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Learning Resources for the course:

Steel Structure Inspector Course for PED INSPECTOR

This document covers only:

Competence unit no. CU-2 EVALUATING AN INQUIRY

Table of Contents

Introduction

Note. It is assumed that the teacher has in depth knowledge of the industry requirements for the topics discussed in this CU.

Reference document covering the course structure, see document D2.2
The content of this document covers deliverables for D4.1 and D4.2

The course consists of a number of CU´s. A CU is the smallest element in the education system that specifies Learning Outcomes, Skills and Competence. A CU can be delivered individually or it can be delivered in combinations with other CUs in order to cover a defined range of knowledge and competence.

The course will clarify the inspector's role in manufacturing where the work begins well before welding starts, continues during the welding operation, involves action after welding is completed, and is finalized only when the results are properly reported.
The course will be work-based and follows the manufacturing process from the order is received until the welded product is ready for delivery. The inspector is responsible for producing documents that ensure traceability of the components and related manufacturing action throughout this process.

The activities in this course are work-based and follows a product from initial order and as it is being produced in the factory until it is ready for delivery. The manufacturing process has been divided in logical steps whereby the learning activity and learning content and tasks, are distributed according the status of the manufacturing process.
Activities in the course will be both planning activities as well as practical tasks to be carried out in the workshop together with the company mentor, or in a laboratory at the VET school.
The learning material will be distributed through the LMS (Learning Management System) system provided for this course.
Learning methods will be a mixture of solving planning and reporting tasks through the classroom or reported through the LMS (Learning Management System) system and practical hands-on training in the workshop.
The CUs will follow the work-based production process. Each CU will contain parts of the work preparation activities or/and a part of the production activities

The students have to submit all tasks, both practical and theoretical, given through the different course CUs. All CUs have practical tasks for the students. The course requires that the student has access to a workshop where products are or can be, manufactured. The products in the workshop will be used during the practical training sessions in this course.

Copyright

A document tagged with copyright in the survey in chapter C, has a copyright statement in the document itself. The teacher has to read the statement before using the resource.

Objective.

The objective of this CU is how to evaluate an inquiry, that comes to a company, from an inspectors point of view. We therefor assume that an inquiry document are present with all relevant drawings that are natural at this stage in the production flow.

The inspectors role in the evaluation of the inquiry is the main topic.
* Which considerations shall be taken?
* Which function and responsibility shall the inspector have if the inquiry materialize into an order?
* How shall the inspector highlight any shortcomings in the company for this inquiry ?
As a result of this CU the inspector shall have a better understanding of his/her role in this part of the work process.

A. Teacher Guideline.

CU 2 is the first step in the work-based product cycle.

As a resource, 3 different welded pipe segments have been delivered as ISOMETRIC drawings. We assume that these pipe segments will be a part of a new production line in the company.

We also assume that the students understand and can read ISOMETRIC drawings.

The students get additional resources covering welding drawings both for ISO and ASME. Both standards are added because a lot of piping work, specially in the oil and gas business, is following the ASME standards. It is therefor important that the students have knowledge of the differences between those standards.

Two general procedures have been added as reference for the students, QA-4.2-1 and QA-4.3-10 (Note these two procedures have a left column which can be used for creating an information flow diagram).

A general overview resource for planning of inspection is added. This document gives a general overview of the inspection process.

Note. If some of the students have similar products that they are in process of evaluating in their company, such products can be used as examples as well or as reference for the student.

The report that shall be submitted by the students can also be submitted as group report, if you have divided the class into multiple groups.

The knowledge that the students should obtain through this CU will be used in CU 2 to develop an inspection plan for the product.

B. Students Guideline

CU 2 represents the first step in the work-based learning.
It is a set of isometric drawings that gives the basic detail for an inquiry. The key tasks is to evaluate if the welding information is correct as well as the welding information in the drawings. But in addition you have to evaluate if the company has the right resources with knowledge and competence for this job.

Please note that pipeline drawings specially in the oil and gas business can be made according the ASME standard instead of the ISO standard. It is important for you to know the differences of these standards. Material describing the differences have been added to this CU.

The tasks given here shall result in a short report.

What you learn through this CU will be used in later CU`s for developing inspection plans and so forth.

Time schedule for CU 2: 6 hours (4 hours studying and 2 hours zoom meeting)

Where do you find information and learning materials etc.:
Under folder with “Resources and activities”. The material is available as pdf-files, word- and excel files, and video material (online at YouTube and as mp4 files stored in the learning management system). Please notice that the written assignments should be answered by using the word-files that are embedded into the description of the tasks. **You shall not use** the Office package installed on your own device.

Type of work:
You have 2 weeks to complete each CU. The first week should be preparation activities, while the second week should be used to solve the tasks, exercises and hand in your results to the teacher. The learning activities include *i*ndividual studies, work-based training in your company, group activities, classroom training and a digital Zoom video meeting with the teacher once per week (Saturdays) of using zoom meetings

C. Learning resources

Support resources from selected from the Internet.

Title	Producer	Language	No of pages	Copy-right
Planning and preparing for inspection	Xcalibur Learning network	English	24	no
Welding Symbols-ISO/AWS	University of Hail	English	66	no
BS-EN 13480-5	BSI	English	36	no

Learning resources developed in the project.

Title	Producer	Language	No of pages	Copyright
Welding symbols and drawings	ISIM	English	13	no
QA-4.2.1Verification of contract requirements	QMS	English	1	yes
QA-4.3-10Personnel requirements for Inspection and verification	QMS	English	1	yes
Project Kiviteli terv1	ISIM	English	1	yes
Project Kiviteli terv2	ISIM	English	1	yes
Project Kiviteli terv3	ISIM	English	1	yes
Example of pipe spools	QMS	English	1	yes
Welded joints	Matrai	English	7	no
Inspection of contract and products drawing	Matrai	English	4	no
Pilot Inspector Pilot	Matrai	English	12	no
RPL CU2 welding symbols	Matrai	English	5	no
Welding symbols	Matrai	English	3	no

Video resources created for this CU

No special resources have been created for this CU

D. Students tasks

Discussions for student group or individual work:

Discuss and report on the following topics:

1. Administrative personnel- job functions and competence requirements for this inquiry.

2. Evaluate training needs and recertification.

3. What functions and tasks shall the inspector have for this inquiry?

*Verify if the welding drawings are ok

* What function and tasks shall the inspector have?

* What personnel is needed for this job and their competence?

Create a short report and deliver that either as group tasks or as individual tasks

1. Administrative Personnel-Job functions and competence requirements for this inquiry.

2. Evaluate training needs and recertification. 3. What functions and tasks shall the inspector have for this inquiry?

3. Sketch the welded joints shown in the drawing, and symbolize them

4. Study the technical isometric drawings, 1.1 Kivitele terv, 1.2 Kivitele terv and 1.3 Kivitele terv

*The control requirements for the inquiry shall it be valid for all items in the inquiry or a limited number of items?

· What does all items mean?

· What does a limited number mean?

*Will your decisions here for this inquiry also be valid for an identical inquiry from the same client?

· Shall your decisions be approved by the client?

· If we are using a subcontractor-- how will this be influenced by the decisions above?

E. Course evaluation questions

1. Did you find this module relevant ?

* Yes
* No
* I don't know

2. Was it time enough for going through the material ?

* Yes
* No
* I do not know

3. Was the resources relevant for this module ?

* Yes
* No
* I do not know

F. Appendix.

Learning resources developed for this CU.

M1.2 Welding symbols and drawings

Weld symbols are a way of communicating design details to different shop personnel as welders, supervisors, and inspectors. A weld symbol indicates the type of weld. The Welding symbol is a method of representing the weld on drawings.
Subcontractors are often required to interpret weld symbols on contractor or client drawings. It is essential that everyone should understand the weld symbol requirements, in order to ensure that the initial design requirement is met.

Although the main features of weld symbols are international, variations in detail occur from country to country. In Europe the welding symbols are specified in EN 22553:1994 “Welded, brazed and soldered joints – Symbolic representation on drawings”. The below welding symbolization will refer to this standard. For weld drawings the referential is EN ISO 9692: Welding and allied processes - Joint preparation.

WELD DRAWING TERMINOLOGY:

- Weld leg
- Weld face
- Weld throat
- Weld groove radius
- Root opening (groove weld)
- Weld root face
- Weld groove angle

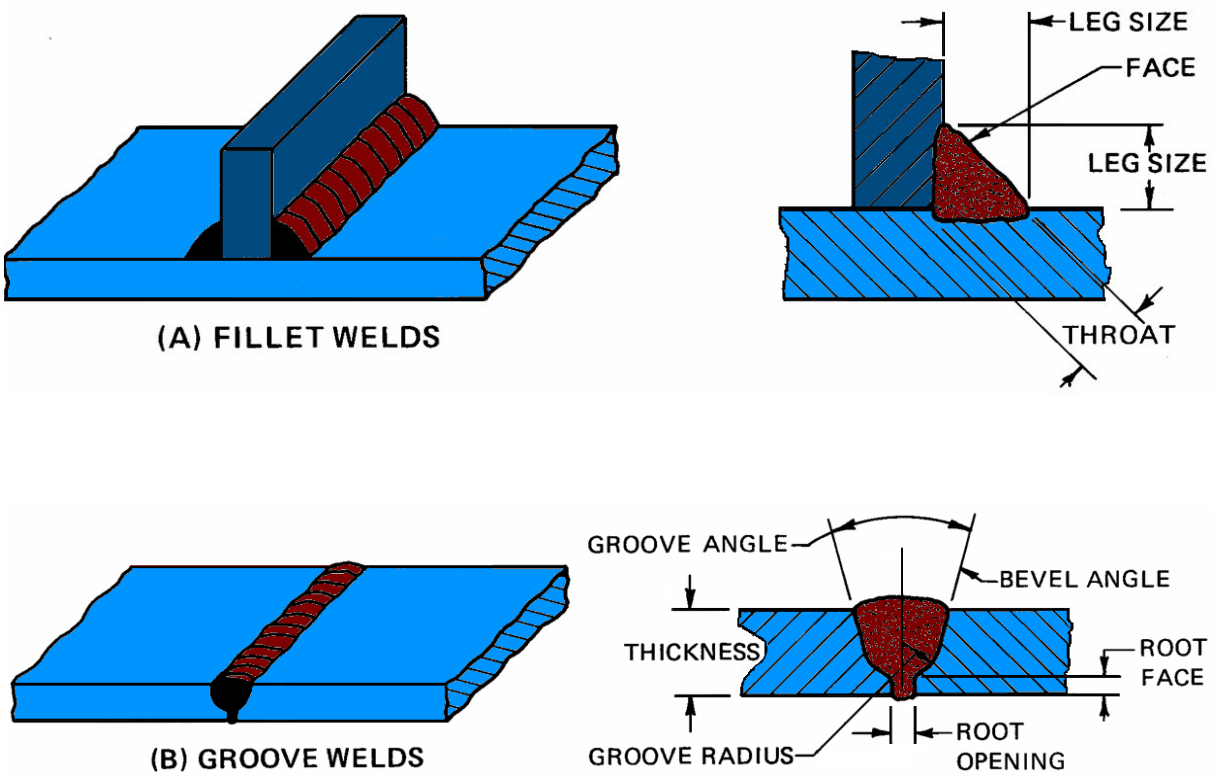


Figure 1: weld drawing terms

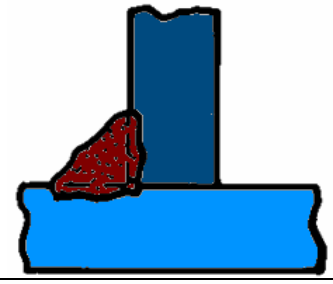
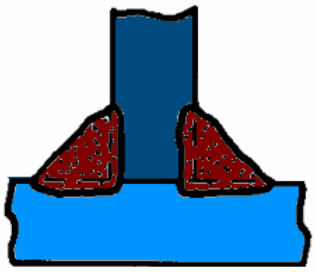
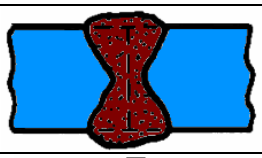
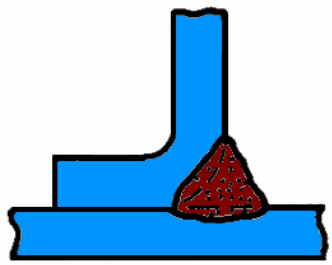
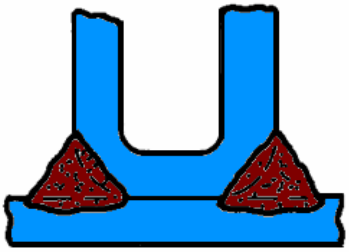
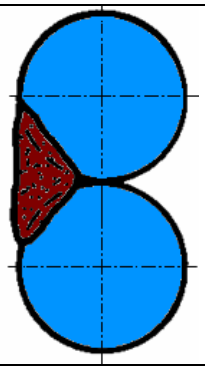
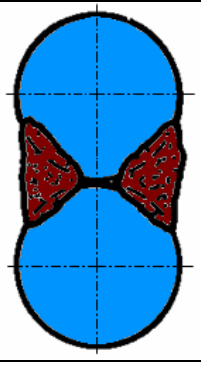
TYPE OF WELD		single side	double side
FILLET			
BUTT	SQUARE		
	BEVEL GROOVE		
	V- GROOVE		
	J-GROOVE		
	U- GROOVE		
FLARE- BEVEL GROOVE			
FLARE-V GROOVE			

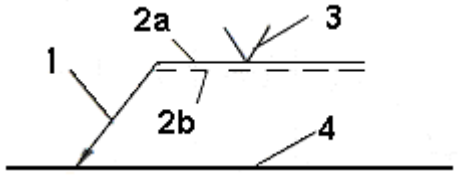
Figure 1: Type of welded joints

WELDING SYMBOLS: include supplementary information & consists of the following elements.

