



R1 76 84 01 Technical Directive

Directives for connecting plastic pipes

Authors : T.J. de Ruijter/W. Hadders

Issue : April 2001

Version : 1.0

Intended for location IJmuiden

The latest version can be retrieved via Intranet at Tata Steel (ProjectNet) or internet
<https://www.tatasteeleurope.com/ts/nl/gezondheid-en-veiligheid/toegang-en-veiligheid-ijmuiden/voorschriften>

Information and modifications:

Document content T.J. de Ruijter/W.Hadders tel. +31 (0)251-4 91896

Standardisation office ptc-adm@tatasteel.com tel. +31 (0)251-4 94443

Table of contents:

1. GENERAL	3
1.1. APPLICATION	3
1.2. INSPECTOR.....	3
1.3. CONDITIONS FOR THE COMPANY CARRYING OUT THE WORK.....	3
1.4. INVESTIGATION.....	3
2. ADHESIVE BONDING OR COLD WELD JOINTS	4
2.1. GENERAL	4
2.2. PREPARATION FOR BONDING PLASTIC PIPES.....	4
2.3. BONDING PROCESS FOR PLASTIC PIPES	4
2.4. INSPECTION.....	4
2.5. PLACING LOAD ON ADHESIVE JOINTS	5
3. BUTT-FUSION WELDING	6
3.1. GENERAL	6
3.2. PREPARATION FOR BUTT FUSION WELDING	6
3.3. CARRYING OUT THE BUTT FUSION WELDING	6
3.4. VISUAL INSPECTION OF BUTT FUSION WELDS	6
3.5. NON-DESTRUCTIVE TESTING (NDT)	7
3.6. PLACING LOAD ON BUTT WELDS	7
4. SOCKET FUSION JOINTS	8
4.1. GENERAL	8
4.2. PREPARATION	8
4.3. CARRYING OUT THE WELDING WORK	8
4.4. VISUAL INSPECTION	9
4.5. PLACING LOAD ON BUTT WELDS	9
5. ELECTROFUSION SOCKET WELDING (LOST ELEMENT WELDING)	10
5.1. GENERAL	10
5.2. PREPARATION	10
5.3. CARRYING OUT THE WELDING WORK.....	10
5.4. VISUAL INSPECTION	11
5.5. PLACING LOAD ON ELECTROFUSION SOCKET WELDS.....	11
6. TOOLS – MATERIAL	12
7. REFERENCES TO OTHER DOCUMENTS	13
8. STATEMENT	14

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 1 of 14

Blank page

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 2 of 14

1. General

1.1. Application

This directive applies to the carrying out and inspection of adhesive bonding (cold weld) and welding work on plastic pipes for use at Tata Steel IJmuiden.

For each project or activity, the parties commissioning and carrying out the work must agree in advance that this directive shall apply.

1.2. Inspector

'Inspector' is defined as:

The ordering party's inspector, or another qualified inspection body designated by the ordering party, a competent body according to a legal provision.

1.3. Conditions for the company carrying out the work

The company that is going to carry out the jointing work in the plastic pipes must have demonstrable expertise in the relevant applications for plastics and jointing techniques. The work must be carried out under the responsibility of a qualified expert. The persons carrying out the work must be in possession of valid qualifications, which must be shown to the ordering party's inspector before the work commences.

1.4. Investigation

Unless agreed otherwise, the cost of any prescribed investigations are to be met by the contractor. The cost of repeat investigations and extended investigations resulting from errors shall be borne by the contractor in all cases.

The scale and nature of investigations must be documented in advance in an approved inspection plan. If there are grounds for doing so, the inspector has the right to extend or repeat investigations. Investigations may only be carried out by an approved qualified body. The inspector shall determine whether the body meets this criterion.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 3 of 14

2. Adhesive bonding or cold weld joints

2.1. General

The guidelines apply to the adhesive bonding of the following materials:

PVC – ABS – Airline Xtra – PVC-C

A specific cleaning agent and adhesive must be used for each type of material.

The work must be carried out in appropriate conditions and in accordance with the conditions specified by the supplier (temperature, humidity, protection from the weather, etc.).

The bonding instructions issued by the supplier of the materials must be followed.

