IQVET

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INSPECTION AND TESTING PLAN FOR WELDING STEEL CONSTRUCTIONS

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CONTENT

INTRODUCTION

Gravity load path

Beam-bolts-weld-column-ground

Load path

INTRODUCTION, CASE #1

- Mexico City Subway Collapse
- Date: May 3, 2021
- Location: Mexico City, Mexico
- Cause: faulty structural welds. the welds did not meet the required standards
- Impact: deaths of 26 people and dozens of injuries

CASE #2

- Kutai Kartanegara Bridge Collapse
- Date: November 26, 2011
- Location: Kutai Kartanegara Regency, Indonesia
- Cause: The collapse was partly attributed to poor welding practices and inadequate maintenance.
- Impact: deaths of 20 people and 39 injuries.

CASE #3

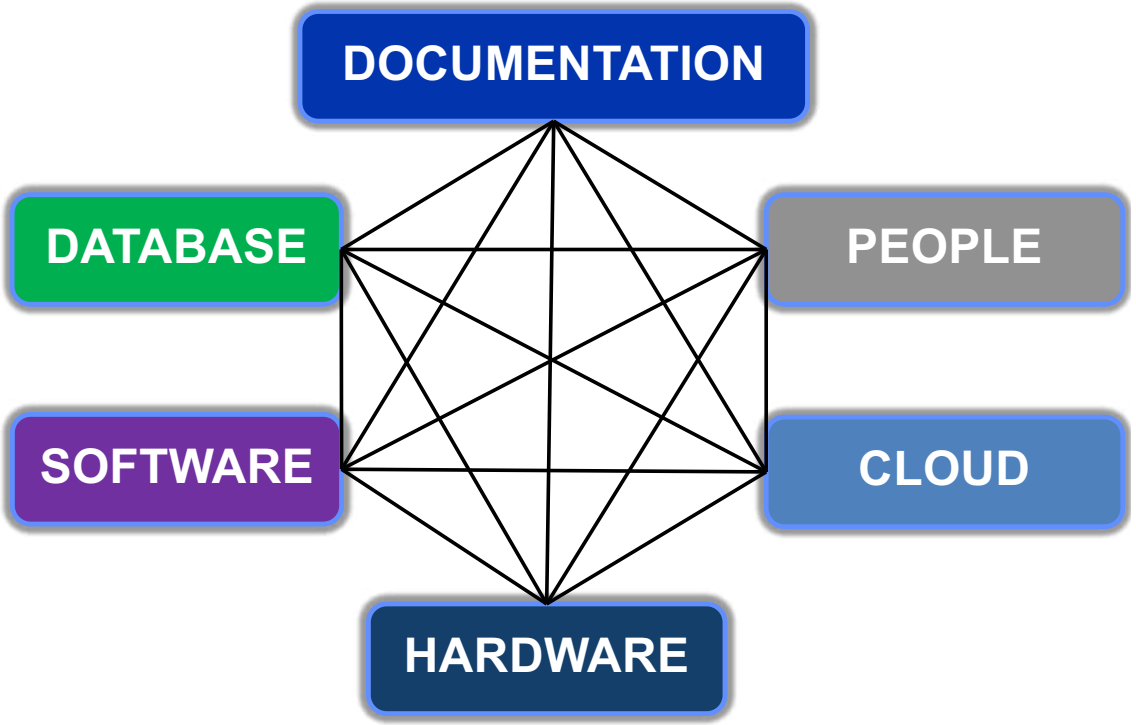
- I-35W Bridge Collapse
- Date: August 1, 2007
- Location: Minneapolis, Minnesota, USA
- Cause: design errors and poor welding quality in the gusset plates
- Impact: deaths of 13 people and 145 injuries.

