



The Institute of Asphalt Technology
Irish Branch

Crack Sealing and Joint Repair Systems

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IAT Seminar 2019

Crack Sealing and Joint Repair Systems

1. Types of Pavement Cracks and Joints
2. Need for a TII Standard
3. Background Research
4. Standard Preview

Types of Pavement Cracks

SURFACE CRACKING

Top to bottom

- Thermal
- Block

STRUCTURAL CRACKING

Bottom to top

- Fatigue / Alligator
- Reflective
- Edge

Caused by the inability of the foundation and/or pavement to withstand strain, shear and tensile stresses created by traffic loading, ground conditions and/or climatic conditions.

Types of Pavement Joints

SURFACE

Between 2 surface courses of:

- same or different age
- same or different material

SUB-SURFACE

Between 2 sub-surface layers of:

- same or different age
- same or different material

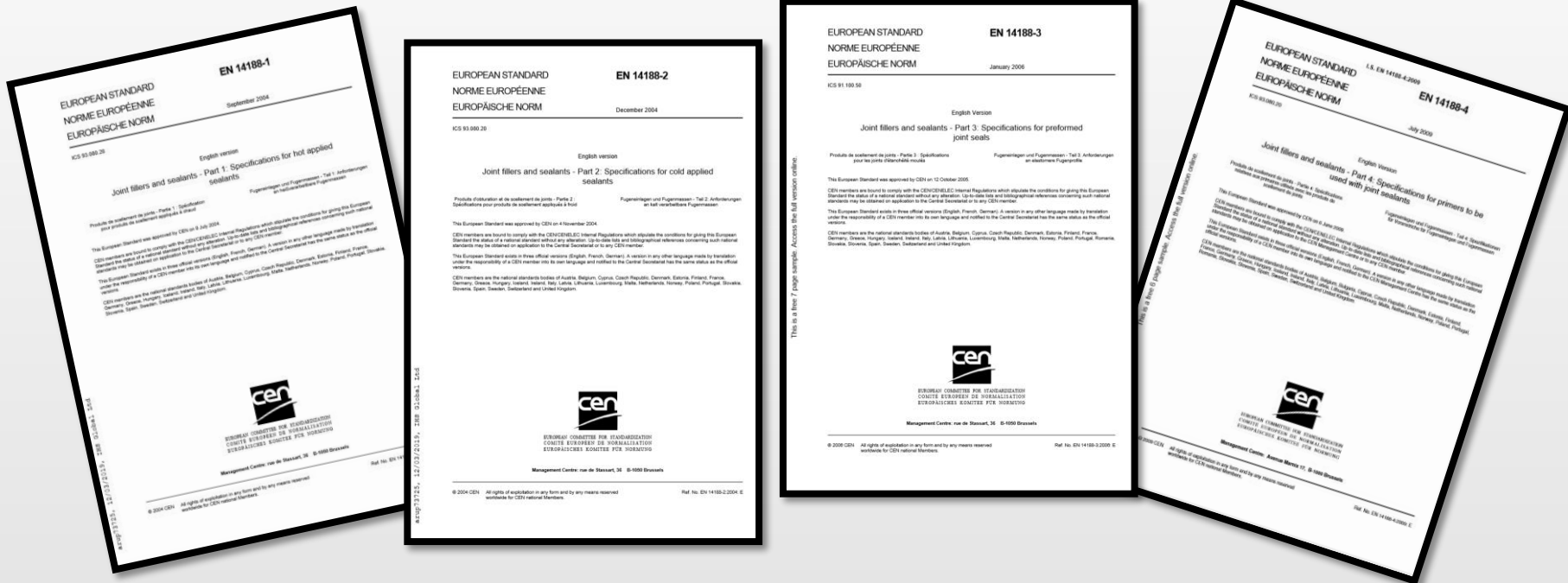
Joint failures generally caused by:

- Low material compaction at edges
- Differences in level and settlement (e.g. widening)
- Poor vertical and horizontal faces bond
- Location of the joint relative to wheel tracks

Need for a TII Standard

No Harmonised European Standard

I.S. EN 14188 series covers Joints Fillers and Sealants which are **NOT** materials suitable for surface crack and joint repairs.