- Reference line
- Arrow
- Basic weld symbol
- Dimension and other data
- Supplementary symbols
- Finish symbols
- Tail
- Specification, process or other reference

For symbolization, the position of a joint to be welded is indicated by an arrow. The arrow points to one side of the joint. This is called the ARROW side.
Arrow side - for fillet, groove, and flanged weld symbols, the arrow connecting the welding symbol reference line to one side of the joint
Other side – the side opposite the arrow side.

BASIC WELDING SYMBOLS
Information about the weld is given on a reference line attached to the arrow at a pivot. The reference line is always horizontal and the arrow can swing about the pivot to point at the weld. Details of the weld on the arrow side of the joint are given on the solid line. Other side information is on the dotted line, which can be shown above or below the solid line.
The identification line may be above or below the continuous reference line.



1.arrow line; 2a. Reference line (continuous line, 2b. Identification line (dashed line); 3. Welding symbol, 4. Welded joint

Figure 3: Representation of the main elements in weld symbolization

The arrow line can be at any angle (except 180 degrees) and can point up or down.

The broken reference line is an additional feature.
It is used when a weld preparation needs to be specified on the 'other side' of the arrow as shown in *Fig.3*.
Any symbol that is used to show a joint or weld type feature on the other side of the arrow line is always placed on a dotted line.
A fillet weld is indicated by a triangle placed on the reference line.

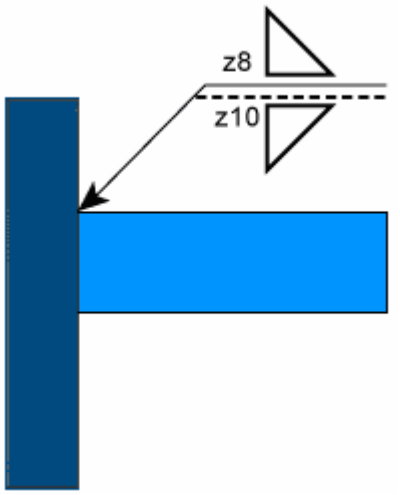
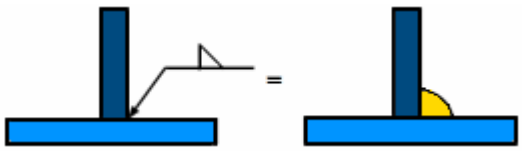


Figure 4: Use of a broken reference line

A triangle on the reference line:
specifies a fillet weld on the *arrow side* of the joint.



A triangle on the dotted line:
specifies a fillet weld on the *other side* of the joint.

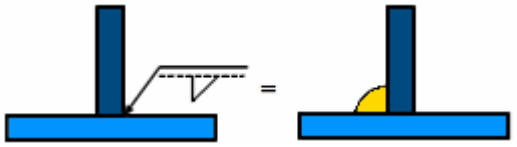
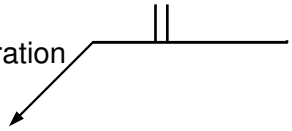


Figure 5: Fillet welds symbolization

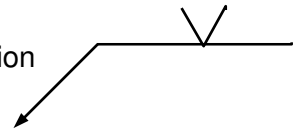
TYPES OF BUTT WELDS SYMBOLIZATION

The common types of edge preparation associated with a butt weld are indicated as follows:

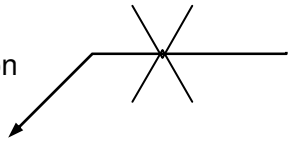
Square edge preparation



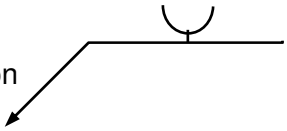
Single V preparation



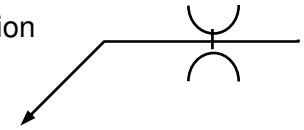
Double V preparation



Single U preparation



Double U preparation



In some cases of joint preparation, only one part is prepared, e.g. single bevel butt or single J butt. In these cases, the arrow points at the edge to be prepared. The vertical upright of the symbol is always to the left on the reference line.

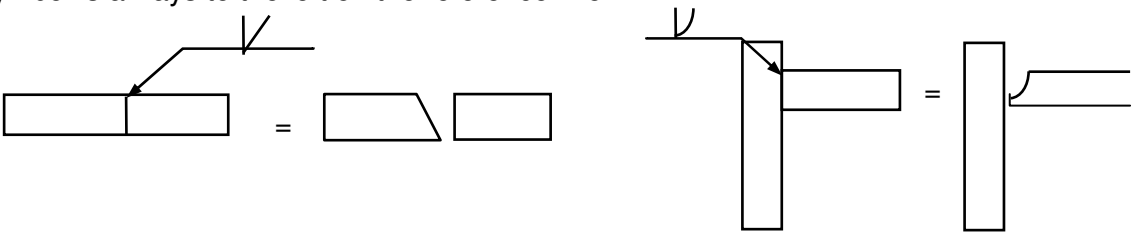


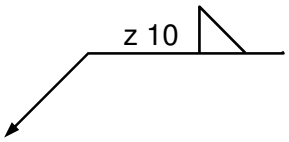
Figure 6: single bevel butt symbolization

DIMENSIONING OF FILLET WELDS

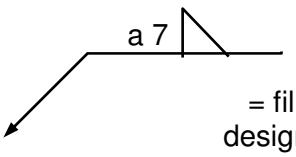
EN 22553 requirements
a = design throat thickness
z = leg length
S = actual throat thickness

The leg length of a fillet weld is located to the left of the weld symbol (triangle). The dimension is in millimeters preceded with the letter “z”. Throat thickness is indicated in the same way but is preceded by the letter “a”. If no letter is shown on a drawing, then assume the dimension is leg length.
The European system uses mainly the “a” value, while the American one uses the “z” value.

As rule: Design Throat Thickness (“a”) = Leg Length (“z”) x 0.7.

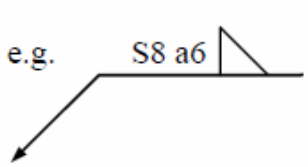


= 10 mm leg length fillet weld



= fillet weld with 7 mm design throat thickness

For deep welds with penetration, the dimensions are indicated as follows:
a weld of 6 mm design throat, with an 8 mm actual throat desired. The actual throat thickness value is preceded by “S”



Intermittent fillet welds are dimensioned by giving:
- number of weld elements (“n”)
- length of weld element (“l”)
- distance between weld elements (“e”)

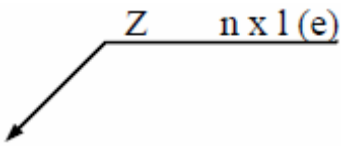


Figure 7 shows the difference between the design throat thickness “a” and the actual throat thickness value “S” for a fillet weld.

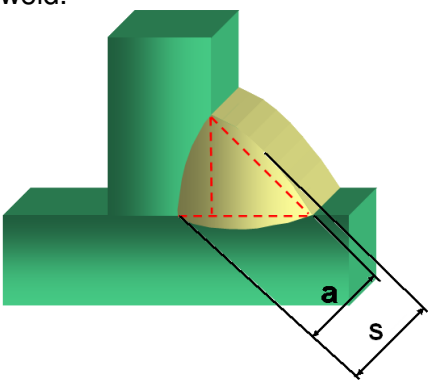


Figure 7
Figure 7 shows the difference between the design throat thickness “a”, which normally should be thickness value and the actual throat thickness value “S”, who in this case is 15 mm.

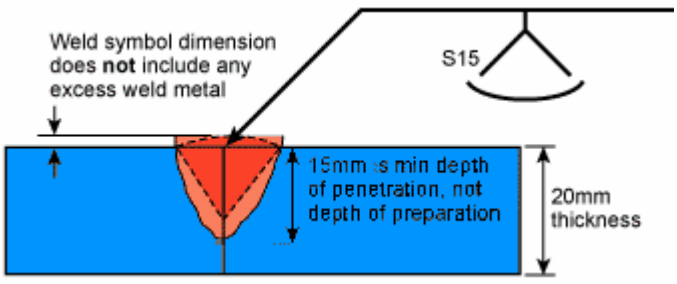


Figure 8:
Often the number of weld elements (“n”) is not specified. In this case the symbol can also be written as l (e) l, the length being repeated. The length is always given in centimeters.

A staggered fillet welded joint, realized with access from both sides, can be symbolized by placing a 'Z' through the reference line (*Fig.9*).

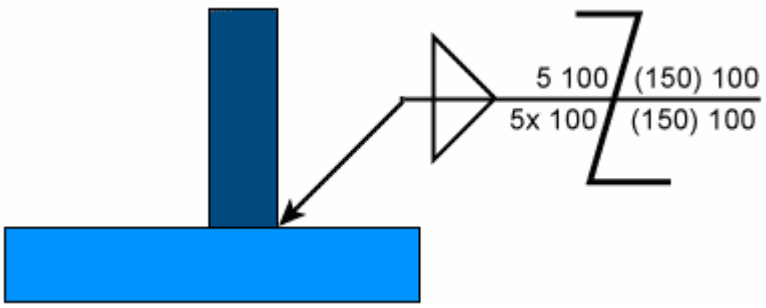
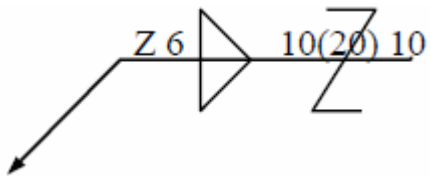


Figure 9: staggered fillet welded joint

A symbol as in the next figure on a double fillet means the weld elements are to be staggered on either side of the joint.

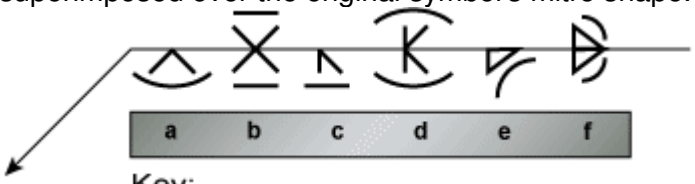


= 8 mm throat fillet welds of 10 cm length with a = gap of 25 cm between each element, staggered on either side of the joint, for the whole joint's length.

Figure 10: staggered fillet welded joint

SURFACE PROFILES SYMBOLS:

The surface profile can be indicated by an extra symbol placed on top of the weld symbol. Butt welded configurations would normally be shown as a convex profile (Fig.11 a, d and f) or as a dressed-off weld as shown in Fig.11 b and c. Fillet weld symbols are always shown as a 'mitre' fillet weld (a right angled triangle) and a convex or concave profile can be superimposed over the original symbol's mitre shape.

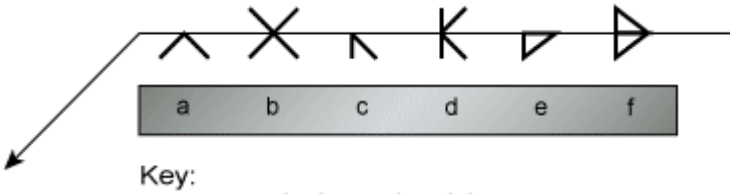


Key:

a = single vee butt weld with convex profile
b = double vee butt weld flushed off both sides on weld face
c = single bevel butt weld flushed off both sides on weld face
d = double bevel butt convex (as welded)
e = concave fillet weld
f = double sided convex fillet weld

Figure 11: welded configurations profiles

The symbols, in particular for arc and gas welding, are often shown as cross sectional representations of either a joint design or a completed weld. Simple, single edge preparations are shown in the next figure.



