

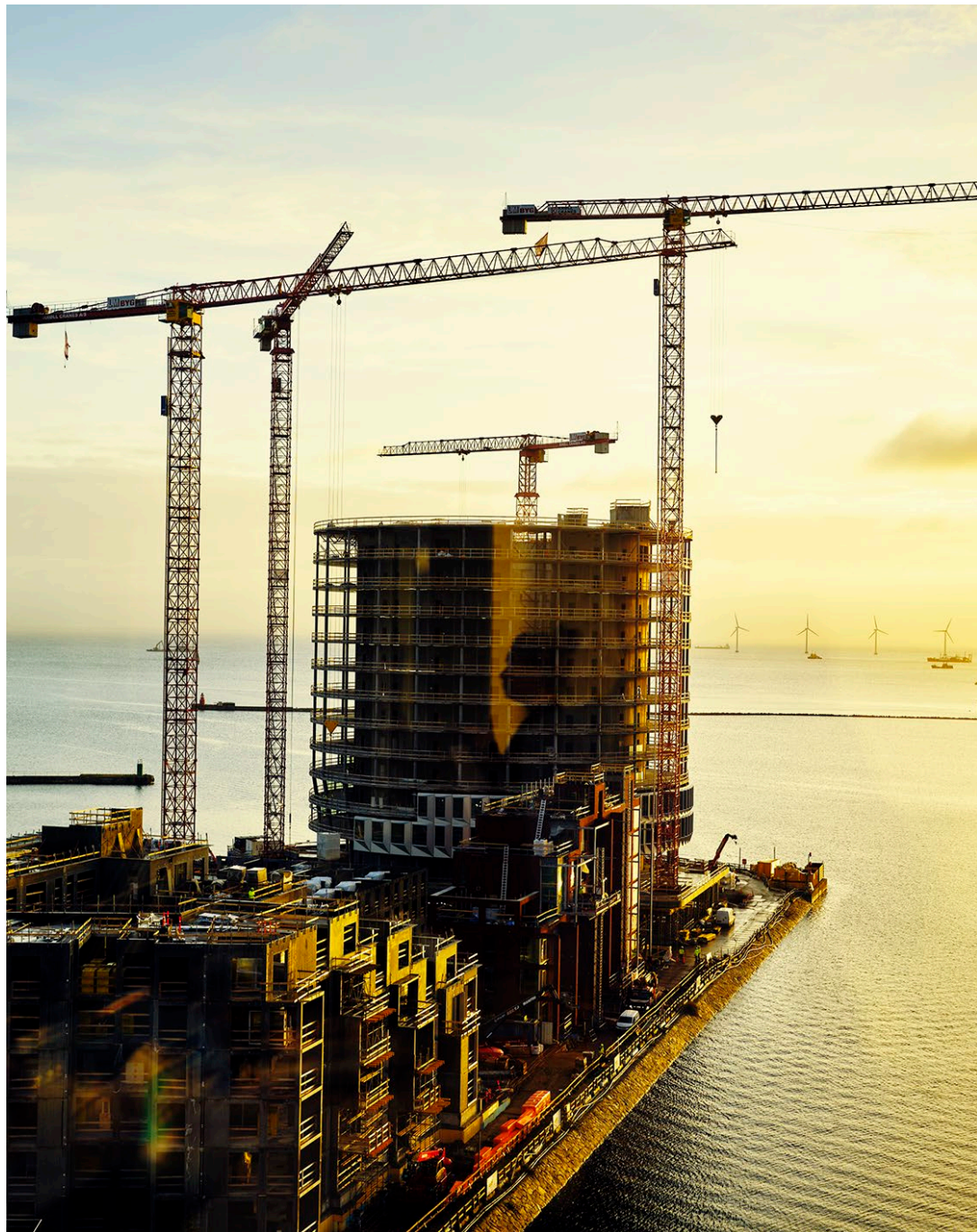
MorgenBriefing

13. oktober 2022

Bæredygtighed i byggeriet

Bæredygtigt byggeri og dokumentationskrav

- Krav om LCA-beregning jf. BR23
- EU's taksonomi for bæredygtige investeringer
- Ny byggevareforordning på vej
- Digitalt produktpas
- Markedsefterspørgsmål med fokus på bæredygtighed, ressourceeffektivitet og genbrug
- Nye europæiske standarder på vej



Dagens program

08:30

Velkomst

v/ Jens Heiede, adm. direktør, Dansk Standard

Hvordan ser kommunerne på deres ansvar og hvilke krav vil de stille til fremtidens byggerier?

v/ Nicolaj Bang, rådmand for Teknik og Miljø, Aarhus Kommune og Tobias Bøgeskov Eriksen, medlem af byrådet, Aalborg Kommune

Svanemærket – en stærk vej til et mere bæredygtigt byggeri

v/ Henrik Hougaard, relationschef, Miljømærkning Danmark

EU's taksonomi for bæredygtige investeringer – en game changer for fremtidens byggeri

v/ Alexander Mollan Bohn Christiansen, konsulent, Dansk Standard

Hvordan tester og dokumenterer vi byggematerialer til genbrug?

v/ Lisbeth Ottosen, professor og Head of Section for Materials and Durability og Anne Holm Sjøberg, afdelingschef, Dansk Standard

ETA'er – dokumentation af samlinger til bærende trækonstruktioner

v/ Thomas Bruun, adm. direktør, ETA-Danmark A/S

10:45

Tak for i dag

Hvordan ser kommunerne på deres ansvar, og hvilke krav vil de stille til fremtidens byggerier?

Nicolaj Bang, rådmand for Teknik og Miljø, Aarhus Kommune

Tobias Bøgeskov Eriksen, medlem af byrådet, Aalborg Kommune

Svanemærket – en stærk vej til et mere bæredygtigt byggeri

Henrik Hougaard, relationschef, Miljømærkning Danmark



Svanemærket Nybyggeri - Generation 4

Miljømærkning Danmark

- Varetager drift og udvikling af de officielle miljømærker Svanemærket og EU-Blomsten på vegne af Miljøministeriet
- Non-profit organisation
- Selvstændig enhed under Fonden Dansk Standard
- Den danske del af Nordisk Miljømærkning
- Medlem af GEN (Global Ecolabelling Network).

Type I Miljømærke ISO 14024

- Frivilligt mærke
- Baseret på livscyklustankegangen
- Helheds- og høje miljøkrav
- Udvikler krav i fuld åbenhed
- Kravene skærpes regelmæssigt
- 3. parts uafhængig certificering



Højt kendskab og troværdighed

- 94%** af danskerne kender Svanemærket¹
- 76%** af danskerne har tillid til, at et produkt er et godt miljømæssigt valg, hvis det er Svanemærket²
- 63%** af danskerne ser efter Svanemærket, når de vælger varer^{1b}

Kilde. 1. YouGov jan. 2021 1b) YouGov jan. 2021, ser af og til, ofte eller altid efter Svanemærket, når de vælger varer. 2. IPSOS 2019 - Nordic Consumer Survey on assignment from Nordic Ecolabelling

Praktisk information om de nye kriterier

- Høringsperiode: 12-01-2022 til 15-03-2022.
- Mere end 500 sider høringssvar
- Kriterierne forventes at blive lanceret xxx

Primære ændringer

- Kriterierne omfatter nu også **kontorbyggeri**
- **Nye klimakrav**; Klimadeklaration og krav til udvalgte materialer.
- **Circulær økonomi**, særligt fokus på byggeaffald, genbrugte / genanvendte materialer og design for adskillelse / demontering
- Kravene til **indeklima** er opdateret og skærpet
- Der er indført et obligatorisk krav om anvendelse af **miljømærkede produkter** i svanemærket byggeri
- Der er øget fokus på **biodiversitet** i kriterierne
- Der tilstræbes compliance med EU's Taxonomy for nybyggeri

Eksempler

Klima – LCA

- Klimadeklaration for bygningen
- Kvalitetssikring af klimadeklarationen
- Restriktioner af energikilder på byggepladsen
- Maskiner på byggepladsen

Cirkularitet

- Håndtering af byggeaffald
- Reduktion af byggeaffald
- Producent take-back systemer
- Farlige stoffer i genbrugte byggevarer og materialer
- Genbrugte byggevarer og materialer
- Design for adskillelse og tilpasning (Disassembly and Adaptability)

- Biodiversitet
- Kravet om certificeret træ udvides
- Beskyttelses- og vedligeholdsplan
- Forbedring og beskyttelse af byggegrundens biodiversitet
- Ørige revideringer
 - Termisk komfort og overophedning
 - Dagslys



Spørgsmål

EU's taksonomi for bæredygtige investeringer – en game changer for fremtidens byggeri

Alexander Mollan Bohn Christiansen, konsulent, Dansk Standard

EU's taksonomi – kort fortalt

- Finansielt værktøj
- Flytte investeringer
- 6 miljømål
- Gør-ikke-nævneværdig-skade
- Sociale minimumskriterier



Introduktion til
EU's taksonomi for
miljømæssig bæredygtighed
- byggeri

Introduktion til EU's taksonomi

- Marts 2022
- Overblik og forståelse
- Rettet mod både store og små virksomheder
- Komplekst emne

Guide til EU's taksonomi for byggeriet

- Samarbejde mellem DTU og Dansk Standard
- Bred inddragelse af branchen
- Identificere værktøjer til overholdelse af taksonomien
- Guide der giver ensrettet billede med høj detaljeringsgrad



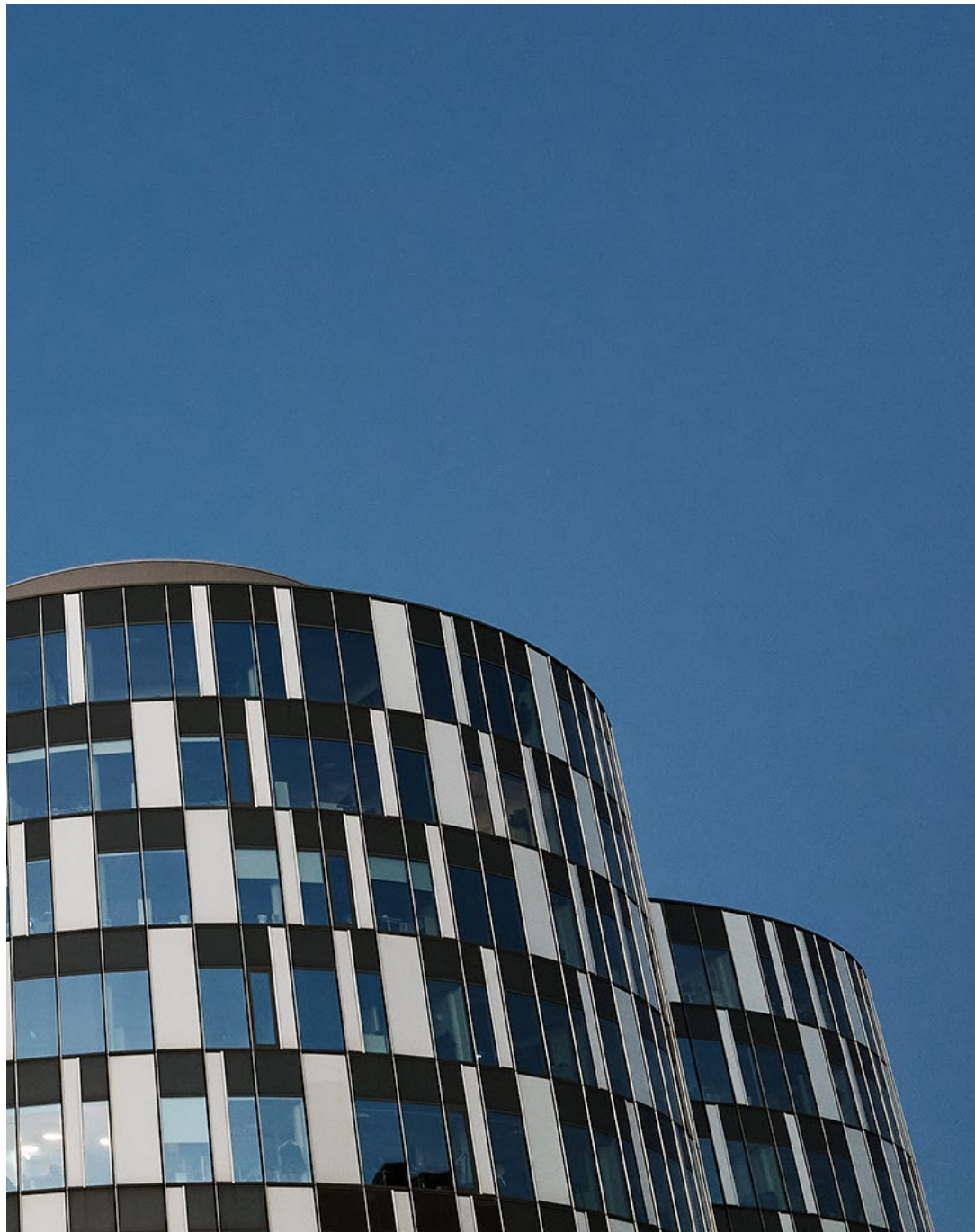
Hvis du vil vide mere:

Alexander Mollan Bohn Christiansen
Konsulent, Dansk Standard

M: amc@ds.dk

T: 28 86 56 35

Læs også på www.ds.dk/taksonomi



Spørgsmål?



Hvordan tester og dokumenterer vi byggematerialer til genbrug?

Lisbeth Ottosen, professor og Head of Section for Materials and Durability
Anne Holm Sjøberg, afdelingschef, Dansk Standard

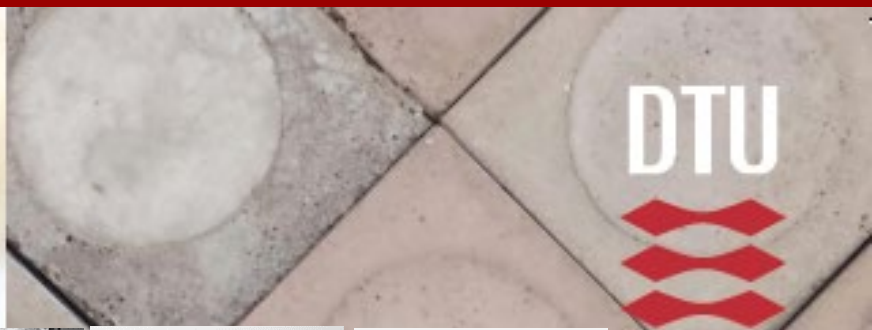
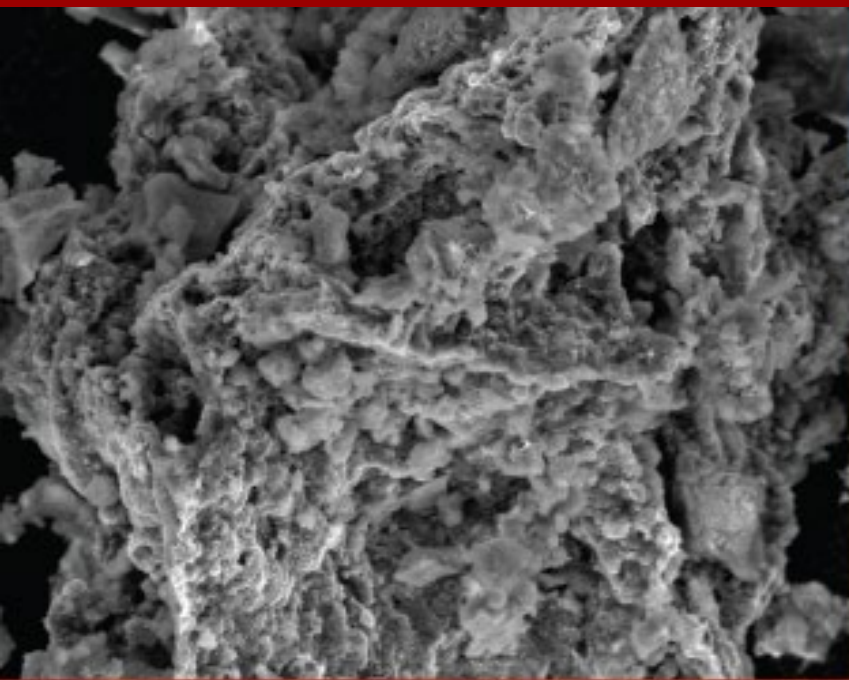
Lisbeth M. Ottosen

Hvordan tester og dokumenterer vi byggematerialer til genbrug?



DTU Sustain – Department of Environmental and Resource engineering





ZeroWaste Byg

Redesigning construction materials towards zero waste society

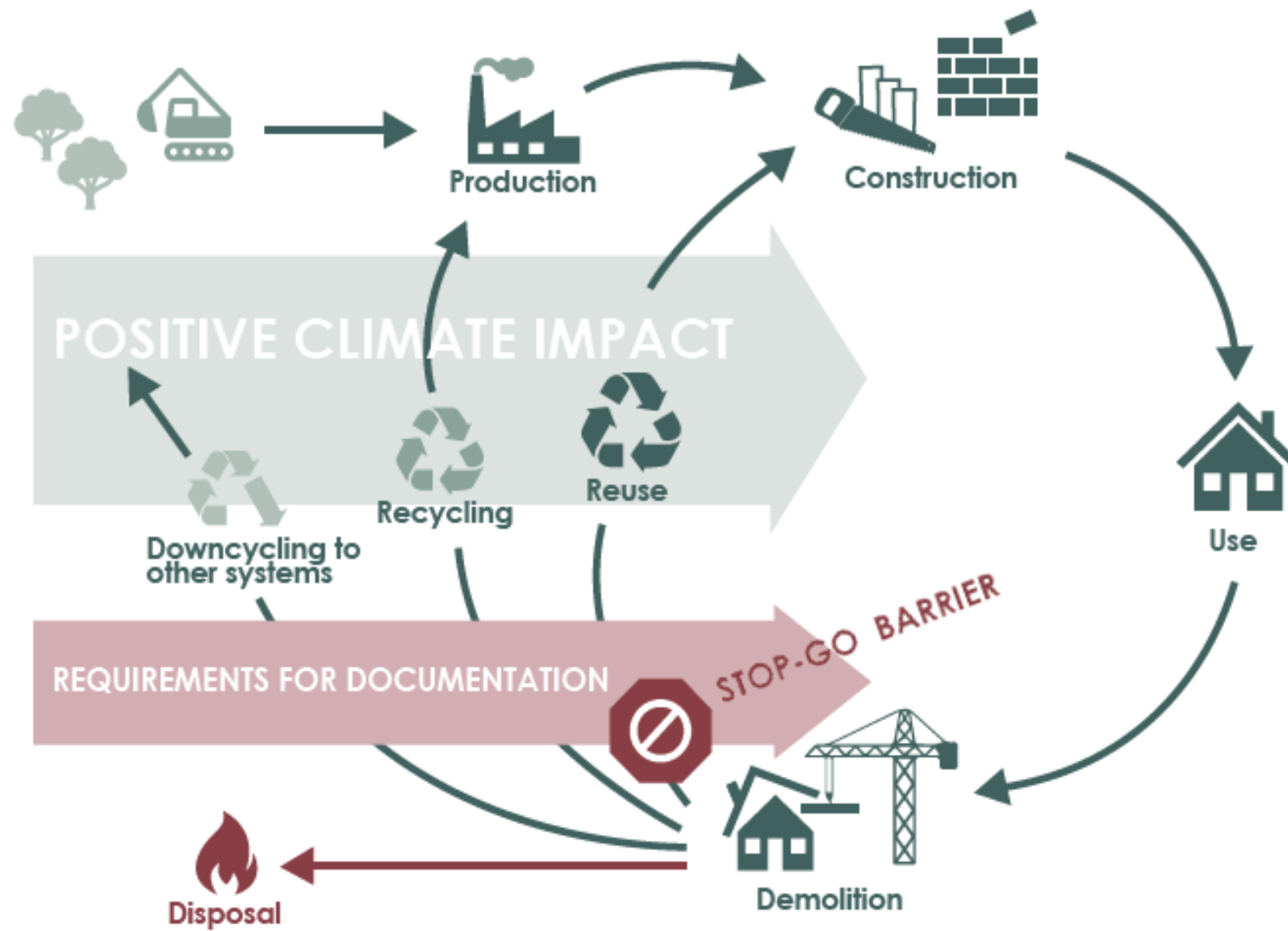


Earth Overshoot Day

29. July 2022

Vi er nødt til at finde andre
veje!





Stop-go-barrier

PensionDanmark

"The unknown prices and risks make it hard to convince contractors to build with recycled materials"

Gladsaxe Municipality

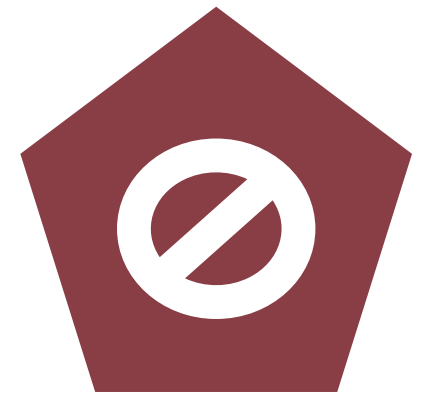
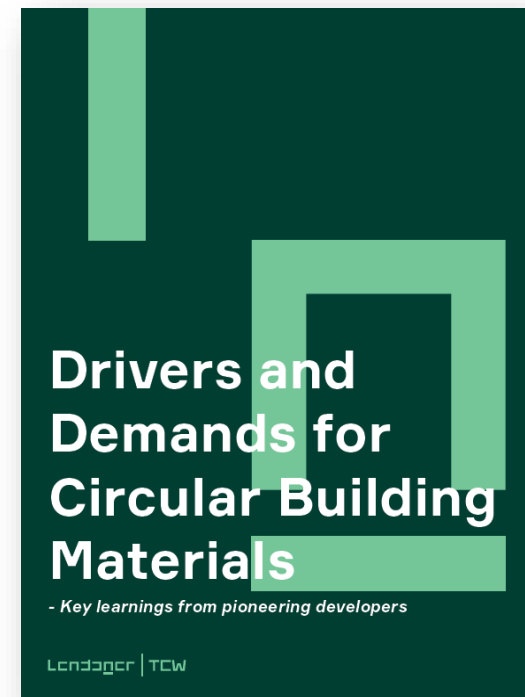
"There is a responsibility vacuum – who will guarantee the durability and quality of reused materials?"

