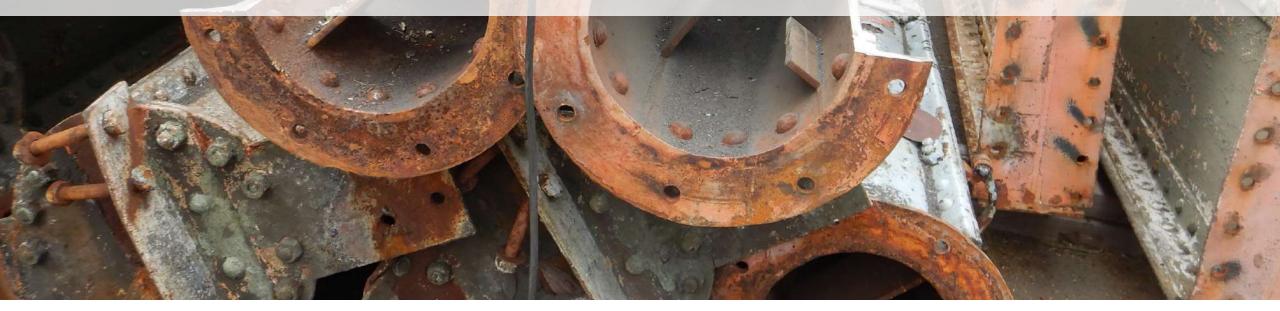


NTA 8713 In practice / In de praktijk



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3 oktober 2023

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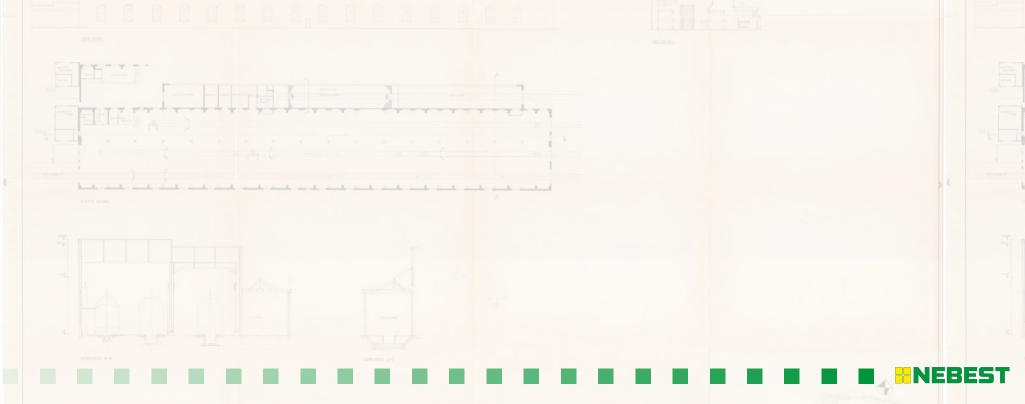
Project

- 16 cast-iron columns
- Year of production estimated around 1899
- 4 riveted segments per column
- Unknown coating system
- Historically related to the Dutch Railways





Reuse of 14 columns in the façade of a new building



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Inspection and test plan

- Inspection units
- Specifications
- Inspection and test scope
- Fastening of the assembly



Inspection units

- 16 columns
 - 4 sections
 - Multiple crossplates
 - Riveted assembly



Inspection units

64 column sections
 ? Cross plates

- Functionally equal
- Dimensionally equal
- Same conditions
- Weight unknown
- Same year of production

Specifications

- Elongation [%]
- Tensile strength
- Yield strength

$$\begin{bmatrix} 70 \end{bmatrix}$$

$$R_{eH} \left[\frac{N}{mm^2} \right]$$

$$R_m \left[\frac{N}{mm^2} \right]$$

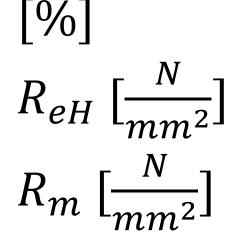
- Impact energy
- Chemical composition
- Carbon equivalent CEV

Engineering Assumptions

- Tensile strength maximum 235 MPA
- No impact resistance
- Material not weldable