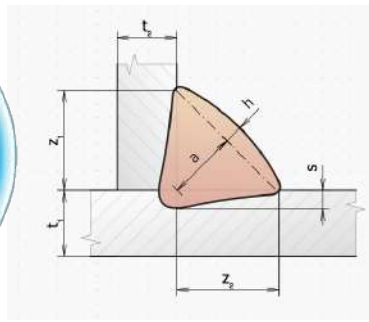
CASE #4

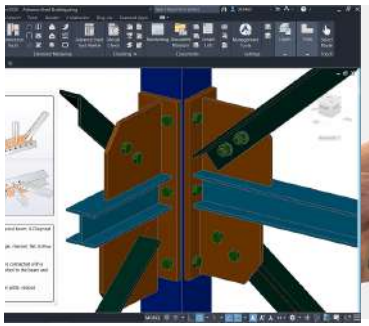
- Seongsu Bridge Collapse
- Date: October 21, 1994
- Location: Seongsu Bridge, Seoul, South Korea
- Cause: Faulty Welding and Construction
- Impact: deaths of 32 people and17 were injuries

INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT)

- Improved accuracy and reliability in welding design
- Streamlined compliance with standards
- Safety and performance of welding
- Tools and software for welding simulation and drawings
- Documentation
- Administration

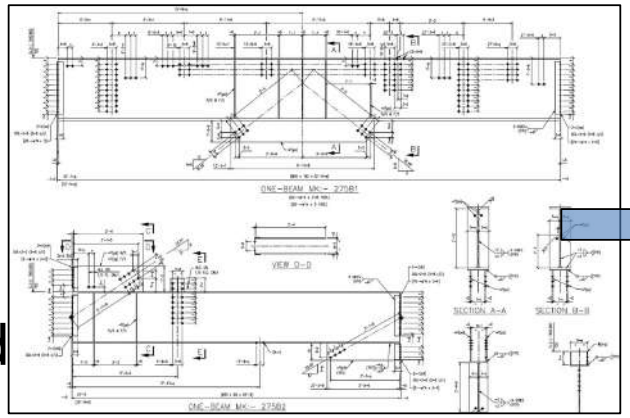






EVALUATING AN INQUIRY

- Review of Documentation
- Verify NDT/DT, 3rd Party inspectors and qualifications
- Verify the dimensions.
- Approving testing laboratory and sample preparation procedure



Detailing

Material Handling and Identification

Fabrication

Fit Up and Welding

Painting

DESIGN REVIEW

- Verify the WPS
- Review of Design Documents
- Ensure that the design complies with relevant standards and codes
- Verify the contractor/manufacturer's potential
- Verify the welding preparation
- Verify the assembly related to tolerances
- Verify the proposal of the welding sequence
- Verify the base material.
- Verify the personnel qualifications

IIS Job N./Comm. N. [redacted] FOR TEST COUPON ONLY

MANUFACTURER'S WELDING PROCEDURE SPECIFICATION
PROCEDURA DI SALDATURA DEL COSTRUTTORE
EN ISO 15609-1

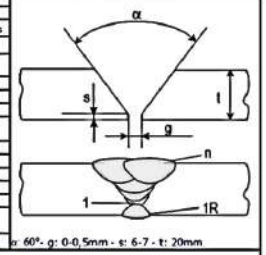
WPS-n°/WPS-n° 002
REV 0
Date/Data 10/07/2018
Supporting WPQR n°/ WPQR di supporto n° VB0195/18

Manufacturer/Costruttore [redacted]

Welding Process(es)/Processo di saldatura a) 121 b) c)
Type(s)/Tipo a) Fully mechanized b) c)

JOINTS/GIUNTI

Joint Type/Tipo di giunto	Butt
Weld Type/Tipo saldatura	Full penetration welded from both sides
Angle of branch connection/Angolo della connes. branch	NA°
Backing/Sostegno	○ Yes ● No
Backing Material Type/Tipo materiale di Sostegno	NA
Weld preparation/Preparazione	Single-V with root faces
Method of preparat. & cleaning/Metodo di prep. e pulizia	Grinding



α: 60°- g: 0-0,5mm - s: 6-7 - t: 20mm

PARENTAL MATERIAL/MATERIALE BASE

Group n° / Gruppo n°	1.2
to Group n° / Con Gruppo n°	1.2
Spec. Type & Grade / Specif. Tipo e Grado	EN 10028-3 - P355NH
to Spec. Type & Grade / Con Specif. Tipo e Grado	EN 10028-3 - P355NH
Thickness/Spessore (mm)	20 to/con 20
Ouside Diameter/Diametro Esterno (mm)	NA to/con NA
Other/Altro	None