NREP

"It is still difficult to get the right permits to recirculate materials in new buildings"

Mustad Eiendom

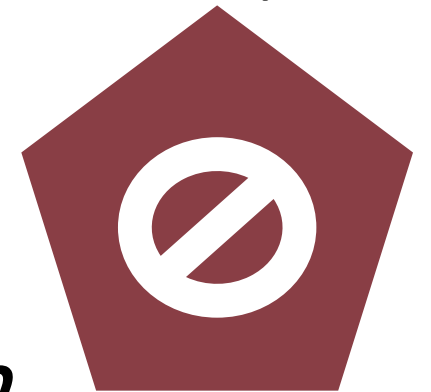
"Construction directives and the CE certification are not designed to operate with reused materials"





Behov for dokumentation

Der er ingen standarder eller anbefalinger, som dækker genbrug af bærende dele i nyt byggeri



BusinessReuse har som hovedformål at ændre det!

BusinessReuse

Enabling business by reuse of basic building components
– documentation of quality for second use

DTU Sustain and DTU Construct



Hvad skal dokumenteres?

Hvordan dokumenterer vi i forhold til kravene?

Hvad med det praktiske?

The BusinessReuse project -Implementation



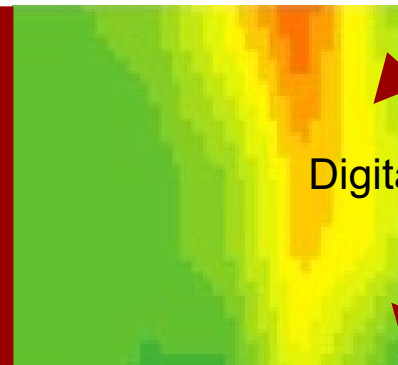
Currently

- Non-load carrying elements
- Random check

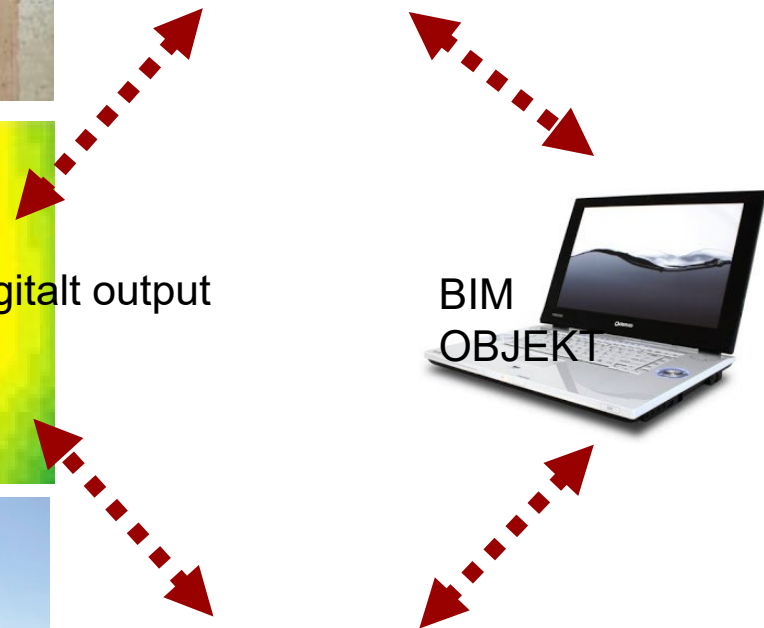


Future

- Structural elements
- All components are tested
- Safety issues coped with

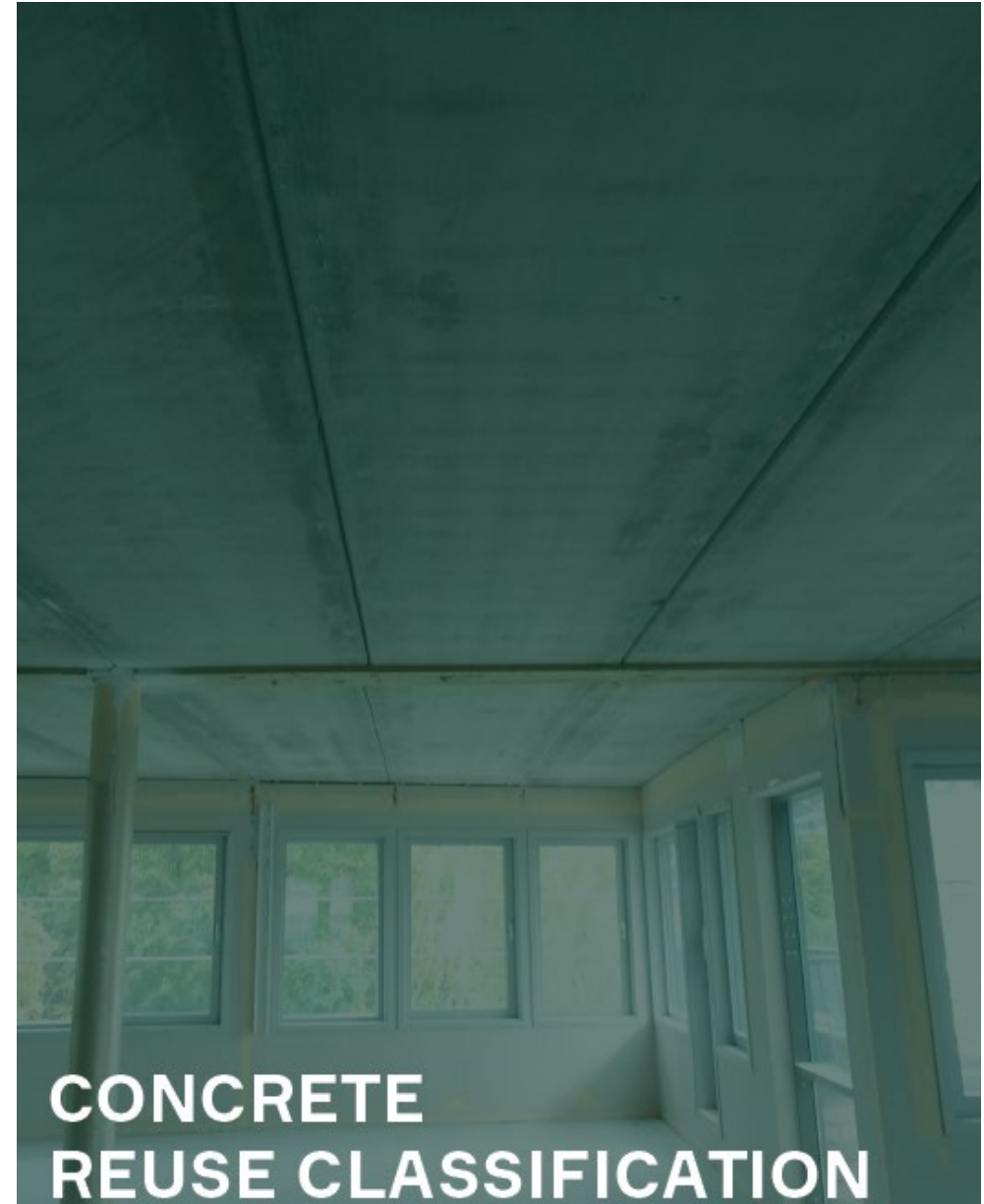


- Data to designers and architects
- Data for LCA/LCC
- Data to materials passports

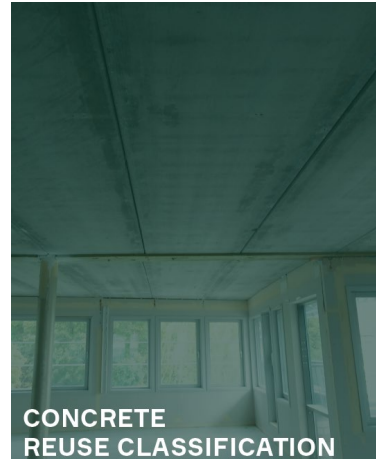
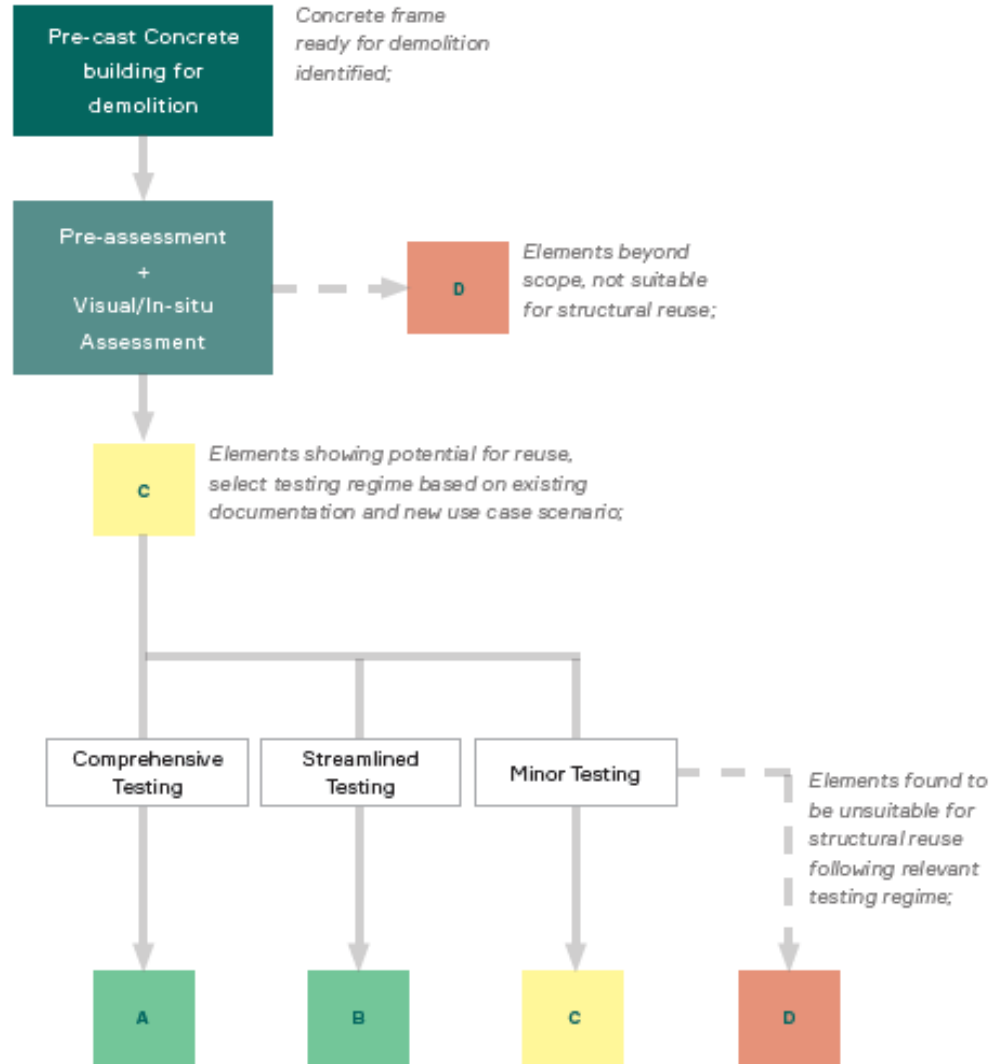


- Data for selective demolition and post processing (cleaning, cutting etc.).