Specifications

- Elongation [9
- Tensile strength
- Yield strength



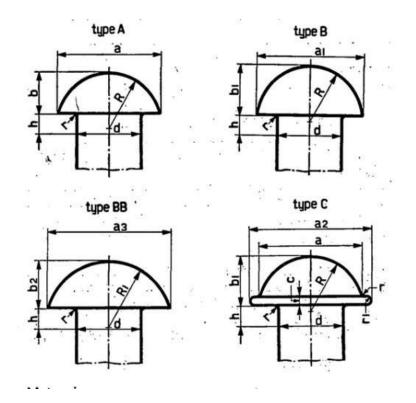
- Impact energy
- Chemical composition
- Carbon equivalent CEV

Inspection and testing scope

- Visual inspection for cracks and other nonconformities
- 4 x tensile test
- 4 x chemical composition test
- 4 x micro examination
- Mobile hardness on all columns

Fastening of the assembly

Determination of type
 Visual inspection



Inspection and testing



Visual inspection

- No major nonconformities
- Coating suspected of containing chromium and / or lead



Visual inspection



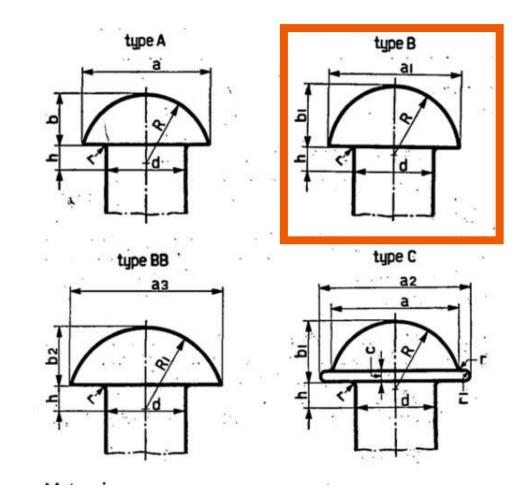
Inspection fasteners







Rivets



Test results

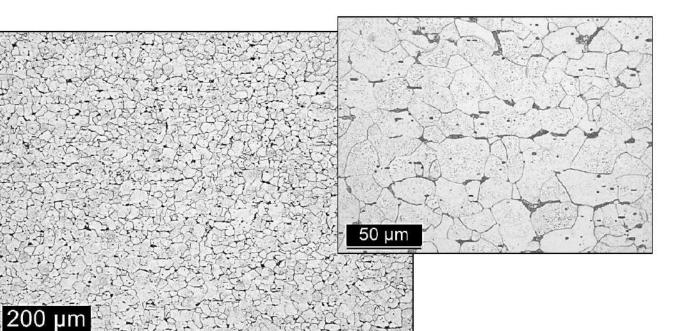
CHEMICAL AN ALYSIS Optical Emission Spectrometry (OES) [SAMPLE "8"]

Specimen	С	Si	Mn	Р	S	Cr	NI	Mo
LT 23.0879-2	0.05	0.01	0.62	0.08	0.08	0.02	0.04	<0.01
Requirement(100	122	1273				22	223
Specimen	~	Co	Cu	Nb	Ti	V	As	N
LT 23.0879-2	<0.01	0.01	0.01	<0.01	<0.01	<0.01	0.07	≈0.01
Requirement(s)				7.74		197720	1572	100
Remark(s): Cev =	0.20*	~	4	-le:				

Note: All results (mass percentages) are an average of minimum 3 measurements <u>Requirement(s)</u>: Not specified * Carbon equivalent value calculated acc. IIW

Method: conform	ISO 6892-1	onena on: Base mate					
Specimen	Size [mm]	Yield strength [MPa]		Tensile streng [MPa]	Elongation (A5) [%]	eduction of ar [%]	
		R _{eH} %	Rp1.0%		After fracture	After fracture	
LT 23.0879-2-1	Ø 7.96	263	240	391	31	63	
LT 23.0879-2-2	Ø 7.96	252	244	394	30	65	
LT 23.0879-3-1	Ø 7.96	262	240	372	33	66	
LT 23.0879-3-2	Ø 7.98	255	230	391	32	67	
Requirement(s)		32	220	.22.5	122		

Requirement(s): Not specified



Analysis

Material of the sections is a cast steel variant The material properties are equal or higher than the assumptions Rivets are larger than expected Cross plates are not yet included in the engineering

Lessons learned

- The process as described in the NTA 8713 is practical to use
- Inspection and testing conforms to known European standards
- All stakeholders are confident in the process and results

Let's reuse steel!