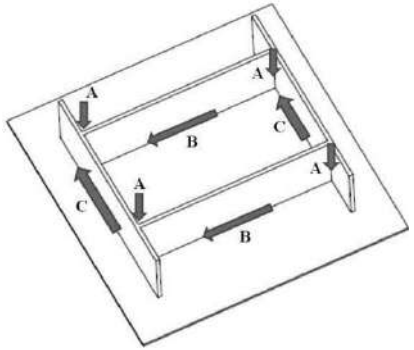
WELDING CONSUMABLES/CONSUMABILI

FILLER METAL/MATERIALI D'APPORTO	a)	b)	c)
Specification No./Specifica No.	ISO 14171-A		
Designation/Classificazione	S2		
Size/Dimensioni (mm)	Diam. 3,2		
Trade name/Nome commerciale	OE-S2		
Throat thickness/Gola (mm)	NA		
Manufacturer/Fabbricante	AIR LIQUIDE WELDING		

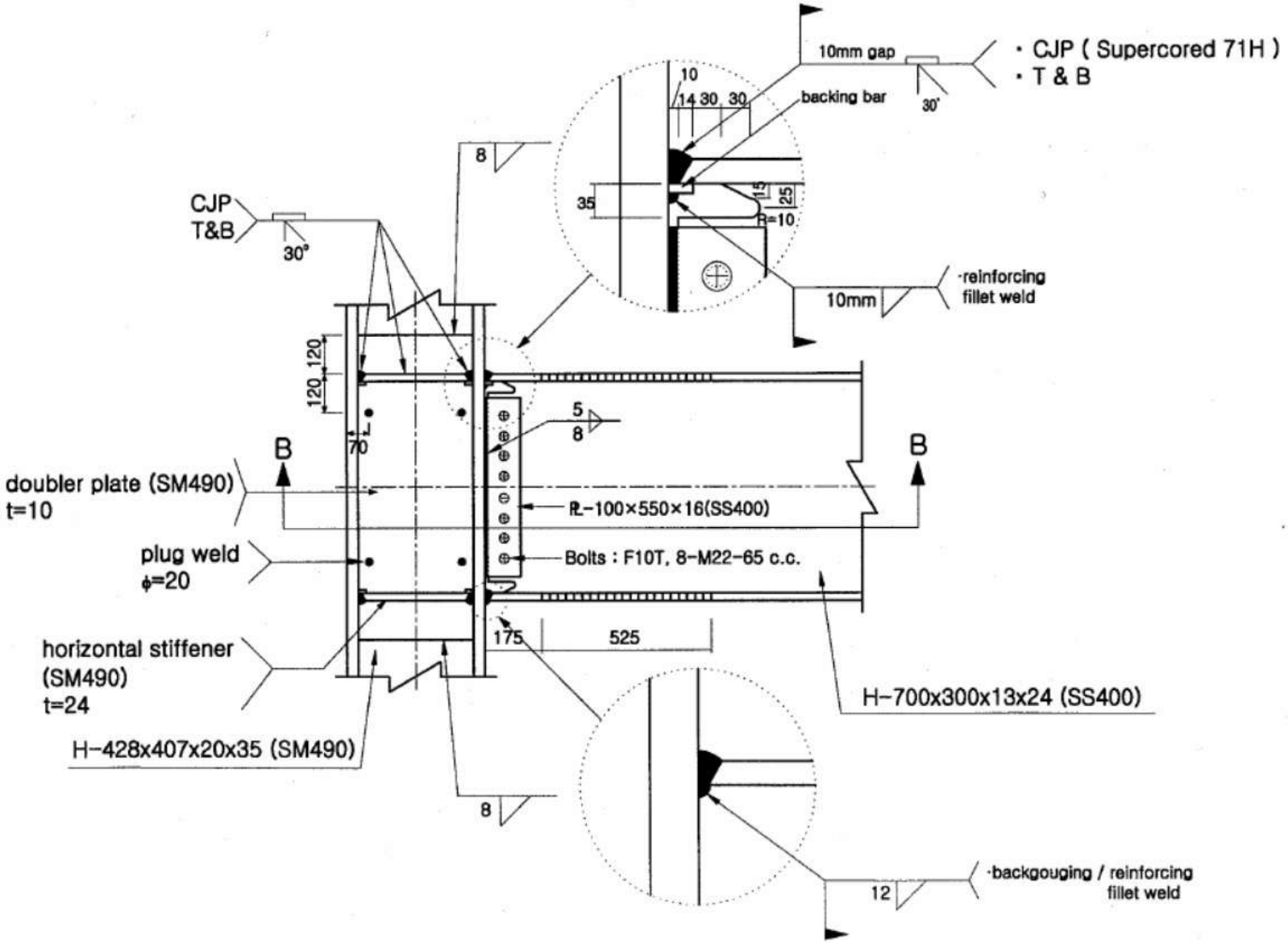
FLUX/FLUSSO	a)	b)	c)
Designation/Designazione	S A AB 1 67 AC H5		
Trade name/Nome commerciale	OP 193 PF7m025		
Manufacturer/Fabbricante	[redacted]		
Weld material thickness/Materiale deposit. (mm)	20		
Other/altro	Flux disign. according to EN ISO 14174		

