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# **Draft of a model-like checklist for the implementation of DIN 2304**

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**Implementation of DIN 2304 in practice  
Workshop 8<sup>th</sup> September 2016**

**Fraunhofer IFAM, Bremen**

Compilation of the checklist: Adhesive Bonding Technology

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- Classification of bonds as a function of the relevant level of safety requirements
  
- Requirements to be met by the process chain
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  - Process design
  - Storage and logistics
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  - Occupational health and safety and environmental protection
  - Quality management

# Classification of bonds as a function of the level of safety requirements

- The designer or the person dealing with the component concerned shall classify the bond into one of the following safety classes, taking into consideration the potential effects of bond failure

## S1 High-level Safety Requirements

Failure of the bond

- will **directly or indirectly** lead to an **inevitable hazard** to **life or limb**
- will result in a **failure of the function**, the effect of which will **most likely** lead to an **inevitable hazard** to **life or limb**

# Classification of bonds as a function of the level of safety requirements

- The designer or the person dealing with the component concerned shall classify the bond into one of the following safety classes, taking into consideration the potential effects of bond failure

## S2 Medium level

### Failure of the bond

- can lead to a hazard to life or limb;
- will result in a failure of the function, the effect of which will probably involve personal injury or result in major environmental damage
- will result in a failure of the function, the effect of which will most likely involve major damage to property

# Classification of bonds as a function of the level of safety requirements

- The designer or the person dealing with the component concerned shall classify the bond into one of the following safety classes, taking into consideration the potential effects of bond failure

## S3 Low level

### Failure of the bond

- will result in a **failure of the function**, the effect of which will **probably not** involve **personal injury** or result in **major environmental damage**
- will result in a **failure of the function**, the effect of which will affect **comfort or performance at the most**
- will result in a **failure of the function**, the effect of which will **probably not** involve **major damage to property**

# Classification of bonds as a function of the level of safety requirements

- The designer or the person dealing with the component concerned shall classify the bond into one of the following safety classes, taking into consideration the potential effects of bond failure

## S4 No safety requirement

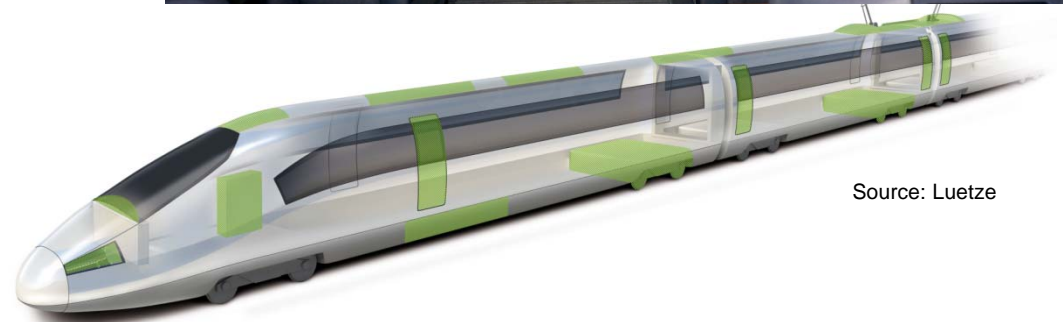
Failure of the bond

- will result in a *failure of the function*, the effect of which will not, under *foreseeable circumstances*, involve *personal injury* or result in *environmental damage*
- will result in a *failure of the function*, the effect of which will *only affect comfort or performance*
- will result in a *failure of the function*, the effect of which will *not involve major damage to property*

# Classification of bonds as a function of the level of safety requirements, Example Railway vehicles and parts

## Example                      Safety/Classification requirements

- |                                     |         |       |
|-------------------------------------|---------|-------|
| • Front-/Side windows               | high:   | A1    |
| • Doors                             | high:   | A1    |
| • Roof segments                     | high:   | A1    |
| • Side panel                        | high:   | A1    |
| • Interior                          | medium: | A2    |
| • Floor adhesion                    | low:    | A3    |
| • Current collectors/<br>collectors | high:   | A1    |
| • Pictograms                        | low/no  | A3/A4 |
| • Driver cabin                      | high:   | A1    |
| • Wet cell/wet room                 | medium: | A2    |
| • ...                               | ...     | ...   |



Source: Luetze

# Infrastructure

- Manufacturing environment
- Transport
- Infrastructure, Maintenance and adaption



# Staff

- sufficient qualified staff for the design, workmanship and supervision of the bonding process
- Bonding supervisors  
Example Safety class S1: the person supervising the overall bonding process shall be qualified as a European Adhesive Engineer, or comparable
- Bonding personnel: in general Qualification as European Adhesive Bonder

# Checking the contractual provisions

- Are any required information provided by the contractor available?
- Application standards, specifications
- Definition of materials and surface characteristics
- Specifications regarding any surface treatment, bonding techniques, testing, equipment
- ...

# Development and design

- Assignment to safety classes (Basis for the determination of all requirements; therefore listed at first of the checklist)
- Design of bonding
- Preparation of documentation for requirements
- Definition of adherends, adhesive, surface treatment
- Requirements to be met by the bonds
- Verification (stress < stress resistance)

# Subcontracting

- All requirements for the final product are to be complied, irrespective of the external subcontractors
- Deciding on subcontracting in a transparent way
- Details and documentation of procurement
- Selection of suppliers
- Supplier management

# Process design

Specifying the bonding process so as to ensure that the requirements to be met by the product or process are complied with in an efficient and reproducible way .

- Bonding as part of the overall manufacturing process
- Work environment
- Work sequence and manufacturing technology
- Production aids and tools (Capacity planning, Manufacturing documents)
- Process approval

# Storage and logistics

- Incoming goods inspection
- Storage
- In-company transport
- Conditioning of materials

# Manufacturing

- Process validation
- Periodic product validation
- Quality control
- Instruction of staff

# Maintenance

Requirements specified for new bonds also apply to maintenance processes

- Assignment of safety classes
- Maintenance instructions
- Performing maintenance work
- Documentation



# Monitoring of measuring and test equipment and of production aids and tools

- Monitoring measuring equipment
- Monitoring bonding equipment
- Monitoring test equipment

# Occupational health and safety and environmental protection

- Legal requirements
- Regulations of the industrial employers' liability insurance associations

# Quality management

DIN 2304 is to be integrated into the contractor's quality management system (QMS).

- Quality planning
- Control of planning and manufacturing documents
- Documentation, marking, traceability
- Document and knowledge management
- Communication system
- Action in the case of deviations
- Change management
- Control of non-conforming products
- Preventive and corrective action