Hvad skal dokumenteres?



Beton klassifikation

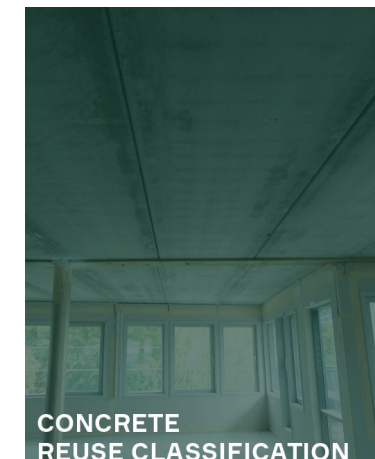


Beton klassifikation

Table 1: Pre-classification Table aligning NS 3682:2022 with the Universal Classification Framework

Reuse Class:	(Class A)	(Class B)	Class C	Class D
Pre-classification	N/A	N/A	Relevant Documentation available; In-situ Visual Assessment; (Pre-assessment Checklist)	Insufficient documentation OR Beyond Scope Not Suitable for Reuse OR Exposure Classes XD, XS, XF, or DS
Previous Exposure	Exposure Class X0, XC1-4	Exposure Class X0 only	Exposure Class X0, XC1-4	Concrete to be recycled or used non-structurally where viable
Testing Regime	Concrete elements to undergo comprehensive destructive and non-destructive testing.	Concrete elements to undergo streamlined destructive and non-destructive testing.	Concrete elements to undergo minor destructive and non-destructive testing. Primarily visual assessment and conservative assumptions	
New use Consequence Class (D18/EN 1990)	Consequence class 1, 2, and 3* Exposure Class X0, XC1-4	Consequence class 1, 2, and 3* Exposure Class X0 only	Consequence class 1 only Same Exposure Class or lower	N/A

*Additional testing requirements may be necessary for Consequence Class 3 structures



CONCRETE REUSE CLASSIFICATION

Stål- klassifikations-skema

Table 1: Pre-classification Table aligning SCI-P427 with the Universal Classification Framework

	Class A	(Class B)	Class C	Class D
Description	Original mill test certificates are available and forms evidence that the material conforms with product standards.	Original mill test certificates not available.	Original mill test certificates not available	Beyond Scope Not Suitable for Reuse Steel to be recycled
Adequacy Assessment	Not required - certificates used as assessment. If required, minimum NDT carried out to confirm.	Reclaimed steel to undergo destructive and non-destructive testing. Characteristics justified according to EN 1090-2 clause 5.1	Visual inspection	
Reliability Assessment	Original inspection documents available and tracing of material possible.	Reclaimed steel tested to justify reliability (statistical requirements)	None	
New use Consequence Class (EN 1990)	Class 1, 2, and 3* NDT: Class 1: 0% Class 2: 10% (random) Class 3: 10% (random) DT: -	Class 1, 2, and 3* NDT: 100% DT: CC1: - CC2: 1 per group CC3: 3 per group	Class 1 Only NDT: - DT: -	N/A

*Additional destructive testing requirements for Consequence Class 3 structures



Hvordan dokumentere?

Ikke-destructive testmetoder er centrale

Materialeegenskaber evalueres fra overfladen

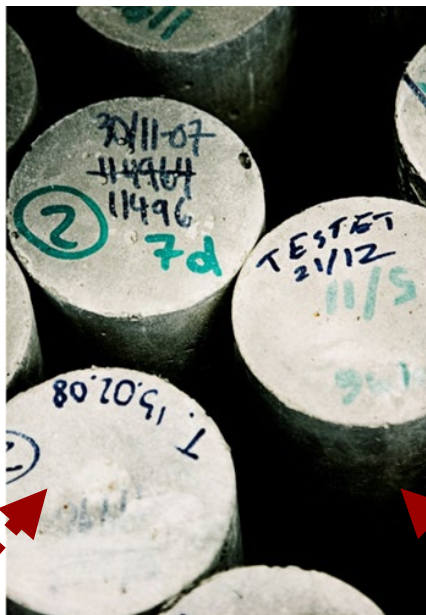
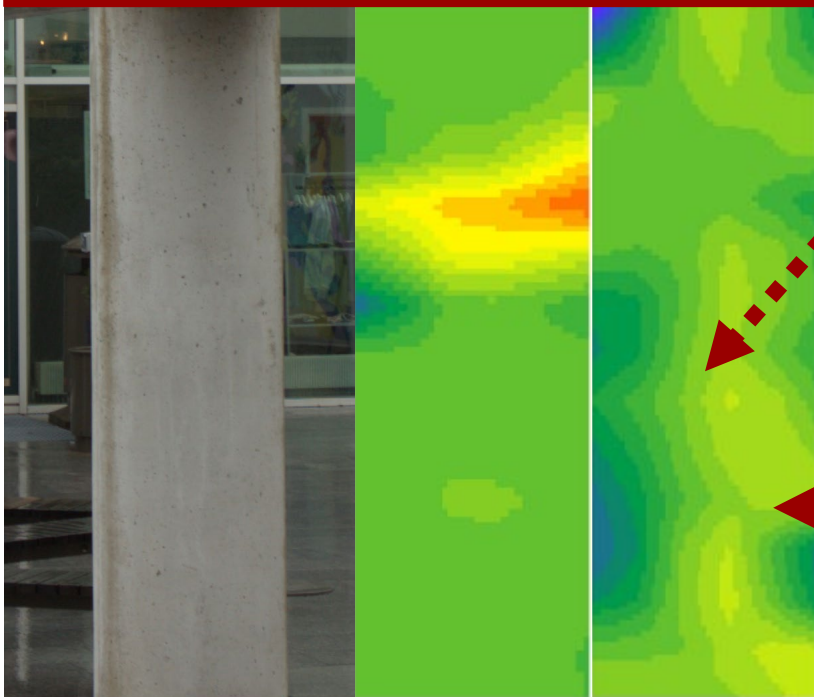
Anvendes f.eks. til broinspektion

Anvendelse i forbindelse med dokumentation af egenskaber i forhold til genbrug er ny



Teknisk udvikling og sammenkobling af metoderne

Ikke-destruktive tests in-situ



Grundlæggende forståelse af signaler

Validering mod kendte metoder



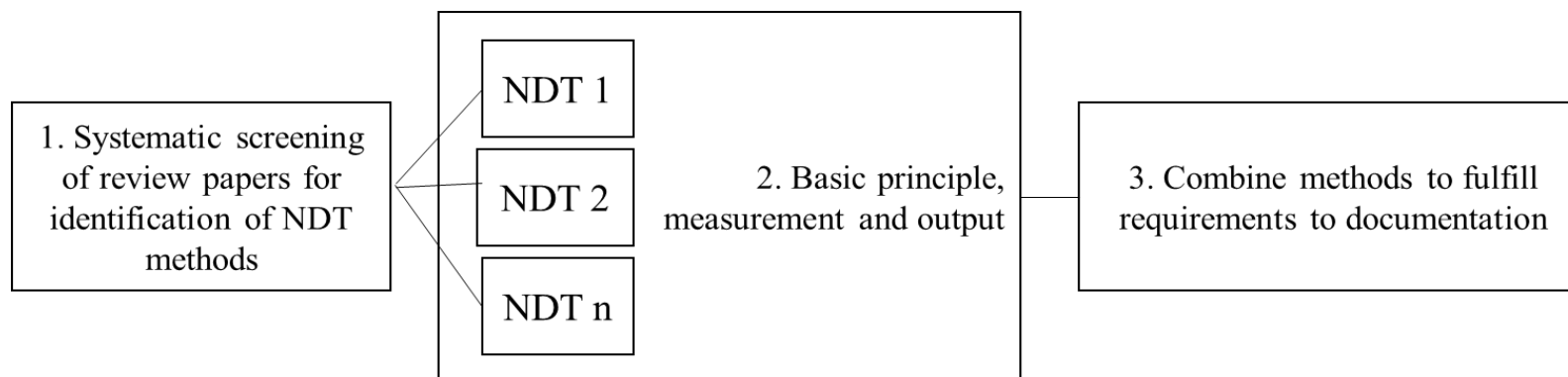
Er der ikke-destruktive testmetoder på markedet, som muliggør at dokumentere egenskaberne tilstrækkeligt i forhold til sikker genbrug?

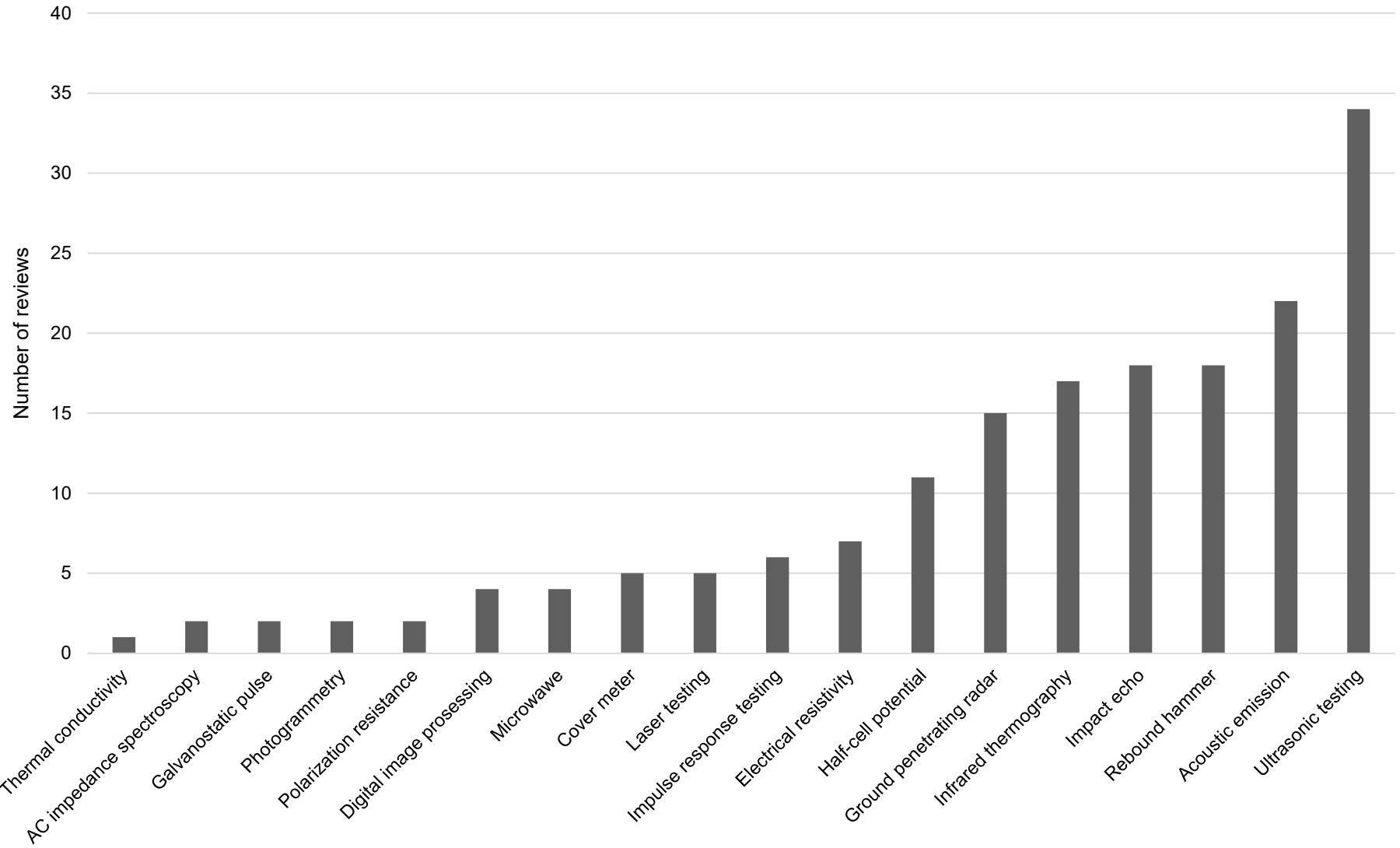
Literature survey

Objective of review is to explore if NDT methods can form basis for the documentation. Three steps are:

1. Identify and describe relevant NDT methods
2. Investigate the versatility of their applications concerning the reuse of structural concrete elements
3. Suggest NDT methods for documenting the necessary properties related to possible reuse

Method for the literature survey:





Sonic and ultrasonic wave based techniques
• Acoustic emission
• Impact-echo
• Impulse response method
• Ultrasonic pulse velocity
Electromagnetic techniques
• Ground penetrating radar
• Cover meter
• Electromagnetic conductivity
Electrochemical techniques
• Electrical resistivity
• Galvanostatic pulse
• Half-cell potential method
• Polarization resistance

Thermal methods
• Thermal conductivity
• Infrared thermography (IR)
Camera based techniques
• Digital imaging
• Photogrammetry
Laser technique
• Laser testing
Physical method
• Rebound hammer

Hvad skal vi dokumentere?

The parameters are grouped into

- (I) Structural properties
- (II) Homogeneity (status on concrete matrix and pore solution)
- (III) Status of reinforcement

Sonic and ultrasonic wave based techniques	ASTM and CEN Standards	Structural properties	Status of concrete matrix and pore solution	Status of reinforcement
Acoustic emission	ASTM D-4580 ASTM E2983-14(2019) ISO 16837 (2019)		Detect and locate cracks in one measurement [12]. Cracks, dislocations, delamination [26]. Fatigue cracks [54]	Early warning of corrosion [27] Corrosion monitoring [55] [43] [9]
Impact-echo	ASTM C1383-15 ASTM C1383-04	Stiffness [29] Thickness [2] [9] Integrity [2]. Evaluate elastic modulus [20] [56]	Detection and location of voids [26] [20] [9]; honeycombs [26] [20]; delamination [26] [20] [9]; bond integrity [26] [20]; and cracks [20] [9] [57]. Depth of internal defects [58]	Corrosion [57]
Impulse response method	ASTM C1740-10		Defects [33]: Voiding [59] [57] delamination [59] [57] debonding [59], honeycombing [59], cracking [59] [57]. Depth of alkali silica reaction [59]. Qualitative method [33]	
Ultrasonic pulse velocity	ASTM C597-16 (2016) ASTM D6760-16 (2016) EN 12504-4 (2004) EN 13791 ISO/DIS 8047	Compressive strength [13] [9] [4] Rebar embedment depth [26] Dynamic modulus of elasticity [56][60] Surface hardness [9] Concrete thickness [60]	Homogeneity [37] Detection of defects but not identification of the nature [4], Cracks [26], [20] [57] voids [26] [37] [20]. Layer thickness [37] Delamination [20] [57]. Honey combing [20]. Thickness of fire damaged layer [7] Locate zones with concrete expansion [23]. Fatigue damage due to cyclic loads [61]. Thermal fatigue [61]	Detecting corrosion damage [61] Debonding of reinforcement bars [20] Corrosion [57]

Oversigt – hvad kan metoderne bruges til?

	Structural properties	Heterogeneties	Status of reinforcement
Acoustic emission		X	X
Impact-echo	X	X	X
Impulse response method		X	
Ultrasonic pulse velocity	X	X	X
Ground penetrating radar	X	X	X
Cover meter	X	X	
Electromagnetic conductivity		X	
Electrical resistivity		X	X
Galvanostatic pulse			X
Half-cell potential method			X
Polarization resistance			X
Thermal conductivity		X	
Infrared thermography (IR)		X	X
Digital imaging		X	
Photogrammetry		X	
Laser testing		X	
Physical method			
Rebound hammer	X	X	

Det er muligt teoretisk at dokumentere opfyldelse af de krævede funktionelle krav ved at kombinere eksisterende NDT-teknikker.

Tak fordi I lyttede 😊

limo@dtu.dk



Nationale specifikationer

Arbejdet i **BusinessReuse** fører til udvikling af to nationale specifikationer **PAS (Public Available Specifications)**:

- **PAS** for genbrug af bærende bygningselementer i **beton**
- **PAS** for genbrug af bærende bygningselementer i **træ**

Standard for genbrug af bærende bygningselementer i **stål** i samarbejde med CEN/TC 135



3 standarder for genbrug af bærende bygningselementer



Bæredygtighed inden for bygge- og anlæg

S-417 Bæredygtighed og afgivelse af farlige stoffer i byggeriet:

- Drøfter bæredygtighedsstandarder inden for miljømæssige, sociale og økonomiske forhold
- Udvikler standarder på produktniveau, bl.a. EPD standarden
- Reviderer bæredygtighedsstandard på bygningsniveau

S-878 Cirkulær økonomi i byggeri og anlæg:

- Drøfter emner inden for cirkulær økonomi i byggeriet
- Følger og påvirker standardiseringsarbejdet i den europæiske komité CEN/TC 350 SC1 Circular Economy in the Construction Sector



Medlemmer af udvalg indenfor bæredygtighed i byggeri og anlæg

3XN A/S

A:gain ApS

Aarhus Universitet, Navitas

Bolig- og Planstyrelsen

Danish Waste Solutions ApS

Dansk Brand- og sikrings-
teknisk Institut, DBI

Dansk Industri

Danske Arkitektvirksomheder

Danske Tegl

DTU Sustain

ETA Danmark A/S

Eurofins Product Testing A/S

Foreningen af Rådgivende
Ingeniører, FRI

Green Building Council
Denmark

Green Care Design &
Rådgivning ApS

H.S. Hansen A/S

H+H Danmark A/S

Henning Larsen Architects

Home.Earth P/S

Iserit A/S

JELD-WEN Danmark A/S

Jorton A/S

Kimconsult.dk

Lemvig-Müller A/S

Miljømærkning Danmark

Molio – Byggeriets
Videncenter

Nifcompliance

Nordic Waterproofing A/S

NREP A/S

Omtanken ApS

Per Aarsleff A/S

Rambøll Danmark A/S

Rockwool Danmark A/S

Saint-Gobain Denmark A/S

Spæncom A/S

Statens Byggeforskningsinstitut

Teknologisk Institut

Trap Rose & Ekblad,
Rådgivende Ingeniører og
Biologer

Troldtekt A/S

VELTEK

VELUX A/S

Würth Danmark A/S

Xella Danmark A/S

CEN/TC 350/ SC1 Circular Economy in the Construction Sector

Standarder inden for cirkulær økonomi for bygge- og anlægsbranchen

- Udvikle rammestandard for implementering af CØ
- Identificere værktøjer til den cirkulære omstilling
- Arbejder både med tekniske emner inden for CØ og miljømæssige, sociale og økonomiske udfordringer.



Arbejdsområder i CEN/TC 350/ SC1 WG 1 og WG 2

WG 1 arbejder med at udvikle en rammestandard for CØ

- Termer og definitioner
- Ramme for implementering
- Principper
- Ramme for måling, vurdering og evaluering

WG 2 arbejder med at identificere hvor der mangler standarder indenfor CØ

- GAP-analyse
- Identifikation og anbefalinger af hvilke nye standarder der skal udvikles
- Anbefalinger præsenteres på møde i komitéen 24. februar 2023.



Medlemmer af CEN/TC 350/SC1

48 medlemmer fra 17 lande:

Belgien Sverige
Cypern Tyskland
Danmark Østrig
Finland
Frankrig
Holland
Irland
Litauen
Luxembourg
Norge
Portugal
Schweiz
Spanien
Storbritannien

29 observatører:

BIBM
CEMBUREAU
CEN
Cerame-Unie
Construction Products
Europe
Europa Kommissionen
ECIA
ECO-Platform AISBL
ECOS
ECSPA
EFCC
EMO
ERMCO
EuPC
EURIMA
EUROFER
European Aluminium
Metals for buildings
PlasticsEurope
PU Europe
SBS

Hvis du vil vide mere:

Om S-878:

Charlotte Vartou Forsingdal, seniorkonsulent

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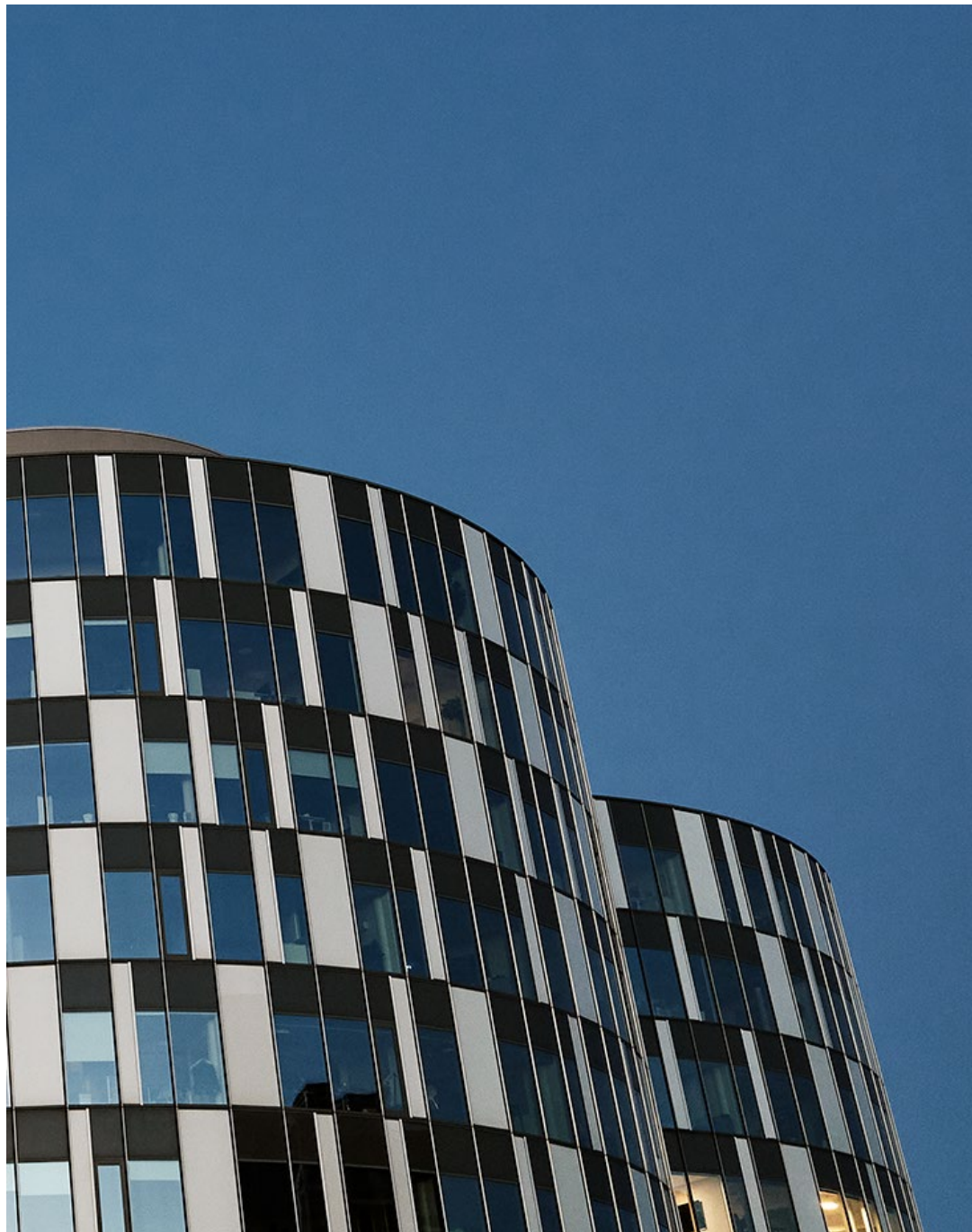
Om S-417:

Birgitte Ostertag, seniorkonsulent

M: bo@ds.dk

T: 39 96 61 27

Læs også på ds.dk/s-878 og ds.dk/s-417



Spørgsmål?