Key:

a = single vee butt joint
b = double vee butt joint
c = single bevel butt joint
d = double bevel butt joint
e = single sided fillet weld
f = double sided fillet weld

Figure 12: simple edge preparations

The weld symbols for resistance welding, spot weld and seam are as in the next figure:

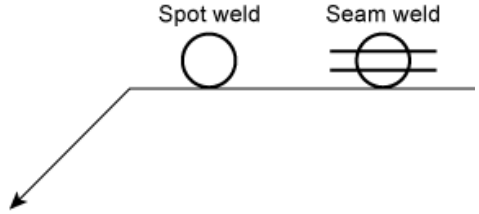
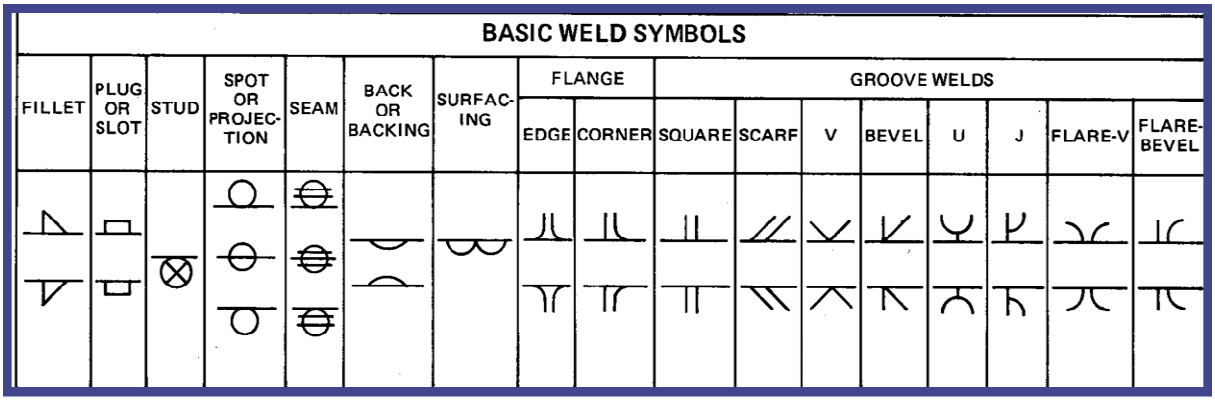


Figure 13: weld symbols for resistance welding



SUPPLEMENTARY SYMBOLS:

Weld symbols indicate the type of preparation to use or the weld type. However, there may be necessary to ad other informations.

To the basic information symbols supplementary symbols should be added to in order to provide more details, as shown in *Figures.14,15 and 16*.

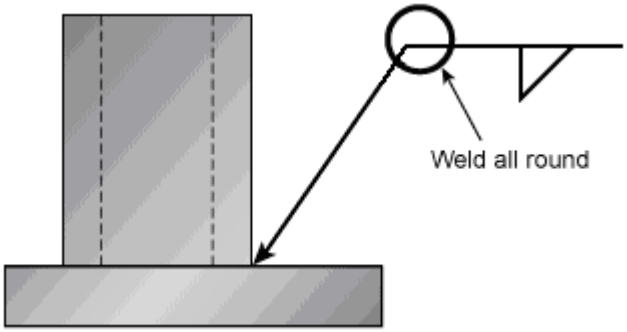


Figure 14:

When there are no specific dimensional requirements specified for butt welds on a drawing using weld symbols, it would normally be assumed that the requirement is for a full penetration butt weld (*Fig.15*).

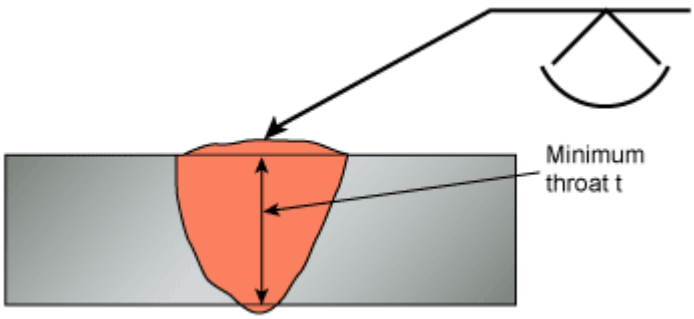


Figure 15:

Numbers to the right of a symbol or symbols relate to the longitudinal dimension of welds, *e.g.* for fillets, the number of welds, weld length and weld spacing for non-continuous welds, as *Fig.4*.

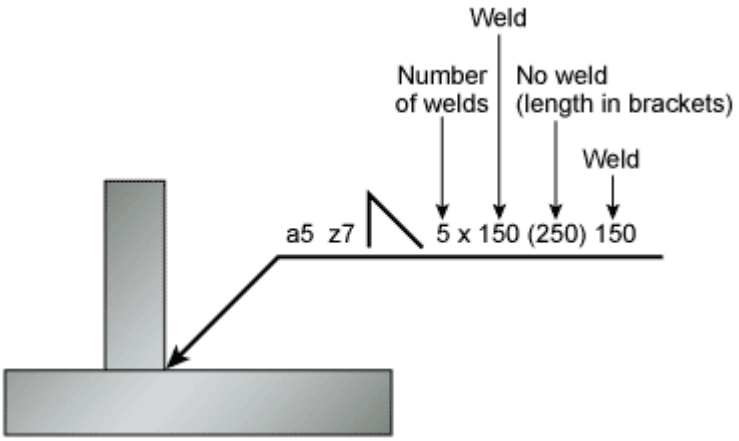


Figure 16:

Symbolization of a weld realized on-site:

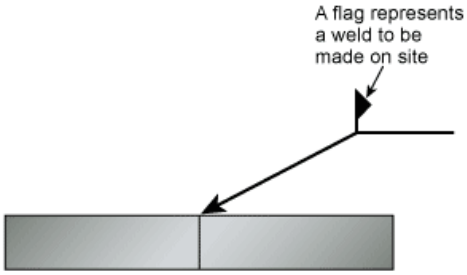


Figure 17:

Symbolization of a weld examined by means of NDT processes (Fig. 18).

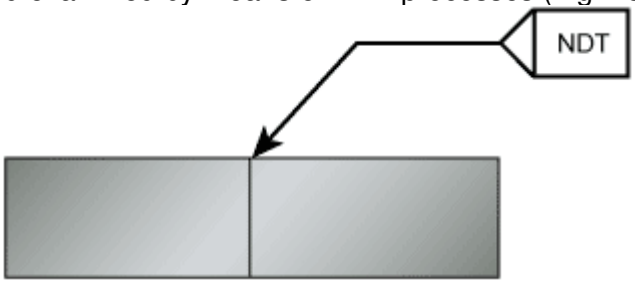


Figure 18:

Welding process type

ISO 4063 gives each welding processes a specific reference numbers. As shown in *Fig.19* the appropriate process number is placed in the tail of the arrow. Other processes are given a unique number. In this example, 135 refers to MAG welding.

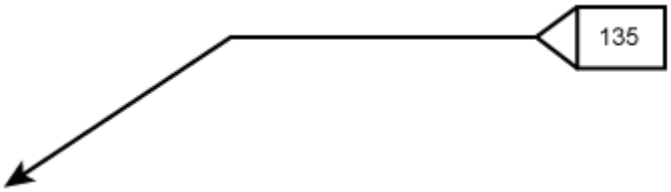


Figure 19:

There are a number of additional symbols given in the Standards (*eg* EN 22553) which refer to additional welding or joint requirements. *Figure 20* shows the requirement for a sealing run.

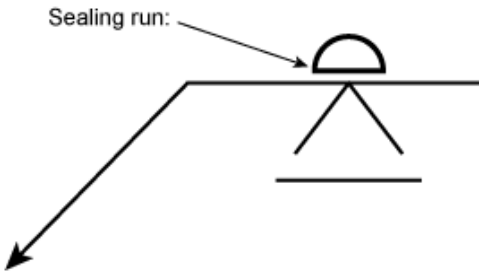


Figure 20:

Compound joints/welds
A compound weld could be a 'T' butt weld which requires fillet welds to be added to increase the throat thickness as shown in *Fig.21*.

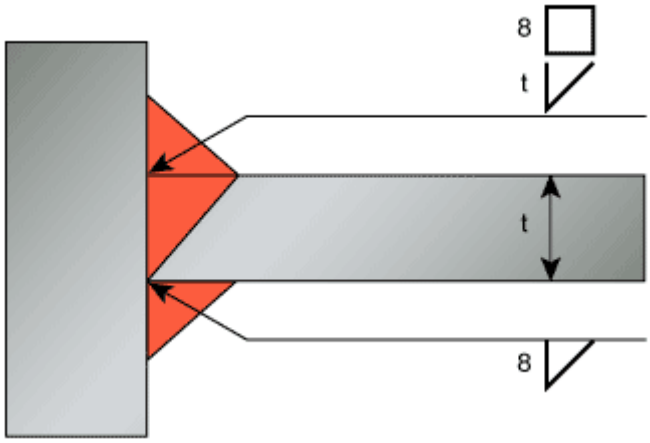


Figure 21:

Summary
A welded joint may be represented in different ways, depending on the drawing (figure):

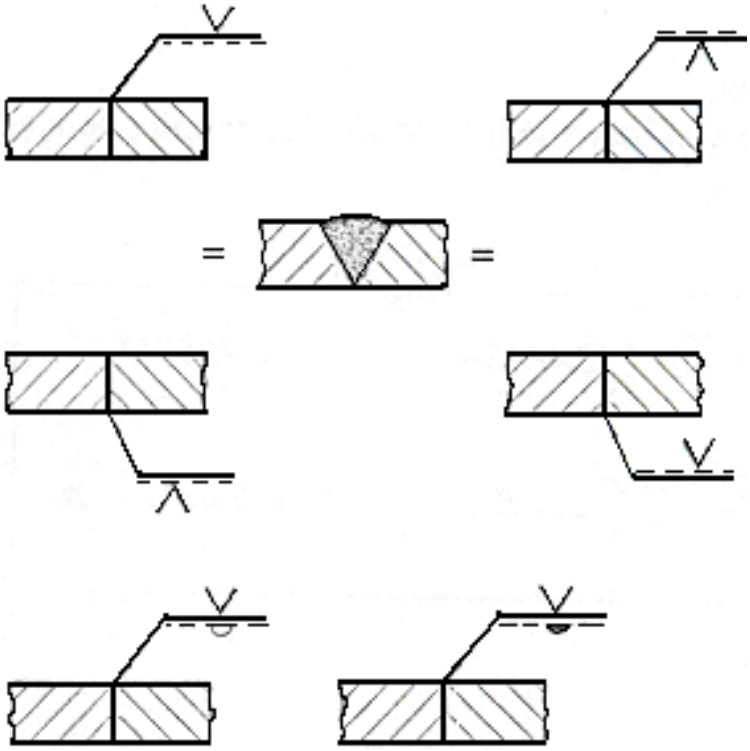
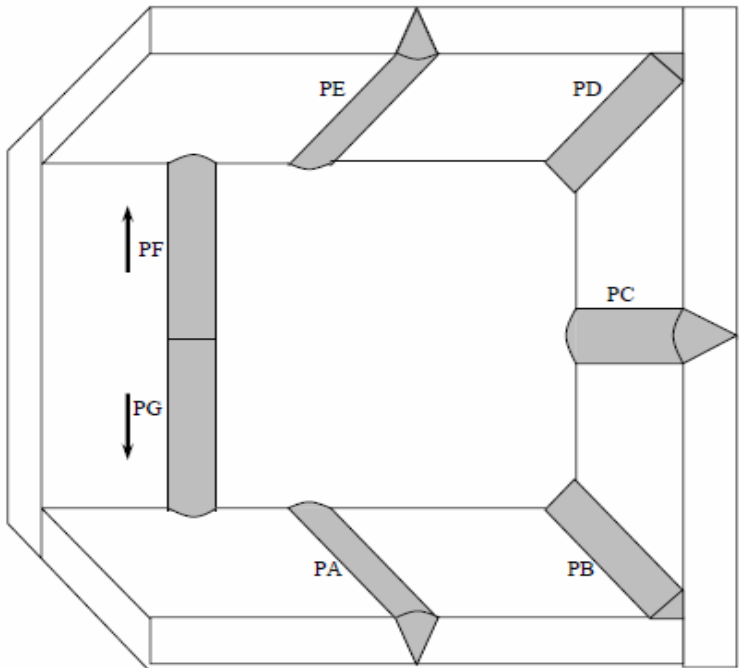


Figure 22:

WELDING POSITIONS: are defined according to EN ISO 6947:2001 (Welds - Working positions - Definitions of angles of slope and rotation)



PA Flat.
PB Horizontal vertical.
PC Horizontal.
PD Horizontal overhead.
PE Overhead.
PF Vertical up.
PG Vertical down:

Figure 23: welding positions

Examples of weld symbolizations:
The examples below which show the weld required and their symbolization.