WELDING POSITION/POSIZIONE DI SALDATURA

	a)	b)	c)
Position/Posizione	PA		
Welding Progression/Progressione	○ Up ○ Down ● NA	○ Up ○ Down ○ NA	○ Up ○ Down ○ NA
Other/Altro	None		



BEAM-COLUMN STEEL MOMENT CONNECTION DETAILS



DOCUMENTATION AND PRODUCTION PLAN

- Ensure that the system for identification and traceability is according to the specified requirements
- Verify the need for documentation related to inspection of welding seams and welding procedures.
- Specify which documents you will use through the inspection process and what content the documents shall have.
- Write a procedure for inspection activities before, during, and after welding that ensures traceability of the activities.
- Ensure that final documentation is correct, complete, and ready for delivery together with the product

WELDING AND CUTTING INSPECTION

1. Cutting Inspection:

- Pre-Cutting Inspection
- During Cutting
- Post-Cutting Inspection

2. Pre-Weld Inspection:

- Review Documentation
- Material Verification
- Joint Preparation
- Welder Qualification

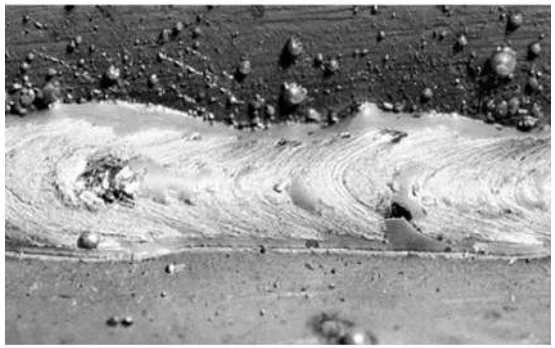
3. During-Weld Inspection:

- Monitor Welding Parameters
- Weld Quality
- Consumable Handling

4. Post-Weld Inspection:

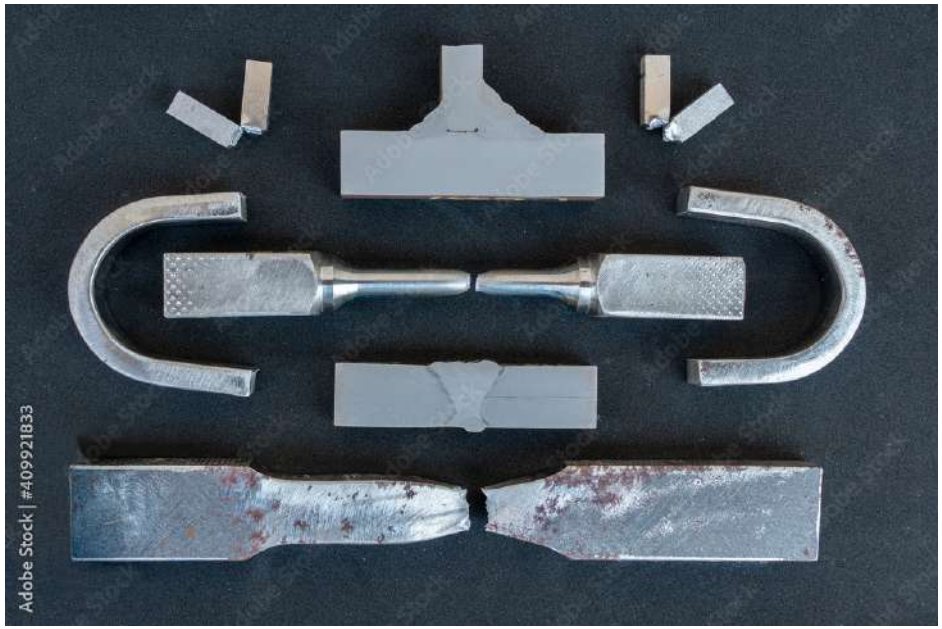
- Visual Inspection
- Non-Destructive Testing (NDT)
- Dimensional Inspection