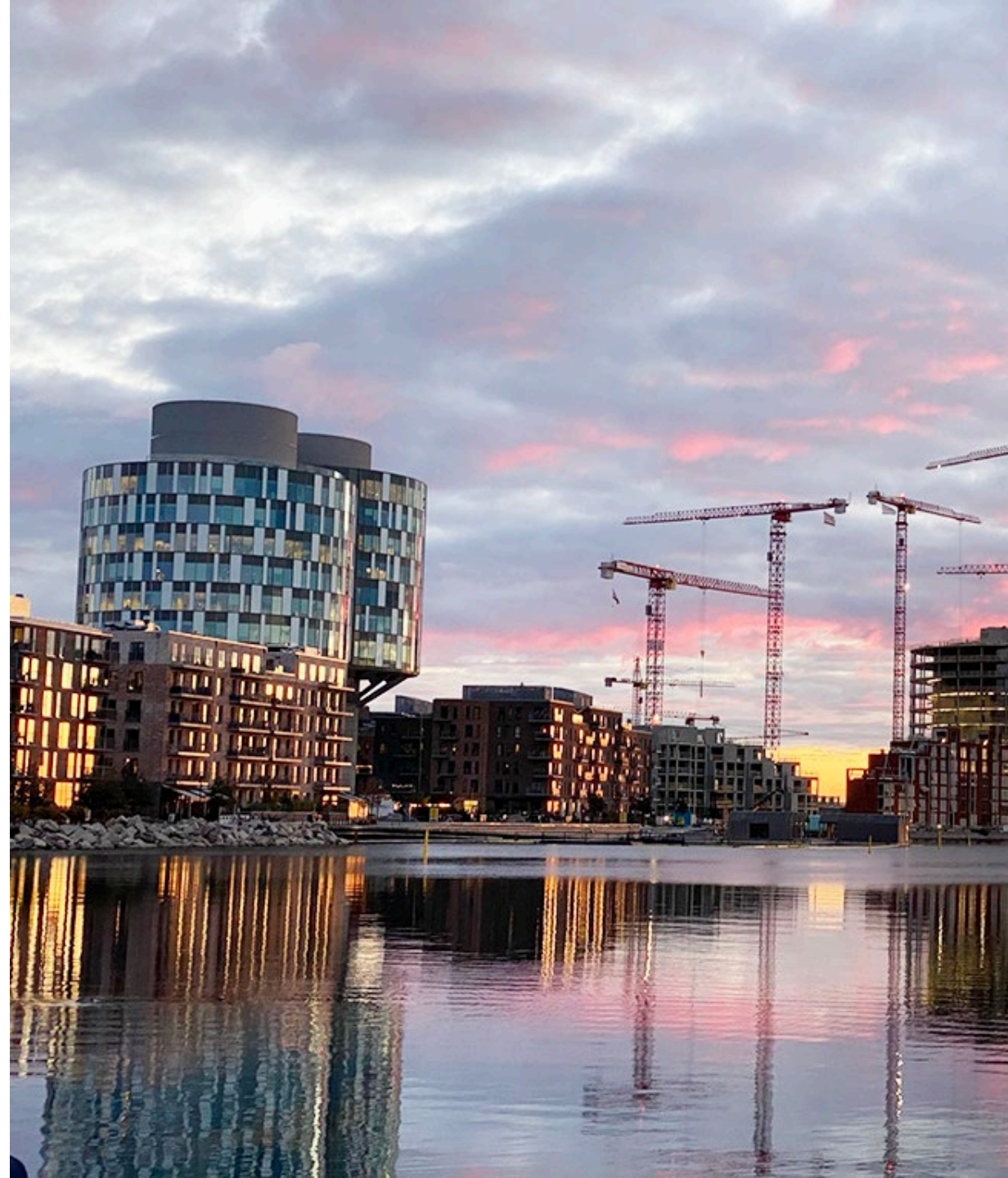
ETA'er – dokumentation af samlinger til bærende trækonstruktioner

Thomas Bruun, adm. direktør, ETA-Danmark A/S



ETA-Danmark A/S

- Udsteder nationale godkendelser og tekniske vurderinger for byggevarer til det danske og europæiske marked
- Udsteder Europæiske Tekniske Vurderinger og udarbejder Europæiske Vurderingsdokumenter i henhold til Byggevareforordningen
- Verificerer innovative miljøteknologier og varetager teknisk sagsbehandling for Miljøstyrelsen af miljøteknologier til landbrugssektoren
- Styrker vores kunders konkurrencekraft gennem godkendelser, vurderinger og verifikation af byggevarer
- Er Dansk Standards datterselskab.



Ordninger

Vurderinger og Verifikationer

- Bedømmer produkterne/teknologierne i forhold til anvendelsen og beskriver egenskaber
- Verifikationer/vurderinger giver ikke i sig selv ret til mærkning
- Verifikationer/vurderinger er ikke produktcertificeringer
- Europæiske Tekniske Vurderinger er grundlaget for at CE-mærke byggeprodukter, som ikke er omfattet af en standard, fx innovative produkter.
- ETV er verifikation af miljøeffekten af innovative miljøteknologi

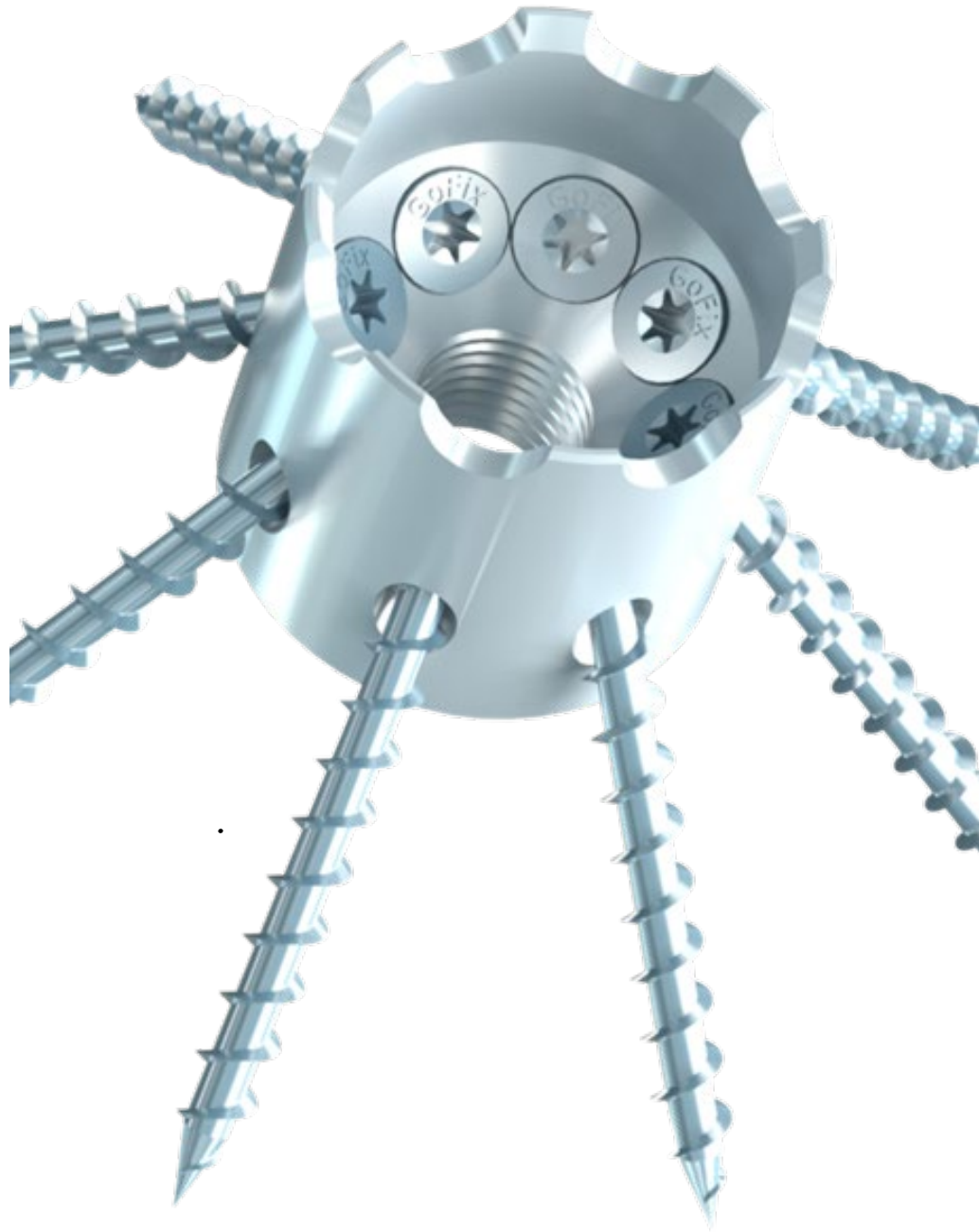
Godkendelser

- Godkendelser bedømmer dels, om produktet/teknologien er egnet til anvendelsen, dels om den opfylder nationale krav
- Godkendelser godkender produkterne til brug
- Godkendelserne giver ret til at mærke produkterne.
- Teknologilisten for landbrugsteknologier



Produkter ikke omfattet af harmoniserede standarder

- Innovative byggevarer, fx
 - Nye materialer, nye løsninger, nye anvendelser
 - Produktet i sig selv er ikke modent til standardisering
 - Der er kun én producent
- Produkter der undergår en hurtig teknologisk udvikling
- Byggesystemer



CE-mærke med en ETA

ETA er en frivillig ordning der gælder for alle områder, produkter og konstruktioner, som der ikke findes en harmoniseret standard for.