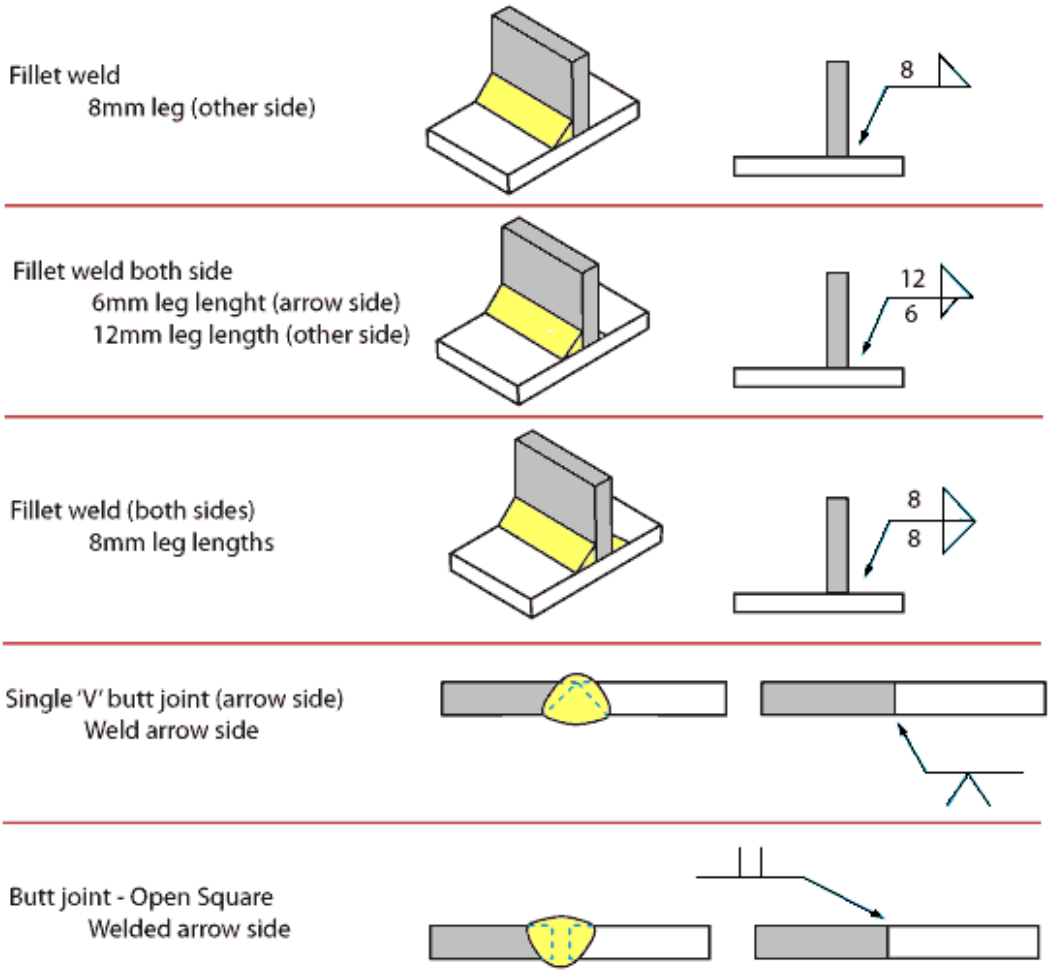


Figure 24:

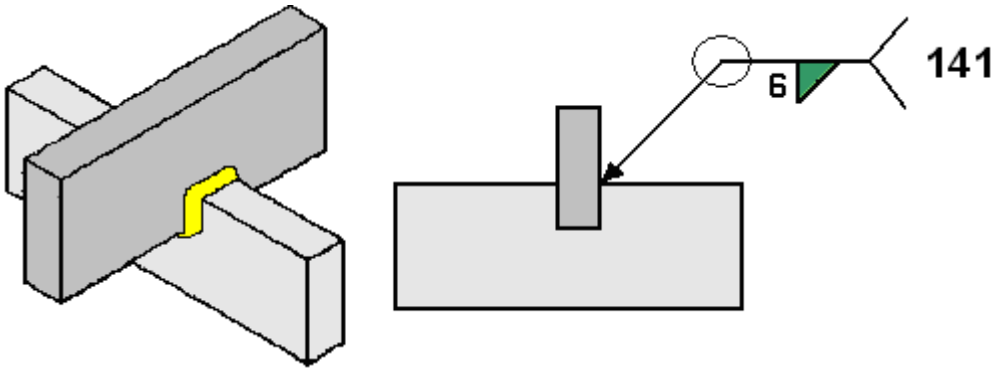


Figure 25: Contour welding symbolization

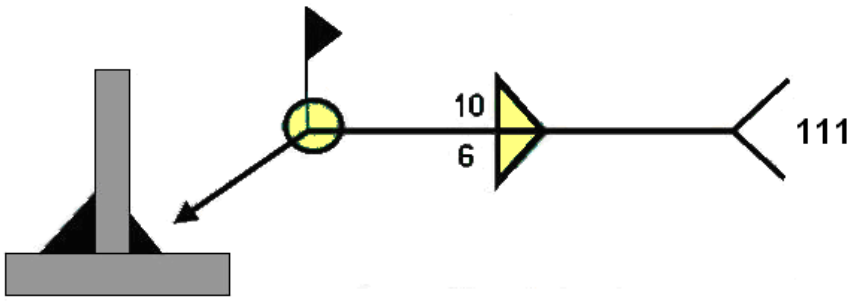
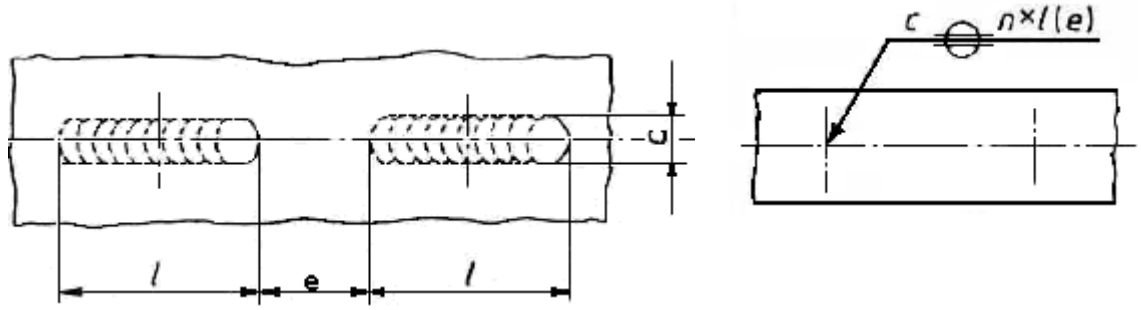
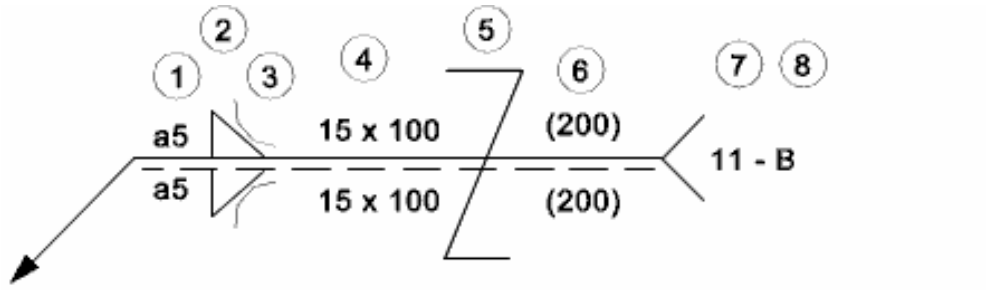


Figure 26: Contour weld realized on site



Where:
c – width of welded joint
l – length of welded joint
e – distance between welded joints

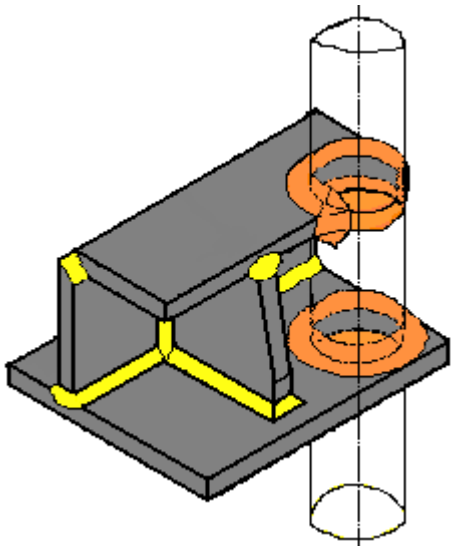
Figure 27: Symbolization of an interrupted resistance spot welding



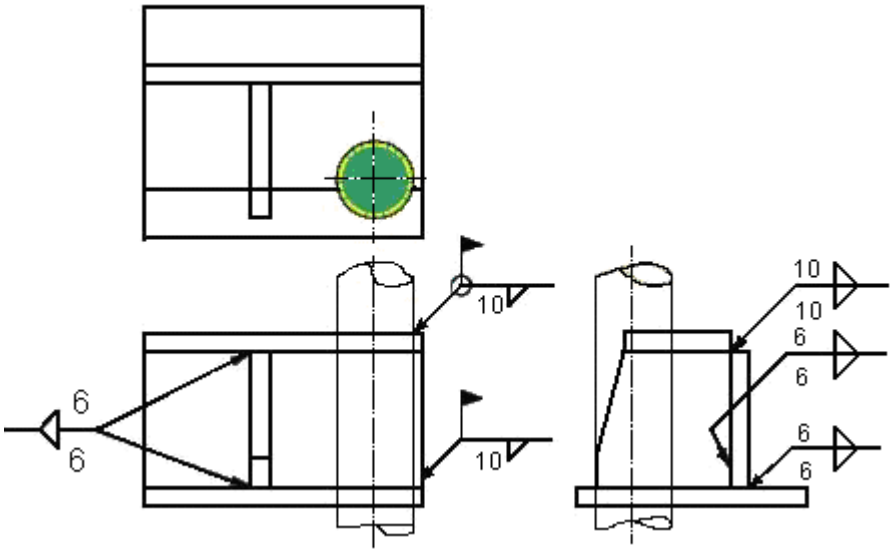
Information above reference line identifies weld on same side as symbolic representation
Information below reference line identifies weld on opposite side to symbolic representation.

1) Dimension referring to cross section of weld
2) Weld Symbol
3) Supplementary symbol
4) Number of weld elements x length of weld element
5) Symbol for staggered intermittent weld
6) Distance between weld elements
7) Welding process reference
8) Welding class

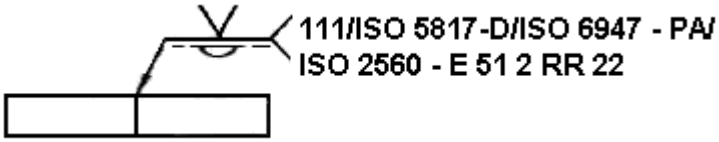
Establishing of the projections followed by the designation of the welds to be realized



Upper and lateral view of the final product:



Example of full designation of a welded joint:



Home work:

Please sketch and symbolize, using as referential EN 22553 and EN 9692, following welds:

1. Plates: 2 mm thickness, butt welded, TIG process, welded from one side
2. Plates: 5 mm thickness, butt welded, MAG process, welded from one side
3. Plates: 8 mm thickness, butt welded, E process, welded from one side
4. Plates: 8 mm thickness, fillet welded, E process, welded from one side
5. Plates: 12 mm thickness, fillet welded, E process, welded from both sides
6. Plates: 12 mm thickness, fillet welded, SAW process, welded from both sides
7. Plates: 16 mm thickness, butt welded, E process, welded from one side, K joint
8. Plates: 16 mm thickness, butt welded, E process, welded from one side, T joint
9. Plates: 20 mm thickness, butt welded, SAW process, welded from one side
10. Plates: 20 mm thickness, butt welded, SAW process, welded from one side
11. Plates: 24 mm thickness, butt welded, GMAW process, welded from one side
12. Plates: 24 mm thickness, butt welded, SAW process, welded from both side.