2.2. Preparation for bonding plastic pipes

- Cut/saw the pipe at a right angle.
- Deburr inside of pipe, make a locating edge on the outside.
- Mark the socket depth (+ 10 mm) on the pipe.
- Abrade the spigot end and socket with K80 emery cloth.
- Clean the spigot and socket with appropriate cleaning agent.

2.3. Bonding process for plastic pipes

- Stir the adhesive before use. Check the fluidity and use-by date.
- Products that have thickened or become lumpy must not be used.
- Use a flat brush of a width equal to $\frac{1}{4}$ of the pipe diameter.
- Adhesive must be applied radially, first to the socket and then the spigot end.
- Without twisting the pipe, insert the spigot end to the full depth of the socket.
- Remove excess adhesive.
- Adhesive bonding must be carried out in accordance with health and safety legislation (*ARBO-wet*, Working Conditions Act).

2.4. Inspection

After 24 hours, test at 1.5 times the nominal pressure (PN). If this is not possible, at 1 bar after 1 hour's drying time.

Visual inspection:

The adhesive sausage must be clean and free of air and the filling must be uniform.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 4 of 14

2.5. Placing load on adhesive joints

For underground pipes, the adhesive joints should be made alongside the trench and allowed to dry for 2 hours before the pipes are laid in the trench.

Clamping must be done in the correct manner.

(See R1474001: Directive for testing pipe systems)

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 5 of 14

3. Butt-fusion welding

3.1. General

Guidelines for butt fusion welding for the following plastics: PE-PP-PVDF

The welding method must be agreed in advance between the client and contractor. A Welding Methods Certification (LMK) for the welding method must be submitted in advance to the inspector for approval. A welding plan must also be approved by the inspector before the work can be carried out.

Inspection during the welding work must be in accordance with a previously approved inspection plan.

For the welding parameters, see the relevant tables in information sheet VM 98 issued by the FME association.

3.2. Preparation for butt fusion welding

- The work location must be protected from weather.
- Check machines and tools before use.
- Wall resistance must not exceed 10% of the wall thickness.
- Use a plane to make the welding surfaces smooth and parallel.
- Keep the welding surfaces clean.
- Clean the hot plate.
- The welding must be carried out no more than 15 minutes after the welding surfaces have been prepared.
- Clamping must be done in the correct manner.

3.3. Carrying out the butt fusion welding

- The welding work must comply with the pressure-time chart diagram according to parameters V.M. 98:
 - pre-heating under pressure;
 - heat soak;
 - alignment;
 - pressure build up;
 - joining under pressure;
 - cooling under pressure.
- Pipes with a diameter of more than 50mm must be welded by machine.
- N.B. Ensure proper ventilation when welding PVDF.
- The welding work must be carried out in accordance with the Working Conditions Act (*ARBO-wet*).

3.4. Visual inspection of butt fusion welds

- Both weld beads must be the same shape and size.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 6 of 14

- A heavy shine on the weld beads is unacceptable.
- Porosity in the weld beads is unacceptable.
- Weld beads that are not complete around the pipe are unacceptable.
- Cracks in weld beads are unacceptable.
- Grooves/notches in the parent material are unacceptable.

3.5. Non-destructive testing (NDT)

NDT should only be carried out on PE material.

The client and contractor must draw up an agreement in advance for the extent of the testing and the technique to be used.

Testing must be carried out in accordance with the following RTD procedures:

RT-21018 for radiographic testing

UT-21115 for ultrasonic testing.

Other procedures require the approval of the inspector.

3.6. Placing load on butt welds

- Forced cooling is unacceptable in all circumstances.
- Before transport, the weld seam requires extra cooling time equal to the original cooling time.
- Welding process.
- Clamping must be done in the correct manner.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 7 of 14

4. Socket fusion joints

4.1. General

Guidelines for socket fusion joints in the following plastics: PE-PP-PVDF

The welding technique must be agreed in advance between the client and contractor. A Welding Methods Certification (LMK) for the welding method must be submitted in advance to the inspector for approval. A welding plan must also be approved by the inspector before the work can be carried out. Inspection during the welding work must be in accordance with a previously agreed inspection plan (see checklist provided for points to check).

For the welding parameters, see the relevant tables in information sheet VM 98 issued by the FME association.