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European Technical Assessment ETA-11/0478 of 2018/06/12

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Arras Construction Furniture Joist Hangers

Product family to which the above construction product belongs:

Three-dimensional nailing plate (Joist hanger for wood to wood connections and wood to concrete or steel connections)

Manufacturer:

Arras Construction Furniture OÜ
Veerne 23
EE-11625 Tallinn
Tel. + 372 670 6000
Fax + 372 670 6405
Internet www.arrascf.eu

Arras Construction Furniture OÜ
Veerne 23
EE-11625 Tallinn

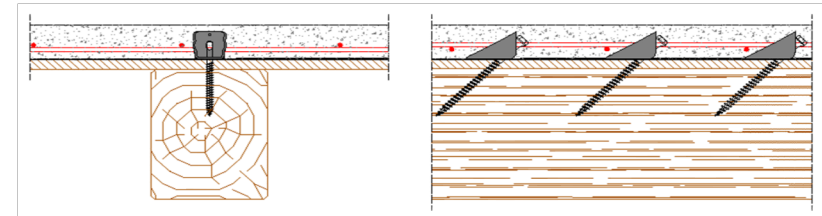
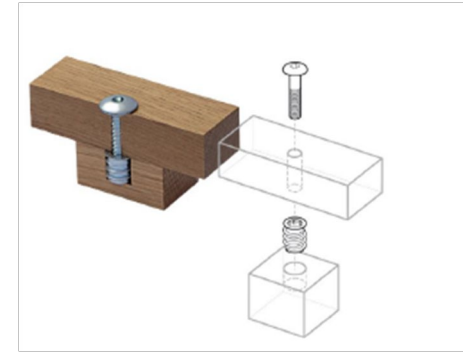
35 pages including 3 annexes which form an integral part of the document

Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

The ETA with the same number issued on 2016-08-09



Eksempler på produkter med ETA



Samlinger til bærende trækonstruktioner



Grundlag

- EAD 130186-00-0603
- Tre-diemsjonale beslag
- Omfatter beslag af stål og aluminium



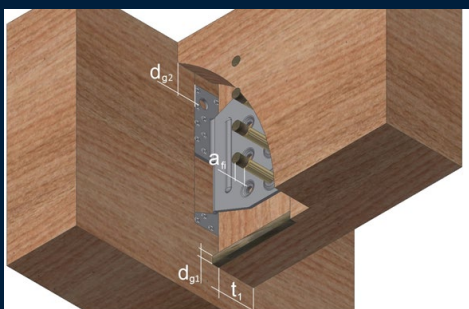
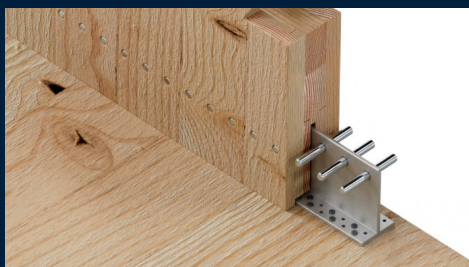
Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance <i>(level, class, description)</i>
Basic Works Requirement 1: Mechanical resistance and stability			
1	Joint strength	2.2.1	Level
2	Joint stiffness		
3	Joint ductility		
4	Resistance to seismic actions	2.2.2	Level
5	Resistance to corrosion and deterioration	2.2.3	Description
Basic Works Requirement 2: Safety in case of fire			
6	Reaction to fire	2.2.4	Class
7	Resistance to fire	2.2.5	Class

Grundlag



- **Statisk og dynamisk bæreevne baseret på**
 - Ren prøvning
 - Kombination af prøvning og beregning – Eurocode 5 og Eurocode 8
 - Ren beregning– Eurocode 5 og Eurocode 8
- **Brandegenskaber**
- Reaktion på brand
 - Prøvning og klassifikation i henhold til delegeret retsakt (EU) 2016/364 og EN 13501-1
- Brandmodstandevne
 - Prøvning og klassifikation i henhold til EN 13501-2
 - Testopstilling med den samlede konfiguration afhængig af anvendelse og med træelementer med en styrkesortering svarende til den styrkesortering som klassifikationen skal dække.
 - Svigt sker ved kollaps af konstruktionen eller ved 30 mm forskydning



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European Technical Assessment ETA-07/0245 of 15/08/2018

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product: SIMPSON STRONG-TIE® Joist End connector
SIMPSON STRONG-TIE® concealed beam hangers

Product family to which the above construction product belongs: Three-dimensional nailing plate (connector for wood to wood connections and wood to concrete or steel connections)

Manufacturing plant: SIMPSON STRONG-TIE A/S
Hedegaardsvej 4 – 11, Boulstrup
DK-8300 Odder
Tel. +45 87 81 74 00
Fax +45 87 81 74 09

This European Technical Assessment contains: 123 pages including 4 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of: Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

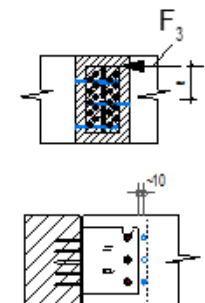
This version replaces: The ETA with the same number and issued on 2016-08-10

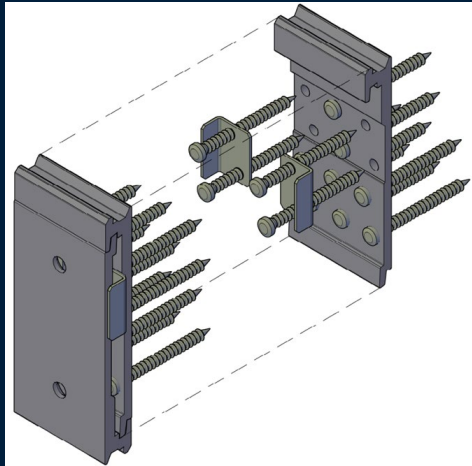
R_{3,k} beam to beam

R _{3,k}	CSA 5,0x50		joist min. b / h [mm]	with screws *						table 25
	number of	nails		width of timber [mm]						
Type	SD		60	80	100	120	140	160	180	
90-2	4	8	... / 100	1,9	3,7	4,7	5,8	6,8	7,3	7,3
120-2	3	10	... / 160	2,2	3,1	4,8	6,2	6,2	6,2	6,2
160-2	4	14	... / 200	2,9	4,7	7,3	8,4	8,4	8,4	8,4
200-2	5	18	... / 240	3,5	5,0	8,1	10,6	10,6	10,6	10,6
240-2	6	22	... / 280	4,2	5,4	8,6	12,4	12,9	12,9	12,9
280-2	7	26	... / 320	4,8	6,1	9,1	13,4	15,2	15,2	15,2
320-2	8	30	... / 360	5,5	6,8	9,6	14,4	17,6	17,6	17,6
360-2	9	34	... / 400	6,1	7,6	9,7	14,5	19,3	19,9	19,9
400-2	10	38	... / 440	6,7	8,3	10,3	15,2	20,6	22,2	22,2
440-2	11	42	... / 480	7,3	9,1	11,0	15,2	21,6	24,6	24,6
480-2	12	46	... / 520	7,9	9,8	11,9	16,1	22,2	26,9	26,9
520-2	12	50	... / 560	8,6	10,6	12,8	16,1	23,4	29,2	29,3
560-2	12	54	... / 600	9,2	11,3	13,8	16,9	23,4	30,6	31,6
600-2	12	58	... / 640	9,8	12,1	14,7	17,6	24,2	31,4	34,0
90-4	4	16	... / 100	1,9	3,7	4,7	5,8	6,8	7,8	8,9
120-4	3	20	... / 160	2,2	3,1	4,8	6,6	8,3	10,1	11,9
160-4	4	28	... / 200	2,9	4,7	7,3	9,9	12,5	15,1	17,6
200-4	5	36	... / 240	3,5	5,0	8,1	13,0	16,7	20,2	22,0
240-4	6	44	... / 280	4,2	5,4	8,6	13,7	20,2	23,5	26,4
280-4	7	52	... / 320	4,8	6,1	9,1	13,7	21,1	26,7	30,2
320-4	8	60	... / 360	5,5	6,8	9,6	14,4	21,1	29,9	33,9
360-4	9	68	... / 400	6,1	7,6	9,7	14,5	21,8	30,6	37,5
400-4	10	76	... / 440	6,7	8,3	10,3	15,2	22,2	32,0	41,2
440-4	11	84	... / 480	7,3	9,1	11,0	15,2	22,2	32,0	44,0
480-4	12	92	... / 520	7,9	9,8	11,9	16,1	23,2	32,0	44,0
520-4	12	100	... / 560	8,6	10,6	12,8	16,1	23,4	32,0	44,0
560-4	12	108	... / 600	9,2	11,3	13,8	16,9	23,4	33,6	45,1
600-4	12	116	... / 640	9,8	12,1	14,7	17,6	24,2	33,6	46,1

screw 6,0x L
with L = b-20mm

(for timber with b=80mm
use screws 5,0x50)
number of screws =
number of steel dowel





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European Technical Assessment ETA-19/0831 of 2022/09/14

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product: Rotho Blaas LOCK Connectors

Product family to which the above construction product belongs: Three-dimensional nailing plate (Connectors for timber, CLT, LVL, Glulam members to timber, steel or concrete)

Manufacturer: Rotho Blaas s.r.l
Via dell'Adige 2/1
IT-39040 Cortaccia (BZ)
Tel. + 39 0471 818400
Fax + 39 0471 818484
Internet www.rothoblaas.com

Manufacturing plant: Rotho Blaas s.r.l
Manufacturing Plants: 1A-2A-3A

This European Technical Assessment contains: 45 pages including 2 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of: EAD 130186-00-0603 for Three-dimensional nailing plates

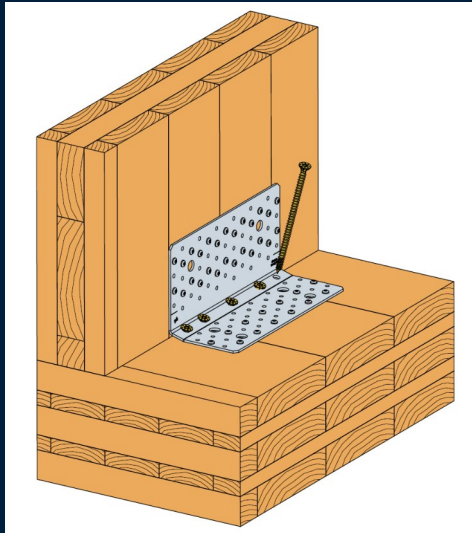
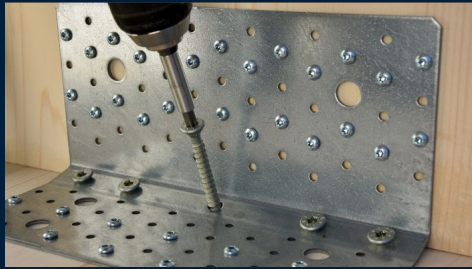
This version replaces: The ETA with the same number issued on 2020-06-22

$$F_{2,Rk} = \min \left\{ \sum_{i=1}^{n_j} F_{v,j,Rk}^i ; \left[\left(\frac{1}{\sum_{i=1}^{n_1} F_{v,H,Rk}^i} \right)^2 + \left(\frac{1}{k_{H,2} \cdot F_{ax,H,Rk}} \right)^2 \right]^{-1} ; F_{2,alu,Rk} \right\}$$