Target:	
Purpose:	Ensure that all requirements for personnel are met.
Scope:	
Responsibility:	Welding Coordinator
Reference:	

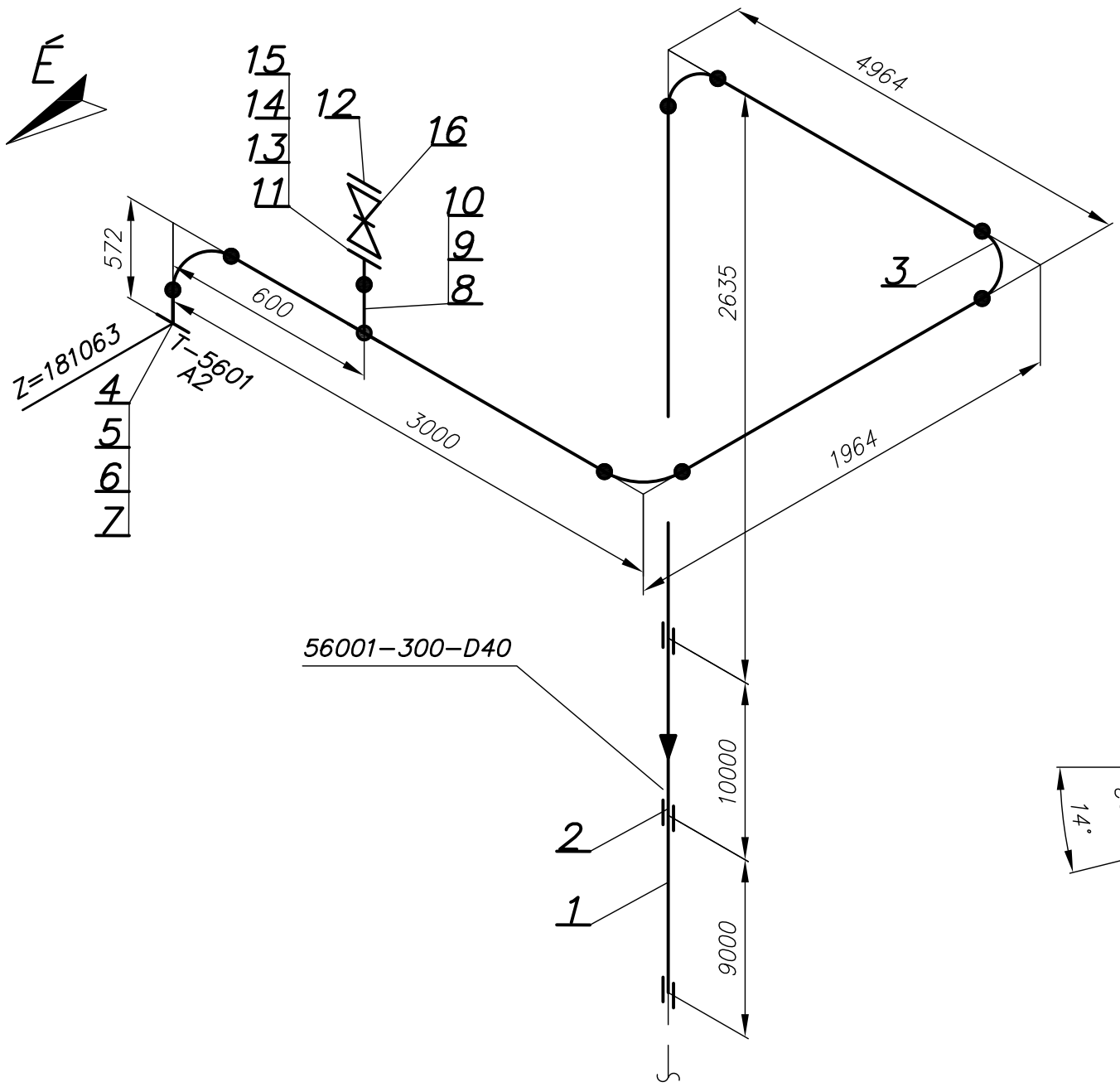
	OK/ NOK	Not rel.	Date sign.
1. Verify that personnel requirements can be met in due time before production starts.			
2 Verify that requirements for welding coordination can be met.			
3. Verify that the company has the necessary number of qualified welders.			
4. Verify that the company has the necessary number of qualified plate workers.			
5. Verify that the company has the necessary number of qualified pipe welders.			
6. Verify that the company has qualified NDT management			
7. Verify if it is required to have a visual inspector.			
8. Verify that the company has the necessary number of qualified NDT operators.			
9. Verify if it is required that an independent 3-party institution is required for verification, test and updates of welders certificate.			

© QM Software	**PERSONNEL REQUIREMENTS FOR INSPECTION AND VERIFICATION**		**Procedure No.:** 4.3-10 **Rev. no.:**
Project:	Order:	Section:	Page: 10 of: 11

Target:	
Purpose:	Ensure that personnel for control and verification fulfills and meets the specified requirements
Scope:	
Responsibility:	Welding Coordinator
Reference:	ISO 3834.part 2, Chapter 4.3

	OK/ NOK	Not rel.	Date sign.
1. Create a specified list for required personnel for control, inspection and verification for welding and handling of material			
2. Verify and get consent for the specified requirements for welding coordinator			
3. Who can approve welding tests for welding certificates and updating of these certificates * qualification of plate workers * qualification of plumbers			
4. What ids the requirements for NDE-management? * what is the requirements for the NDE operators ?			
5. Make an agreement for use of approved test laboratory for testing of weld tests. Create instructions/procedure for creation of test pieces			

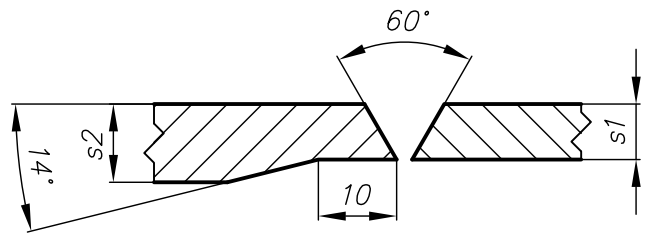
Created by:	Approved by:	Date:	Manual no.:



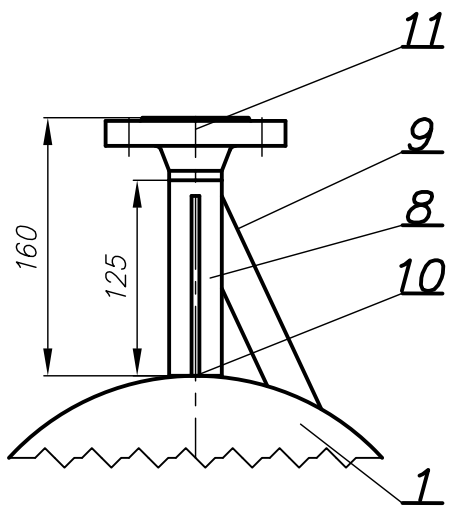
Folytatás a 2. lapon

Műszaki jellemzők, gyártási és vizsgálati előírások		
Közeg		Propilén+propán
Csőosztály		D40
Tervezési nyomás	(bar)	25,5
Tervezési hőmérséklet	(°C)	75
Próbanyomás vízzel	(bar)	33,16
Mértékadó hőmérséklet	(°C)	−20
Csővezetéki besorolás: MSZ EN 13480−1 szerint		III.
Gyártás és vizsgálat: MSZ EN 13480−4,−5		
Hegesztés, varratvizsgálat		
Eljárás		Elektromos
Hegesztők minősítése		MSZ EN ISO 9606−1
Varrat vizsgálat	körvarrat	100% RT+100% PT/MT
	sarokvarrat	100% PT
Egyéb vizsgálat:		100% LT+100% VT
Szigetelés, kísérőfűtés		
Szigetelés:	50 mm melegszigetelés	
Kísérőfűtés:	Nincs	
Héjalás:	Al	

Különböző falvastagságú csővégek előkészítése hegesztéshez



M1:5

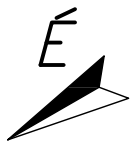


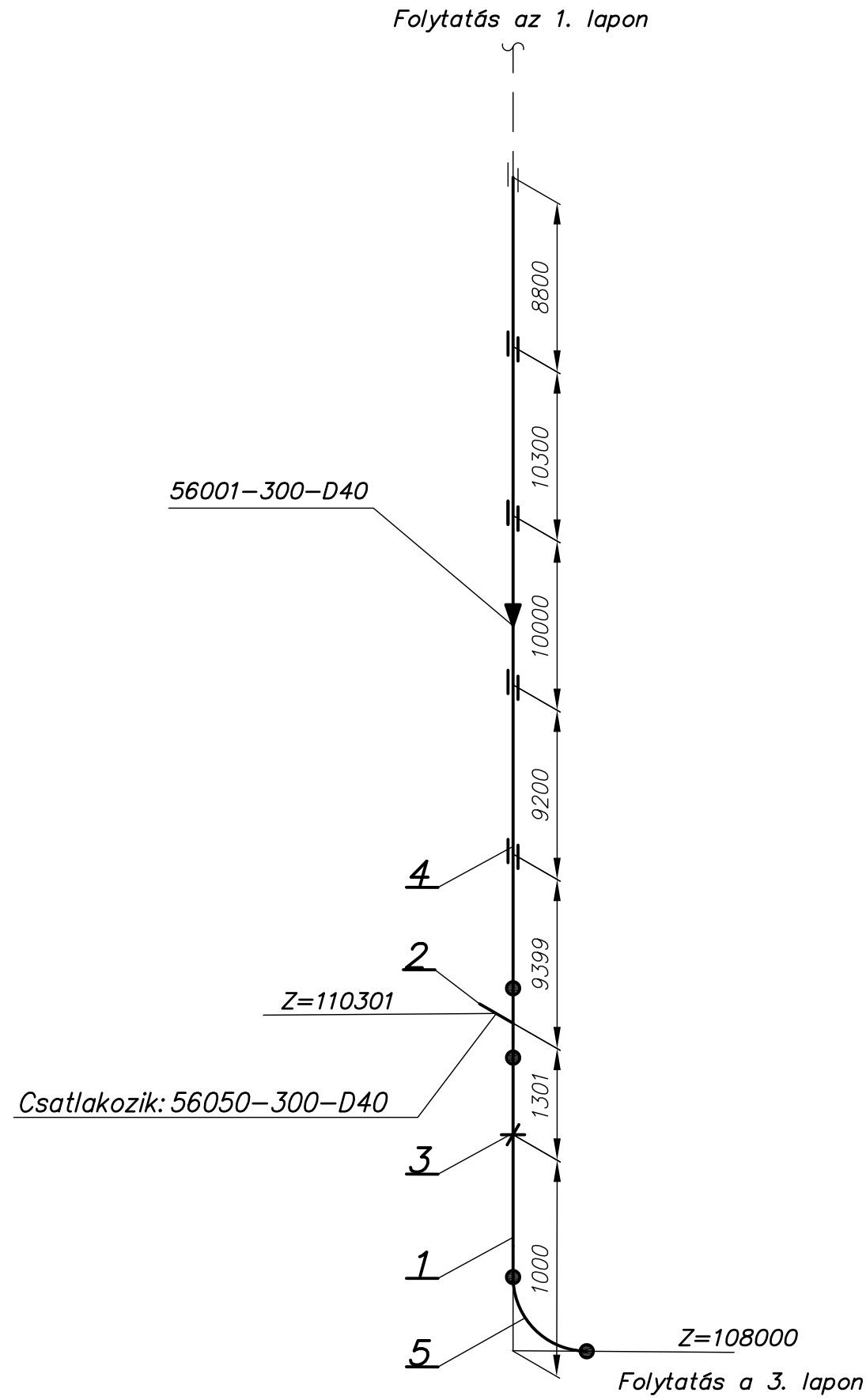
Versenydokumentum BME

Tétel	Db	Megnevezés	Méret	Szabvány v. rajzszám	Anyag	Tömeg [kg]	Bizonyl.
16	1	Karimás tolózár	DN25 PN40		1.0460		3.1
15	16	Csavaranya	M12	MSZ EN ISO 4034	25CrMo4		3.1
14	8	Szegcsavar "B"	M12x70	DIN 976	25CrMo4		3.1
13	2	Lapos tömítés "IBC"	DN25 PN40	MSZ EN 1514−1	Sigraflex Universal belső védőlemezzel		2.2
12	1	Vakkarima Type: 05/B1	DN25 PN40	MSZ EN 1092−1	P245GH		3.1
11	1	Heg.told karima Type: 11/B1	DN25 PN40	MSZ EN 1092−1	P245GH		3.1
10	1	Merevítő léc 2	x5x25−126	MSZ EN 10028−2	P265GH		2.2
9	1	Merevítő léc 1	x5x25−150	MSZ EN 10028−2	P265GH		2.2
8	1	Varrat nélküli acélcső	ø33,7x4−125	MSZ EN 10216−2	P235GHTC1		3.1
7	32	Csavaranya	M30	MSZ EN ISO 4034	25CrMo4		3.1
6	16	Szegcsavar "B"	M30x160	DIN 976	25CrMo4		3.1
5	1	Lapos tömítés "IBC"	DN300 PN40	MSZ EN 1514−1	Sigraflex Universal belső védőlemezzel		2.2
4	1	Heg.told karima Type: 11/B1	DN300 PN40	MSZ EN 1092−1	P355QH1	47,6	3.1
3	4	Csőív "A" 90°, R=1,5d	323,9x10	MSZ EN 10253−2	P355NH	195	3.1
2	3	DN300 vezetett csőtartó		3301.2−10.00.00−000			2.2
1	1	Varrat nélküli acélcső	ø323,9x7,1−31,5 fm	MSZ EN 10216−3	P355NHTC1	1748	3.1