4.2. Preparation

- Cut the pipe at a right angle.
- Deburr the inside.
- Deburr the outside of the pipe with a calibrated cutter.
- Clean the spigot end and socket with methylene chloride.
- Keep the welding surfaces clean.
- Check the temperature of the welding element.
- Remove dirt from the welding element.

4.3. Carrying out the welding work

- Push the fitting straight onto the mandrel of the welding element.
- Push the spigot end straight into the heating tube of the welding element.
- The welding work must be carried out in compliance with the parameters according to material sheets
- FME V.M. 101.
- Push the fitting radially onto the end of the pipe.
- Welding can be carried out manually on pipes with a diameter of up to 63 mm.
- N.B. Ensure proper ventilation when welding PVDF.
- The welding work must be carried out in accordance with the Working Conditions Act (*ARBO-wet*).

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 8 of 14

4.4. Visual inspection

- The welding bead should be of the same shape and size all round.
- The pipe must be inserted in the fitting to the correct depth.
- The angle deviation must be less than 0.2° .

4.5. Placing load on butt welds

- Forced cooling is unacceptable in all circumstances.
- Load can be placed on the joint after 1 hour.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 9 of 14

5. Electrofusion socket welding (lost element welding)

5.1. General

Guidelines for electro socket welding (lost-element method) the following plastics: PE – PP.

A Welding Methods Certification (LMK) for the welding method must be submitted in advance to the inspector for approval. Before the work commences, a welding plan must be approved by the inspector.

Inspection during the welding work must be in accordance with a previously agreed inspection plan. A reference weld must be made before this stage, for use during the inspection.

5.2. Preparation

- Cut the pipe at a right angle.
- Deburr.
- Mark the socket depth (+ 10 mm) on the pipe.
- Clean the socket with methylene chloride (not necessary if the socket is packed well).
- Scrape the pipe surfaces clean (radially) from the marking.
- Clean the spigot end with methylene chloride (cover spigot end with plastic bag if necessary).

5.3. Carrying out the welding work

- Welding should be carried out no more than 15 minutes after cleaning.
- Fully roll out the cables.
- Check the power voltage and transformer.
- Insert the ends of the pipes into the fitting and mark the insertion depth again as a check.
- Position the sockets according to instructions.
- Connect the secondary cable.
- Carry out the steps required to make the weld, according to the supplier's instructions.
- Keep the pipe and fitting in the correct position during welding.
- After the cooling time, remove the secondary cable from the fitting.
- Ensure there is no movement during welding.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 10 of 14

5.4. Visual inspection

- The appearance of the actual weld must correspond exactly to the reference weld.
- There must be no cracks, dirt or damage in the weld area.
- Check the insertion depth.
- The filling in the split between the socket and pipe must be even.
- The resistance wires must not be visible.
- Joint faults due to insufficient form retention of the fitting or to a crooked pipe are not acceptable.

5.5. Placing load on electrofusion socket welds

- Forced cooling is unacceptable in all circumstances.
- Keep to the prescribed cooling time.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 11 of 14

6. Tools – material

- Tools must carry the CE mark.
- The butt welder must be well maintained.
- The butt welder must have clamps to ensure that the pipe and fittings are held in place during welding.
- The clamping device must be constructed so that both weld surfaces remain in line.
- Periodic calibration of the clamping device using a load cell is absolutely essential.
- Check the temperature of the welding element before every weld.
- The materials and tools to be used must comply with safety requirements (NEN 1010).

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 12 of 14

7. References to other documents

This Technical Directive refers to:

Technical Guidelines

R1 47 40 01 Testing pipe systems

RTD procedures:

RT-21018 for radiographic testing

RT-21115 for ultrasonic testing

NEN 1010

Information sheet VM98, FME Association

Material sheets VM101, FME Association

Address of FME Association:

PO Box 190

2700 AD Zoetermeer

tel: 079 3531100

fax: 079 3531365

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 13 of 14

8. Statement

Version 1.0

This is a new document and replaces HO standard 76 00 84 130.

Tata Steel IJmuiden	R1 76 84 01
Projects & Technical Consultancy	Directives for connecting plastic pipes
Tata Steel Technical Directive	Page 14 of 14