Rotho Blaas LOCK Connectors	Module width [mm]	$k_{H,2}$	$F_{2,alu,Rk}$ [kN]
LOCK T 80	17,5	$n_M \cdot 2,19$	$n_M \cdot 10$
LOCK T 100	17,5	$n_M \cdot 4,39$	$n_M \cdot 10$
LOCK T 100FLOOR	210	$n_M \cdot 12,5$	$n_M \cdot 130$
LOCK T 120	17,5	$n_M \cdot 7,36$	$n_M \cdot 10$
LOCK T 135	25,0	$n_M \cdot 5,30$	$n_M \cdot 15$
LOCK T 135FLOOR	300	$n_M \cdot 15,3$	$n_M \cdot 240$
LOCK T 175	25,0	$n_M \cdot 10,0$	$n_M \cdot 20$
LOCK T 215	25,0	$n_M \cdot 17,2$	$n_M \cdot 20$
LOCK T 240	25,0	$n_M \cdot 22,7$	$n_M \cdot 24$
LOCK T 265	25,0	$n_M \cdot 29,0$	$n_M \cdot 24$
LOCK T 290	25,0	$n_M \cdot 36,0$	$n_M \cdot 24$

n_M is the number of basic modules, see product drawings





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European Technical Assessment ETA-06/0106 of 2021/04/09

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product: Simpson Strong-Tie Angle Brackets
See type numbers in section II.1 of the ETA

Product family to which the above construction product belongs: Three-dimensional nailing plate (timber-to-timber/timber-to-concrete angle bracket)

Manufacturer: Simpson Strong-Tie Int. Ltd
For local branch addresses refer to www.strongtie.eu

Manufacturing plant: SIMPSON STRONG-TIE Manufacturing facilities

This European Technical Assessment contains: 423 pages including 4 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of: EAD 130186-00-0603 for Three dimensional nailing plates

This version replaces: The ETA with the same number issued on 2020-01-29

Table D1-2 Modified characteristic capacity timber beam to timber beam – 1 Angle Bracket Load duration P

1 Angle Bracket ABR90 per connection				Modified characteristic capacity per connection (kN)							
Nailing pattern	Number of fasteners		Load duration	$R_{1,k} \times k_{Mod}$		$R_{2/3,k} \times k_{Mod}$		$R_{4,k} \times k_{Mod}$		$R_{5,k} \times k_{Mod}$	
	Flange A	Flange B		4,0x40	4,0x60	4,0x40	4,0x60	4,0x40	4,0x60	4,0x40	4,0x60
Nailing pattern 2	4	6	P	f _s : 40: 78 f=60	f _s : 49: 114 f=60	1,7	2,2	e<37,5: 30,6 37,5-e	e<37,5: 50,9 37,5-e	e≤ 58: 31 68-e	e≤ 55: 52 68-e
								e≤ 37: 2,2	e≤ 42: 2,83	58<e≤ 1,83·b:	55<e≤ 1,62·b+3:
								37<e≤ 101: 81 e	42<e≤ 109: 119,8 e	3,3	4,2
								e>101: 28,9 e-65	e>109: 48 e-65	e>1,83·b:	e>1,62·b+3:
				f _s : 40: 31,1 f	f _s : 49: 51,7 f						
Nailing pattern 1	8	10	P	f _s : 34: 85 f=60	f _s : 41: 127 f=60	2,8	3,5	e<37,5: 37,5 37,5-e	e<37,5: 62,7 37,5-e	e≤ 57: 46,3 68-e	e≤ 54: 77,5 68-e
								e≤ 20: 4,4	e≤ 23: 5,66	57<e≤ 1,47·b+10:	54<e≤ 1,23·b+15:
								20<e≤ 96: 89 e	23<e≤ 102: 133,1 e	4,3	5,8
								e>96: 28,7 e-65	e>102: 48 e-65	e>1,47·b+10: 6,3·b-247 e-68	e>1,23·b+15: 7,2·b-308 e-68
				f _s : 34: 30,9 f	f _s : 41: 51,7 f						

b, e and f are in mm.



CLT-paneles



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European Technical Assessment ETA-21/0914 of 2021/11/25

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	REZULT CLT
Product family to which the above construction product belongs:	Cross laminated timber element
Manufacturer:	Ukrainian Sawmill Holding Company Ltd 38 Yaroslaviy Val St. UA-01034 Kyiv, Ukraine Internet www.rezult.pro
Manufacturing plant:	Ukrainian Sawmill Holding Company Ltd 38 Yaroslaviy Val St. UA-01034 Kyiv, Ukraine
This European Technical Assessment contains:	16 pages including 4 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	EAD 130005-00-0304 - Solid wood slab element for use as structural element in buildings
This version replaces:	



ER	Requirement	Verification method	Class / Use category / value
Mechanical resistance and stability			
Bending, tension and compression strength and stiffness: For the calculation the characteristic strength and stiffness values of softwood according to EN 338 shall be used taking into consideration the definitions in annex 2. In addition the following values apply:			
	Board strength class	EN 338	C16/T10 C24/T14
	Modulus of elasticity parallel to grain of the boards $E_{0,mean}$	EAD 130005-00-0304 2.2.1.1	C24/T14 12000 MPa
	Bending strength parallel to grain of the boards $f_{b,k}$	EAD 130005-00-0304 2.2.1.1	C16/T10 $f_{b,k} = 16$ MPa C24/T14 $f_{b,k} = 24$ MPa
	Tensile strength parallel to grain of the boards $f_{t,k}$	EN 14080	C16/T10 16 MPa C24/T14 19 MPa
	Compressive strength parallel to grain of the boards $f_{c,k}$	EN 14080	C16/T10 20 MPa C24/T14 24 MPa
	Density ρ_k	EAD 130005-00-0304	Pinus <i>Sylvestris</i> : C16/T10 1,1 - 380 kg/m ³ C24/T14 1,1 - 420 kg/m ³ Other softwood species: C16/T10 1,1 - 310 kg/m ³ C24/T14 1,1 - 350 kg/m ³
1	1.1 Mechanical actions in plane of the cross laminated timber		
	Shear strength for the calculation with the gross cross section $f_{v,k}$	EAD 130005-00-0304 2.2.1.3	C16/T10 3,2 MPa C24/T14 4,0 MPa
	Shear strength for the calculation in the joints between non-edge glued boards within a layer $f_{v,j,k}$	EAD 130005-00-0304 2.2.1.3	8,0 MPa
	Shear strength for the calculation in the crossing areas of orthogonally bonded non-edge glued boards $f_{v,c,k}$	EAD 130005-00-0304 2.2.1.3	2,5 MPa
	1.2 Mechanical actions perpendicular to the plane of the cross laminated timber		
	Rolling shear strength $f_{r,k}$	EAD 130005-00-0304 2.2.1.3	See Figure 3
	Rolling shear modulus $G_{0,mean}$	EAD 130005-00-0304 2.2.1.3	50 MPa
	Compression strength $f_{c,0,k}$	EAD 130005-00-0304	C16/T10 2,5 MPa C24/T14 3,0 MPa
For references regarding the calculation see below. National regulations might have to be followed.			
	Use of fasteners	According to EN 1995-1-1, for further details see annex 4	
	Creep and duration of load	According to EN 1995-1-1	
	Dimensional stability	Moisture content during use shall not change to such extent that adverse deformations can occur.	

ETA'er

Træforbindelserne dokumenteres med samlinger med skruer og bolte, og understøtter den fremtidige mulighed for adskillelse – design for disassembly – for at sikre fremtidigt genbrug.

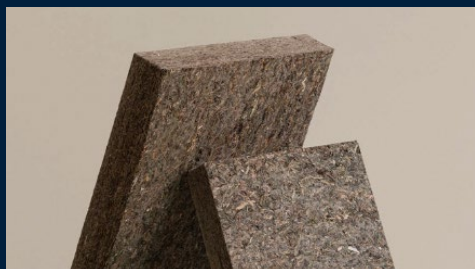
Beslagene og samlingsmønstre optimeres til stadighed for at optimere materialeforbruget for at minimere trækket på naturressourcer

ETA'erne er et vigtigt redskab til at sikre dokumentation for nye og innovative løsninger for at understøtte den cirkulære økonomi i byggeriet.

De udtrykker produkternes og samlingsernes egenskaber på et fælleseuropæisk sprog og skaber adgang til alle EU lande og er baseret på en transparent og teknisk velfunderet proces.



Nyere ETA'er med focus på cirkulær økonomi



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European Technical Assessment ETA-22/0684 of 2022/09/26

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	BioLITH biocement tiles
Product family to which the above construction product belongs:	Tiles made of aggregate blends and microorganisms
Manufacturer:	BioMASON Denmark ApS c/o Gorrissen Federspiel Axeltorv 2 DK-1609 København V Denmark www.biomason.com
Manufacturing plant:	IBF BioBeton ApS F.L. Smidths Vej 8 DK-7441 Bording
This European Technical Assessment contains:	6 pages which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	EAD 210207-00-0404: Tiles made of aggregate blends and microorganisms
This version replaces:	-



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European Technical Assessment ETA-21/1036 of 2021/12/17

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	Søuld Acoustic Mats: FR
Product family to which the above construction product belongs:	Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres
Manufacturer:	Søuld ApS Storhavevej 4 DK-9940 Læsø Tlf: +45 93 805 810 www.sould.dk
Manufacturing plant:	Søuld ApS Storhavevej 4 DK-9940 Læsø
This European Technical Assessment contains:	5 pages
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	EAD 040005-00-1201 for Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres
This version replaces:	-

Nyere ETA'er med focus på cirkulær økonomi



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European Technical Assessment ETA-21/0774 of 2021/08/25

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product: Genbrugssten Re-used bricks

Product family to which the above construction product belongs: Recycled clay masonry units

Manufacturer: Genbrugssten ApS
Agdrupvej 3
DK-9700 Brønderslev
Tel +45 69 16 03 77
Internet www.genbrugssten.dk

Manufacturing plant: Genbrugssten ApS
Agdrupvej 3
DK-9700 Brønderslev

This European Technical Assessment contains: 6 pages including 1 annex which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of: European Assessment Document (EAD) no. EAD 170005-00-0305 for Recycled clay masonry units

This version replaces:

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
----------------	------------------------------

3.2 Safety in case of fire (BWR2)

Reaction to fire	The Genbrugssten Re-used bricks are classified as class A1 without testing in accordance with EC Delegated Regulation 2016/364/EU and EN 13501-1
------------------	--

3.3 Hygiene, health and the environment (BWR3)

Dimensions	The dimensions of the Genbrugssten Re-used bricks are
------------	---

Type	Length mm	Width mm	Height mm
Genbrugssten Re-used bricks	228	108	55

The tolerance on all dimensions is ± 20 mm corresponding to tolerance category Tm in EN 771-1

Density	The gross dry density of Genbrugssten Re-used bricks is 1650 kg/m ³ with tolerance class Dm ($\pm 30\%$) in accordance with EN 771-1
---------	---

Compression strength	See annex A
----------------------	-------------

Initial rate of water absorption	No performance assessed
----------------------------------	-------------------------

Bond strength	No performance assessed
---------------	-------------------------

Determination of volume and percentage of voids and net volume	No performance assessed
--	-------------------------

Freeze/thaw resistance	Type	Mean value for the ratio of pore volume by boiling
	Genbrugssten Re-used bricks	pf $\leq 0,9$

Active soluble salt content	No performance assessed
-----------------------------	-------------------------

Spørgsmål?



Tak for i dag

BUILDING
GREEN

Mød os på Building Green
i Forum, København
2. og 3. november