Need for a TII Standard

No specification for the use of these systems on National Roads:

- How to get a system approved for a specific use
- What system to use to treat each different type of crack or failing joint
- How to ensure consistent installation and validation of early system performances



Background Research – Literature Review

The following standards and best practices have been reviewed:

- **USA:** ASTM Standards and Caltrans Standards
- **UK:** RSTA CoP and BBA Certification documentation
- **Ireland:** I.S. EN 14188 series
- **Australia:** Austroads “Guide to Pavement Technology” and AAPA “Pavement Working Tips No. 8 – Treatment of Crack in Flexible Pavements”
- **Germany:** TL Fug-StB 11 – “Technical Delivery Conditions for Joint Fillers in Traffic Areas”

Background Research – Literature Review

Elements requiring consideration:

- Requirements on the system's constituents (binder, aggregate...) vs. Performance based specifications for the whole systems
- Tests in laboratory and on site (before and after opening to traffic)

Strength

Adhesion

Flexibility

Water Resistance

Durability

Skid Resistance

Viscosity

Workability

- Definition of Roles and Responsibilities

Background Research – Irish Context

Testing done on all three types of systems

Substrate:

- **Concrete** vs. asphalt substrate
- “V” channel or **trapezoidal** channel

Skid Resistance:

- Before and after wheel tracking test (**50** vs. 60°C)
- **Wide** vs. **narrow** slider
- **Long** vs. short sweeping length

Wheel tracking IS EN 12697-22 (Proc. A, small device):

- **50** vs. 60°C testing temperature

Background Research – Market Consultation

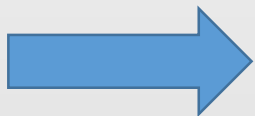
Industry Consultation

- Mix of manufacturers, installers and distributors
- 12 different systems
- All types of systems (Overband, Fill and Overband, Inlaid)
- Hot and Cold Applied
- Bituminous / resinous binders
- Single or multiple components
- Mostly BBA HAPAS approved systems (UK)
- Various expected durability (3, 5 or 8 years)

Background Research – Market Consultation

We asked about:

- Testing and certification achieved (BBA / EN 14188)
- Variability of application in terms of:
 - In/out of wheel track zone
 - Type of road (single, dual, motorway/local, ports...)
 - Substrate (HRA, SMA, Concrete...)
- Weather conditions for installation
- System's height above surface level
- Failure mechanisms



All used to draft up the specifications

Standard Preview – Design

Employer's Representative

Identify the need



Employer's Representative

Select right type of system to treat the right crack/joint under the right constraints



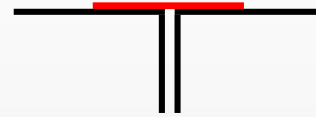
Employer's Representative

Specify works to Contractor

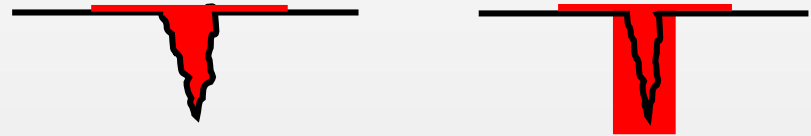
Standard Preview - Design

Different types of systems:

- Overband



- Fill and Overband



- Inlaid



Standard Preview – System Approval

Contractor

Select right proprietary system to satisfy specifications



Contractor and Manufacturer

System approved through prTAIT



Contractor and Manufacturer

System certified for a prTAIT family

Standard Preview - PrTAIT

Laboratory Validation

- Requirements on constituents
- Requirements on whole system

Site Validation

- Ability to install on site
- Assessment of performance before and after trafficking

PrTAIT Certification

- After successful 1, 6, 12 months monitoring plan

Standard Preview - Requirements

Reference	Requirement (All systems)	Test Method
Visual assessment of defects P_i - Loss of material (%)	0 ¹	Visual inspection
Skid Resistance Value ($rSRV$) ²	≥ 50	IS EN 13036-4
Performance of the surface run-off	No standing water shall be present as a result of system installation.	Visual inspection (as per section 3.5.2.3)

Notes

¹ The Zero '0' defects requirement applies to the integrity of the system in terms of preventing water ingress to the pavement e.g. cracking, breakage, loss of bond etc. The assessment does not extend to minor loss of surface aggregate through trafficking

² Where SRV testing is undertaken to confirm compliance, it shall consist of four tests per kilometre of system installed with a minimum of three tests for any installation

Standard Preview – Install Approved System

Contractor

Select right proprietary system to satisfy specifications



Contractor

Demonstrate certification to the Employer's Representative



Contractor

Install the system following same method as during prTAIT



Contractor

Assess system's performances prior to opening to traffic

Thank you