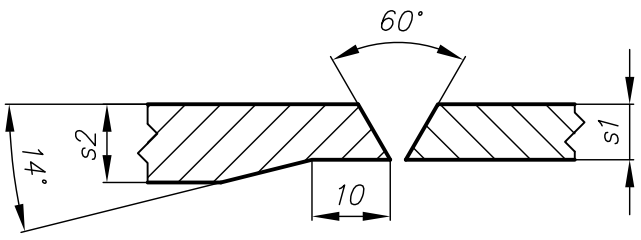
Rev.	Dátum	Leírás	Tervező	Aláírás
3				
2				
1	2019.04.18.	Varratvizsgálat, csővégek illesztése, cím		

Tervező	Terv cím		Lapszám 1./3
Ellenőr			Rajzméret A3
Fájl név	T−5601 és T−5602 reflux és fejvezetékek cseréje		Méretarány
Munkaazonosító	56001−300−D40 vezeték		Tömeg
	KIVITELI TERV		Anyag
Létesítmény	Dátum 2019.02.12	Műszaki leírás Van	Rajzszám 3301.2−01.00.00−000 Rev. 1





Különböző falvastagságú csővégek előkészítése hegesztéshez



Versenydokumentum BME

Tétel	Db	Megnevezés	Méret	Szabvány v. rajzszám	Anyag	Tömeg [kg]	Bizonyl.
5	1	Csőív "A" 90°; R=1,5d	323,9x10	MSZ EN 10253–2	P355NH	48,8	3.1
4	4	DN300 vezetett csőtartó		3301.2–10.00.00–000			2.2
3	1	Rögzített csőtartó	DN300	3301.2–12.00.00–000			2.2
2	1	T–idom	323,9x10–323,9x10	MSZ EN 10253–2	P355NH		3.1
1	1	Varrat nélküli acélcső	ø323,9x7,1–49 fm	MSZ EN 10216–3	P355NHTC1	2720	3.1

Rev.	Dátum	Leírás	Tervező	Aláírás
3				
2				
1	2019.04.18.	Csővégek illesztése, cím		

Tervező
Ellenőr
Fájl név
Munkaazonosító

Létesítmény

Terv cím

T–5601 és T–5602 reflux és fejvezetékek cseréje
56001–300–D40 vezeték

KIVITELI TERV

Dátum 2019.02.12

Műszaki leírás Van

Rajzszám 3301.2–01.00.00–000

Rev. 1

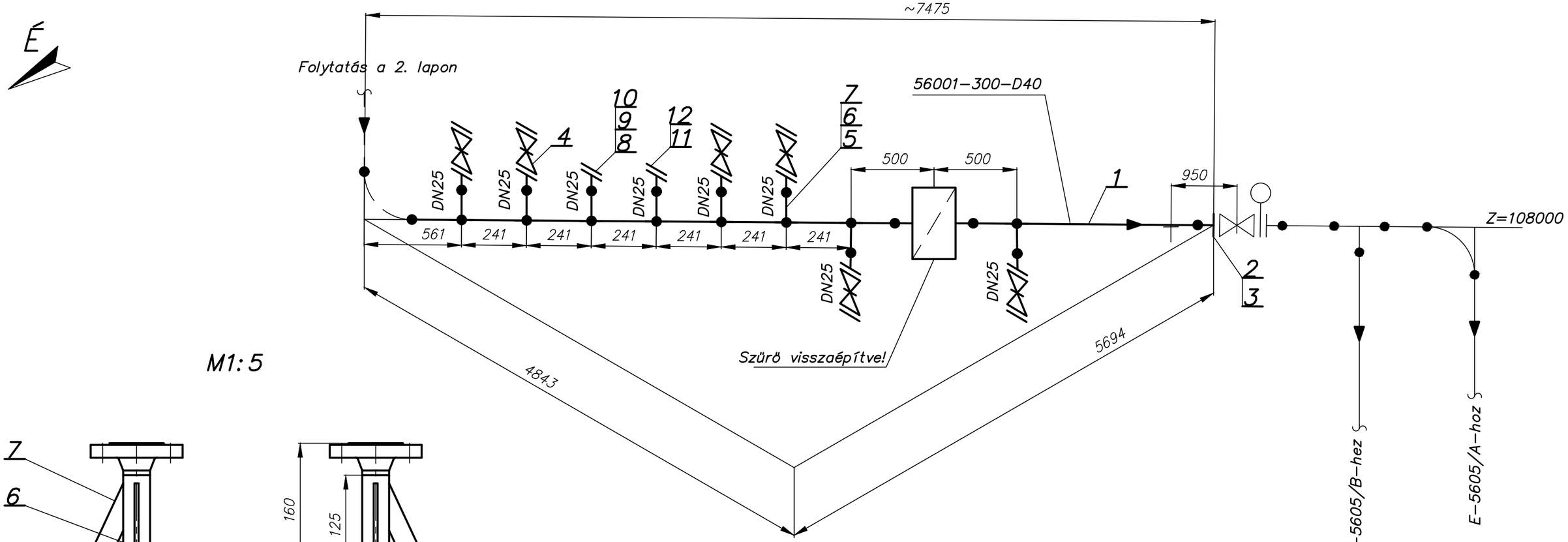
Lapszám 2./3

Rajzméret A3

Méretarány

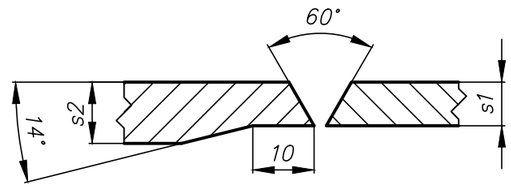
Tömeg

Anyag



Versenydokumentum BME

Különböző falvastagságú csővégek előkészítése hegesztéshez



Tétel	Db	Megnevezés	Méret	Szabvány v. rajzszám	Anyag	Tömeg [kg]	Bizonyl.
12	112	Csavaranya	M12	MSZ EN ISO 4034	25CrMo4		3.1
11	56	Szegcsavar "B"	M12x70	DIN 976	25CrMo4		3.1
10	14	Lapos tömítés "IBC"	DN25 PN40	MSZ EN 1514–1	Sigraflex Universal belső védőlemezzel		2.2
9	8	Vakkarima Type: 05/B1	DN250 PN40	MSZ EN 1092–1	P245GH	11,04	3.1
8	8	Heg.told karima Type: 11/B1	DN25 PN40	MSZ EN 1092–1	P245GH	10,4	3.1
7	8	Merevítő léc 2	x5x25–126	MSZ EN 10028–2	P265GH		2.2
6	8	Merevítő léc 1	x5x25–150	MSZ EN 10028–2	P265GH		2.2
5	8	Varrat nélküli acélcső	ø33,7x4–125	MSZ EN 10216–2	P235GHTC1	2,9	3.1
4	6	Karimás tolózár	DN25 PN40		1.0460		3.1
3	2	Lapos tömítés "IBC"	DN300 PN40	MSZ EN 1514–1	Sigraflex Universal belső védőlemezzel		2.2
2	1	Heg.told karima Type: 11/B1	DN300 PN40	MSZ EN 1092–1	P355QH1	47,6	3.1
1		Varrat nélküli acélcső	ø323,9x7,1–7 fm	MSZ EN 10216–3	P355NHTC1	333	3.1

Rev.	Dátum	Leírás	Tervező	Aláírás
3				
2				
1	2019.04.18.	Csővégek illesztése, cím		

Tervező

Ellenőr

Fájl név

Munkaazonosító

Létesítmény

Terv cím

T–5601 és T–5602 reflux és fejvezetékek cseréje

56001–300–D40 vezeték

KIVITELI TERV

Dátum 2019.02.12

Műszaki leírás Van

Rajzszám 3301.2–01.00.00–000

Rev. 1

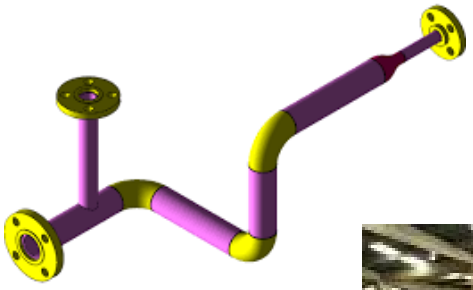
Lapszám 3./3

Rajzméret A3

Méretarány

Tömeg

Anyag



CU2
Inspection of contract and product's drawing welding symbols

Welded joints

Types of welded joints are differentiated according to the correlated position of the elements that have to be joined.
These namings are according to the relative position of the connecting elements, thus usually these namings define the form of the connection.
Weld is part of the joint.

Welded joints illustrated with photos
Butt joint
Corner joint - Outside joint
Corner joint - Inside joint
Corner joint - T- joint
Corner joint - Cruciform joint
Corner joint - Three-member joint
Parallel joint - Edge joint
Parallel joint - Edge joint II
Parallel joint - Lap joint
Scarf joint I.
Scarf joint II.

The factors to be taken into consideration in the edge preparation
Edge Preparation
Edge Preparation - Need
Data of edge preparation
Data
Butt joint - U groove

Preparation of the edges for welding

One of the most important actions before welding is preparation of the edge.
The fusion face or edge surface is the properly formed area of the workpiece where the place of welding is assigned, and the planned weld has to be placed.
Factors affecting the choice of preparation:

Preparation of the edges for welding
Applicable Welds for Butt joint
Applicable Welds for Butt joint - Doubles
Applicable Welds for Corner joint
Applicable Welds for T-joint

Welding symbols

- The welded joints are marked with a symbolic representation in the technical life.
- The weld is illustrated by simple or complex symbols.
- The simple and complex symbols are associated with symbols and are even supplemented with additional instructions that point to the weld interface designed shape.

Welding symbols
a) Arrow line
Supplementary symbols_Tail optional
b) Tail
Examples of application _Method of representation
c) Symbols
Elementary weld symbols_Square Groove & Single V Groove
Elementary weld symbols_Single Bevel Groove & Single U Groove
Elementary weld symbols_Single J Groove & Backing
Elementary weld symbols_Fillet & Plug/Slot
Elementary weld symbols_Spot & Seam
Elementary weld symbols_Edge & Surfacing
Supplementary symbols_Flat & Convex & Concave
Supplementary symbols_Toes blended & Permanent Backing & Removable Backing
Supplementary symbols_Peripheral
Supplementary symbols_Site

Welding symbols

d) Examples of the technical application of symbols:

CU2
Inspection of contract and product's drawing welding symbols

Welding symbols

- The welded joints are marked with a symbolic representation in the technical life.
- The weld is illustrated by simple or complex symbols.
- The simple and complex symbols are associated with symbols and are even supplemented with additional instructions that point to the weld interface designed shape.

Welding symbols
a) Arrow line
Supplementary symbols_Tail optional
b) Tail
Examples of application _Method of representation
c) Symbols
Elementary weld symbols_Square Groove & Single V Groove
Elementary weld symbols_Single Bevel Groove & Single U Groove
Elementary weld symbols_Single J Groove & Backing
Elementary weld symbols_Fillet & Plug/Slot
Elementary weld symbols_Spot & Seam
Elementary weld symbols_Edge & Surfacing
Supplementary symbols_Flat & Convex & Concave
Supplementary symbols_Toes blended & Permanent Backing & Removable Backing
Supplementary symbols_Peripheral
Supplementary symbols_Site

Welding symbols

d) Examples of the technical application of symbols:

CU-1
Product Inspector PILOT Course -1.8-**ver1**

INTRODUCTION

Pilot Distance Course – **pdiwi-S**

CU-1
Product Inspector PILOT Course-1.8.-**ver1**

Good day

the order of the classes can be found in the program available to you,

Our common goal in the course is:

- to develop the ability to supervise production processes in a professional manner and to deal with any technical problems that may arise,
- professional knowledge can be learned and acquired through some examples,

CU-1
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- **Our chosen example:**
- relating to the manufacture of metal structures,
- a simple pressure vessel is tested as a sample,
- its design, manufacture and application fall within the legally regulated area (legislation, harmonized standards, and best practice), so this welded product can be used well to fulfill the purpose of our training,
- Before learning more about the course, review the design, manufacturing, and application characteristics and use risk analysis as one of the tools. factor

CU-1
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- review the design, manufacturing, and product application characteristics before learning more details about the course, using risk analysis as one of the tools;
- Going further with our topic, let's identify some of the key factors influencing the design, manufacture, and use of this very important welded structure, which is considered to be "typical" in the metal industry.