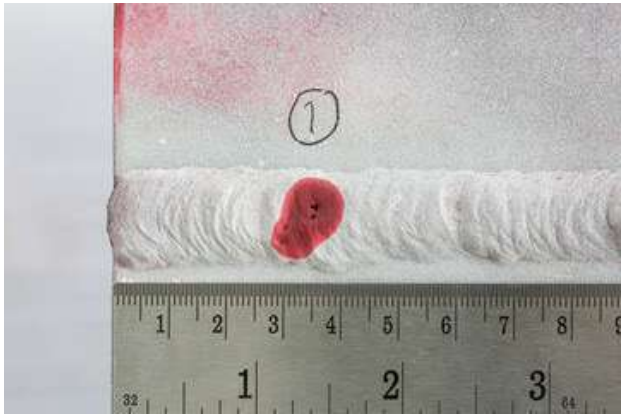
5. Documentation and Reporting



TESTING, DT/NDT AND LOADING

- Responsibilities
- Destructive Testing (DT)
- Non-Destructive Testing (NDT)
- Documentation and Reporting





MECHANICAL FASTENING AND ERECTION

- Review Documentation
- Material Verification:
- Surface Preparation:
- Responsibilities
- Handling and Storage on Site
- Check that any necessary repairs
- Verify the fit-up and alignment
- Welding During Erection
- Inspect the welding conditions.
- Welding testing
- Inspection and Testing after erection
- Documentation and Reporting

SURFACE PROTECTION

- Verify the Environmental Conditions
- Verify the Cleaning and slag removal
- Checking the surfaces are welded free of painting.
- Ensure that edges and welds are free from sharp edges, burrs, and weld spatter.
- Checking Grinding and dressing of welds and edges to smooth out irregularities.
- Inspection welding painting
- Non-Destructive Testing (NDT)
- Documentation and Reporting

DIMENSIONAL CONTROL AND DELIVERY DOCUMENTATION

- Inspection of documentation that has been created during manufacturing.
- Verify documents that should be stored in the company and documents to be submitted to the client.
- Write a status report after document control for the product
- Establish as-built documentation related to inspection
- General content of the final documentation:

➢ Material, and equipment orders
➢ Material certificates for raw materials and welding consumables
➢ Delivery notes
➢ Welding roster Non - compliance reports
➢ Other construction notes
➢ Inspection and test reports
➢ Environmental notes

ITP EXAMPLE

General activities ← Project phase scription

	Activities	Requirements	Form report		Subcontractors		Contractor		Customer		NoBo
1.1	Verification of company suitability, certificates	MSZ EN ISO 3834-2 MSZ EN ISO 9001 MSZ EN ISO 14001	Certificates, authority permits	N/A			R	N/A		R	
1.2	Checking the qualifications of welders	Welding certificates MSZ EN ISO 9606-1 2014/68 EU Directive	Welding certificates Approved welders list	N/A			H	H		R	

Inspection step/line

Inspection point

Stakeholders

CONTROL POINTS:
H - Hold point
W – Witness point
M – Monitoring
R – Document review
A - Approval

Checking of incoming materials (etc.)

-Volume (100% or 10%....)
-Carrying out activities personnel
-Signatures
-etc

SUMMARY

- Identifies the defects, reducing the risk of structural failures and hazards.
- Ensures that all materials used meet the specified standards and are free from defects
- Inspections during and after welding ensure that welds are of high quality, and free from defects.
- Ensuring that the project progresses according to the approved plans and specifications.
- Detailed documentation of inspection activities ensures accountability and facilitates future maintenance and quality assurance.
- Ensures all safety protocols are followed, protecting workers and the environment.

THANK YOU FOR YOUR ATTENTION!

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