid brick walls, with and without air cavities.

The percentages of these values are highly variable, due to the heterogeneity of the layers that make up the enclosure, so the values have ranged from 39% maximum value to the lowest values of 5%, and 1% in roofs.

When it comes to wooden pine enclosures, the value of improvement of Energy Transmission: U, is approximately: (20'00%) -.

In Granada, 17 February 2014

Author:

BIBLIOGRAPHY CONSULTED

Technical Building Code "CODIGO TÉCNICO DE LA EDIFICACIÓN (CTE)". 2006, in sections

- **DB-HS** (*Documento Básico de Salubridad*)/Basic Document of Sanitation
- **DB-HR** (*Documento Básico de protección frente al Ruido/*) Basic Document of protection against noise: It was adopted after the other Basic Documents

DB-HE (*Documento Básico de Ahorro de Energía*/ Basic Energy Saving Document): The legislation requires introduction of solar energy system and the use of materials and construction techniques that contribute to energy saving.

AND THE CATALOG OF BUILDING CONSTRUCTION ELEMENTS

CTE
CÓDIGO TÉCNICO DE LA EDIFICACIÓN

CATÁLOGO DE
ELEMENTOS CONSTRUCTIVOS
DEL CTE

Redacción: Instituto Eduardo Torroja de ciencias de la construcción con la colaboración de CEPCO y AICIA

Versión preliminar: Marzo 10. Borrador

Archivo: CAT-EC-v6.3(MARZO10).doc

Qualification Program of Energy Efficiency for Existing Buildings (CE-3)

The development of this procedure has been commissioned by the Institute for Energy Diversification and Saving) under the provisions of the draft Royal Decree on Energy Certification of Buildings, the team consists of:

- APPLUS NORCONTROL SLU (APPLUS)energy efficiencyUnit

· Elisa Castaño Alarcón; Margarita Hernández Díez;
Luisa Fernanda Rodríguez Cuadrado; Pilar López Sánchez;

Iván Ruelas Cerda

· Thermotechnical Group of AICIA – University of Sevilla
· : Servando Álvarez Domínguez; José Luis Molina Félix;
José Manuel Salmerón Lissén; José Sánchez Ramos;
Rafael Salmerón Lissén;
Manuela Gordillo Bellido; Raúl García Blanco; Miguel Puig García;
Juan Francisco Coronel Toro; Luis Pérez Lombrard Martín de Oliva;

· Group of Thermic Engineering University of Cádiz(UCA)
· Francisco José Sanchez de la Flor; Pilar Monsalvete Álvarez de Uribarri;

· Institut Ildefons Cerdá, Private Foundation (I. CERDÁ): Elisabet Viladomiú; César Muñoz

· Unit of Quality in Construction. Institute Eduardo Torroja (IETcc) José Antonio Tenorio Rios (Responsable); Fernando Martín-Consuegra Ávila; Maria Jesús Gavira Galocha; Germán de Diego Aguado; Daniel Jiménez Gonzalez; Virginia Sánchez Ramos

· Unit of Building and Land Planning, Foundation Labein (LABEIN) José Antonio Sánchez de Sancha; José Maria Campos; Olga Macías

· REPSOL-Technology Direction
Ismael Vela Morejón (Centro Tecnológico Repsol);
Miguel Angel Muñecas Vidal (Centro Tecnológico Repsol)
Ignacio Leiva Pozo (Repsol Butano)

This team has benefited from the participation of the following advisers:
· Margarita de Luxán (Polytechnic University of Madrid), Gloria Gómez y Emilia Román.- Adviser in construction and rehabilitation
· Ramón Velázquez (Consulting Engineer).- Adviser on audit methodology and caracterization of heating and refreigerating installations.
· Alberto Viti (Consulting Engineer).- Adviser on installations and RITE.
· Rafael Guzmán (University of Málaga).- Adviser on lighting installations.

The software application uses library code graphing VTK version 4.2 under the license described in http://www.kitware.com/Copyright.htm

The implementation of the **UNE-EN 16001** certification and allows cost savings and creates a differentiating effect against other standards and is compatible with the international standard **ISO 50001**, Energy Management System, which will soon be available