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- Legal characteristics of a simple pressure vessel:
- field of application:
  - storage of air and nitrogen
  - pressure limits: 0.5 bar - 30 bar,
  - the value used for the characteristic load-bearing design: the product ‘pv’ (p-pressure, v-cubic content),
  - the base material may be steel and aluminum alloy,
  - can be made in several geometric shapes and sizes,
  - should not be exposed to heat under operating conditions,
  - the relevant and general safety requirements must be met,

CU-1
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- the welded structure manufactured in accordance with the law must bear the CE marking,
- recognition of a Notified Body may also be required for a legally regulated industrial activity,
- if the operating pressure is less than 50 bar.
- liter, it can be manufactured using general engineering and technical experience - which is a common practice in the EU - BUT the CE marking cannot be on the product,
- the minimum allowable operating temperature - 50C ° for the design, manufacture and application of legislation
- required by the relevant EU Directive (Directive): 2014/29 / EU).

The EU Directive defines groups of pressure vessels based on the pv value and this regulates the operational load capacity

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- Az EU Irányelv a pv – érték alapján nyomástartó edény csoportokat határoz meg és ez szabályozza a hegesztett termék üzemi terhelhetőségét, az irányelv (direktíva) érvényes a piaci, kereskedelmi forgalomba hozásesetére és az EU területén történő üzembeállításra – az előírás érvényes az EU-ba történő behozatal esetében is.

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- *It can be seen that the inspector must have a thorough knowledge of the product, its purpose of application, area, design, production and commissioning conditions, and its characteristics for safe operation. the manufacturer of the pressure vessel presented must be certified by the accreditation body.*

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- It is precisely because of the “Industry 4.0” that the inspector needs to get to know and practice the computer technology necessary for both his training and his daily work and practice,
- Thus e.g. Itm ?, ZOOM, TEAMs, STIMULY - we use these
- These are presented in separate lessons.
- RECOMMENDED AFTER THE LECTURES:
- repetitive review of the curriculum

CU-1

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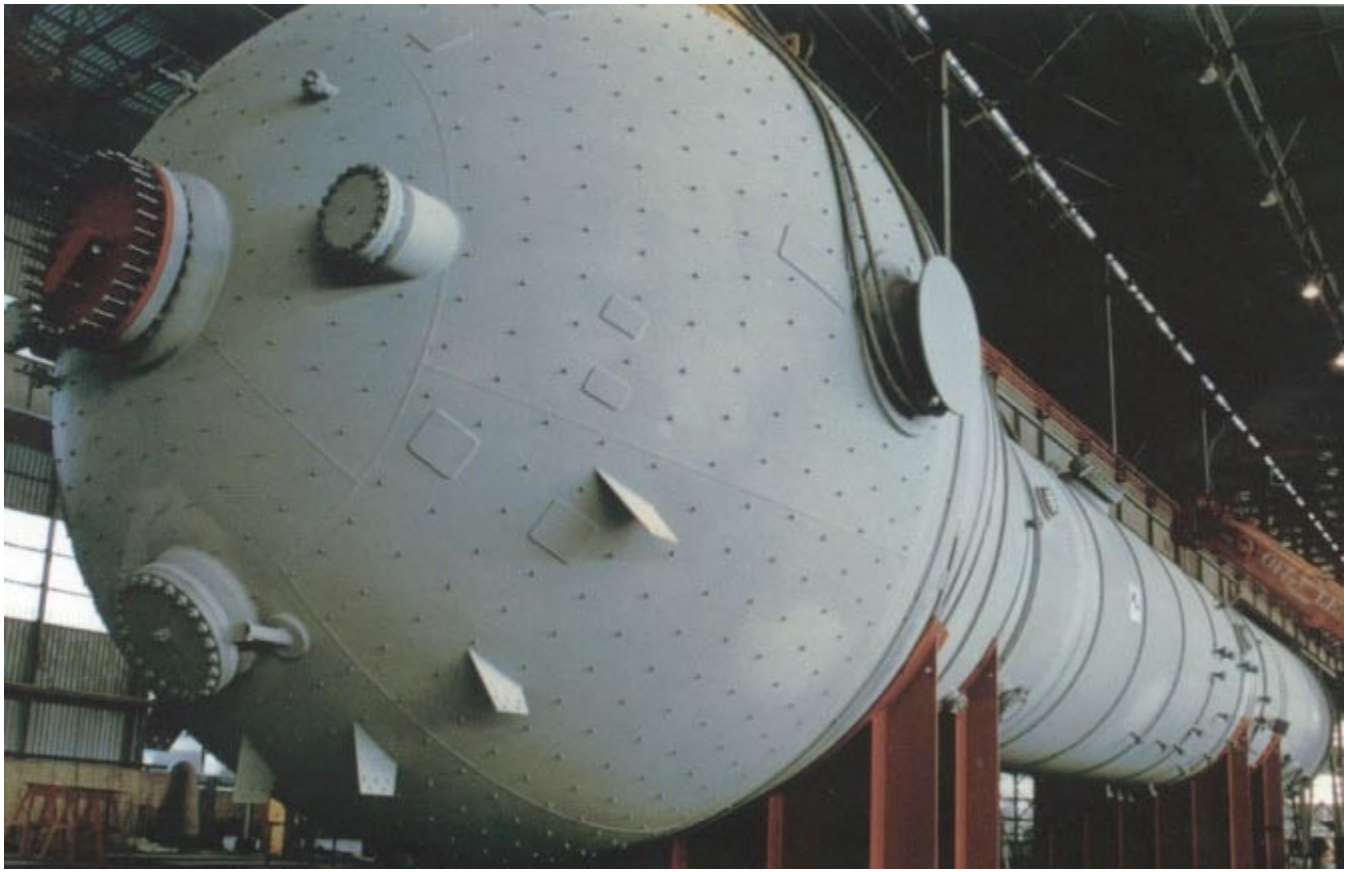
Tipikus szerkezet



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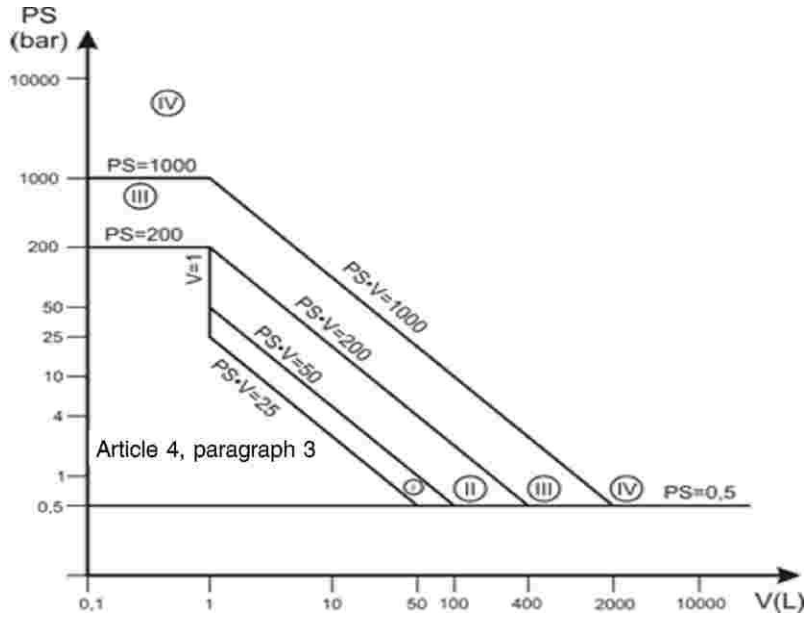

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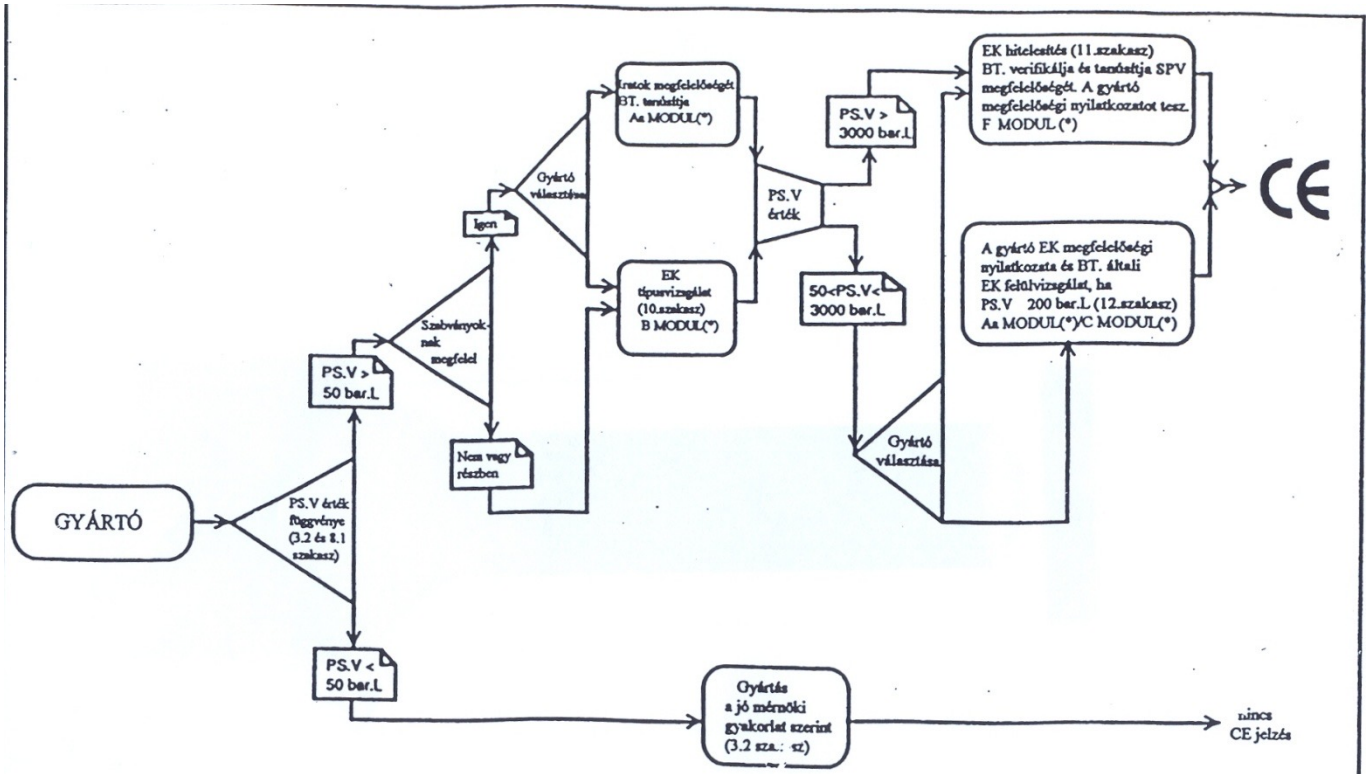
Product Inspector PILOT Course-1.8.-**ver1**



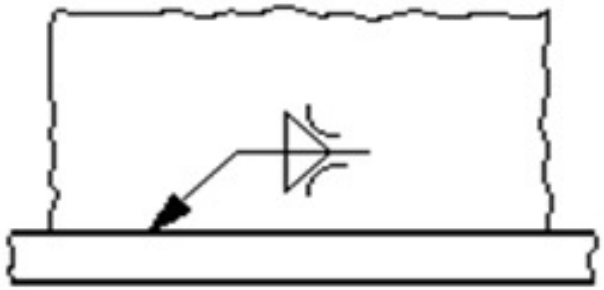
A 87/404/EGK Irányelv szerint az egyszerű nyomástartó edények megfelelőség tanúsítási eljárásai folyamatábrája

(*) Ezeket az eljárásokat az előtt hagyták jóvá mielőtt a 90/683/EGK sz. a megfelelőség tanúsítási eljárásokra vonatkozó (modulok) Tanácsi Határozatot (amelyet a 93/465/EGK Határozat módosított) elfogadták. Ezek rendelkezései ezért nem lehetnek azonosak a modulokéval.

RPL CU2 Welding symbols

What does the sketch below show?

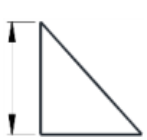
a) double blunt seam
b) flat corner seam
c) double side concave corner seam
d) double-sided convex corner seam



What is a convex corner seam according to ISO 2553?

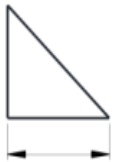
a.) 
b.) 
c.) 
d.) 

Which figure correctly indicates the size of the corner seam "a"?


a)

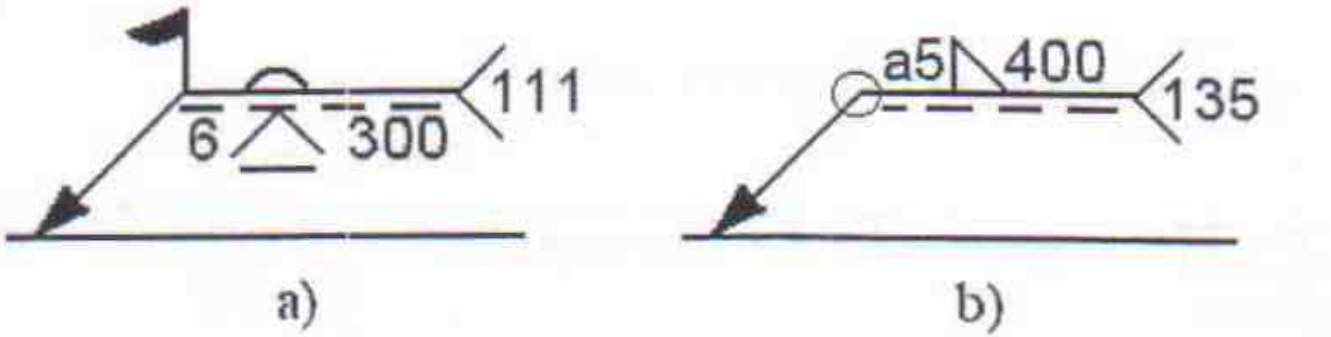

b)


c)


d)

RPL CU2 Welding symbols

On the drawing of the welded part you will find the following markings. Describe the welds to be made in case "a" and "b".

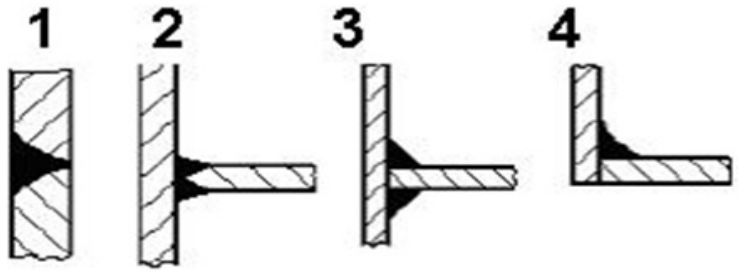


a) spot welded butt weld (111) on the opposite side to the index arrow on a 6 mm plate, 300 mm long, welded by root welding and the surface of the weld shall be machined flush on the crown side.

b) A=5 mm heel weld made by a consumable active arc arc welding (135) on the side facing the pointer arrow, which is a circumferentially welded heel weld, 400 mm long.

RPL CU2 Welding symbols

Which figure shows the double edged blunt seam?



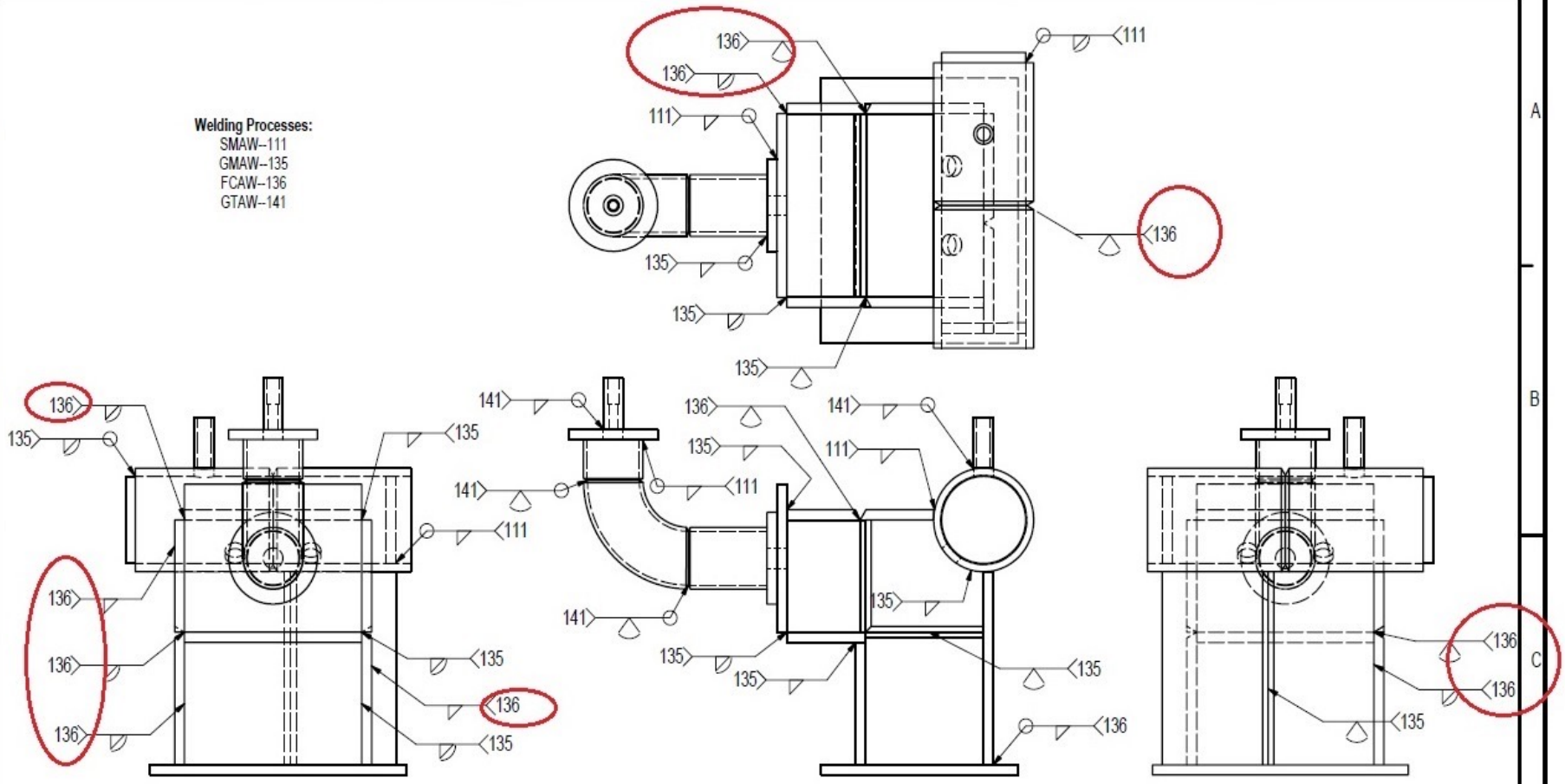
What is the nominal corner seam size?

a) the height of the largest isosceles triangle of right-angles that can be written in the seam
b) the corner seam size shown on the drawing (minimum requirement)
c) the actual foot size of the seam
d) the smallest corner seam size measured on the actual seam

How should a symmetrical seam be indicated on a technical drawing?

a) b**elow** or above the reference line, with a mark perpendicular to it
b) Above the reference line, with a symmetrically placed mark
c) Not necessary as it is already included in the WPS
d) Neither answer is correct

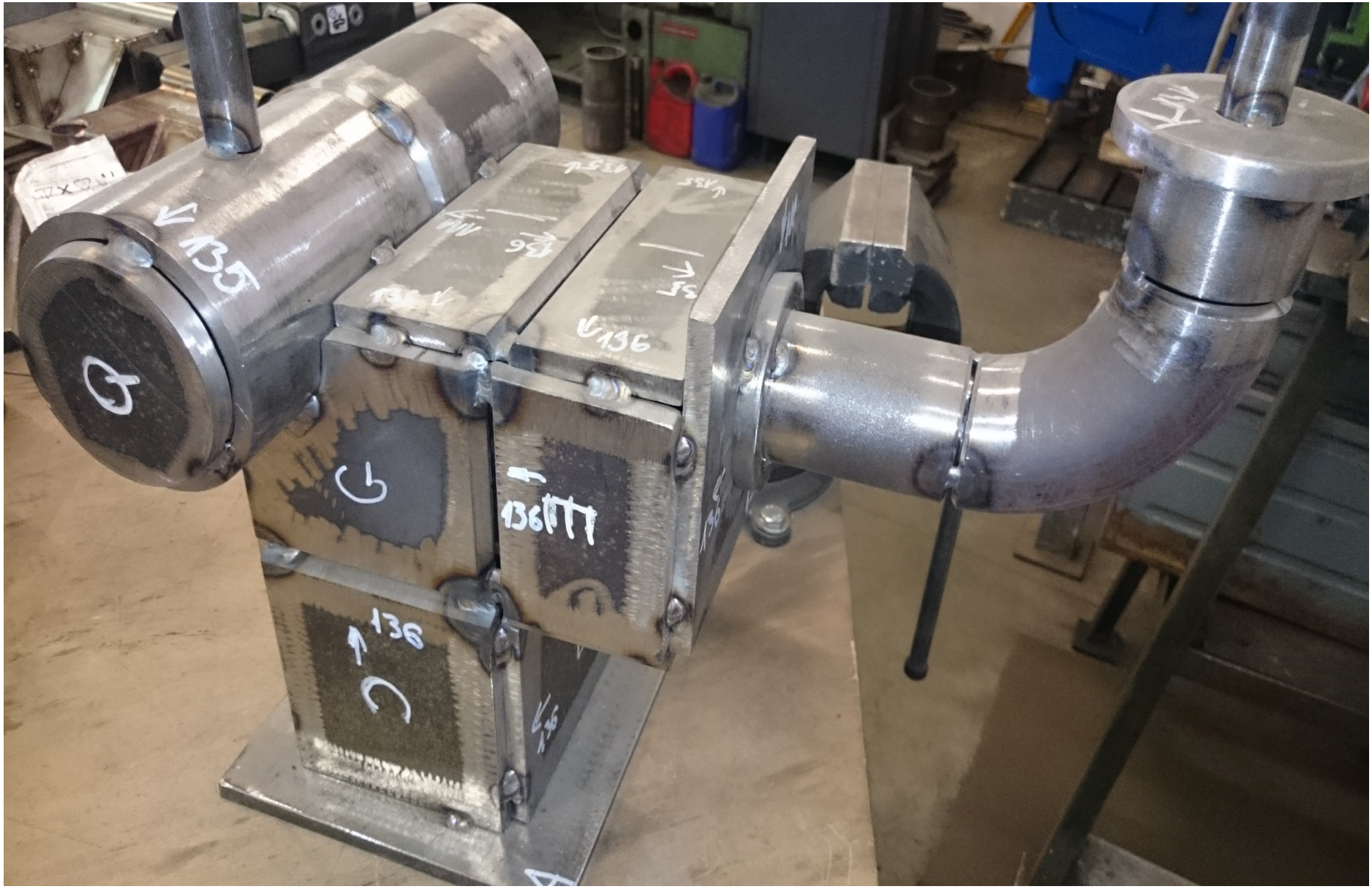
Welding Processes:
SMAW--111
GMAW--135
FCAW--136
GTAW--141



INSTRUCTIONS TO COMPETITORS

1. TACK WELDS ARE TO BE MADE IN ANY POSITIONS USING ANY PROCESSES LISTED ON THE DRAWING.
2. ALL TACK WELDS ARE TO BE MADE NOT LONGER THAN 15 mm AND MUST BE MADE ONLY ON THE OUTSIDE OF THE VESSEL.
3. ALL FILLET WELDS TO HAVE A LEG SIZE OF 10 mm WITH TOLERANCE (+2.0 mm/-0.0 mm).
4. GRINDING WILL BE ALLOWED TO BE CARRIED OUT ONLY FOR TACK WELD, START/STOP AND INTERLAYER PASSES.OF THE WELDS.
5. FINAL CLEANING MAY BE CARRIED OUT BY USING WIRE BRUSH.

Description: Pressure Vessel-Symbols	Rev:	Page:
Test project	Appd:	Sign:


135
136
136
136