STANDARD FLAWED SPECIMENS

BASIC WELD FLAW EVALUATION

A set of small, lightweight, and convenient to handle weld specimens, each containing either one or two flaws, with a minimum of 18 flaws per set.

Our basic weld flaw evaluation specimens are designed for practical training to provide an introduction to flaw detection, sizing and interpretation. Each set is presented in a durable polypropylene carry case with high-density foam inserts to ensure total protection of the specimens.

Recommended for

- Introduction to basic flaw detection
- Introduction to basic flaw sizing
- Introduction to basic flaw interpretation
- Simple weld geometries

Methods

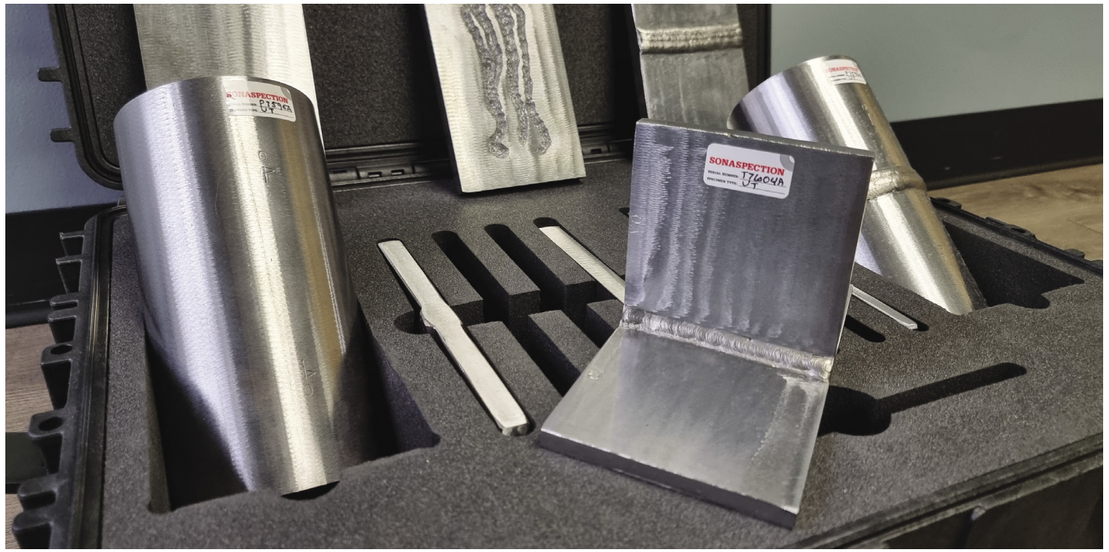
- Ultrasonic testing
- Visual testing
- Magnetic particle testing
- Penetrant testing
- Radiographic testing

Materials

- Carbon steel
- Stainless steel
- Aluminum

Set contents

- 10 small flawed specimens
- An average of 18 real flaws
- Flaw location details
- Testing and acceptance criteria
- Certificate of conformance



An example of a comprehensive ultrasonic testing set (FS-CS-08)

Set types and contents

Basic ultrasonic set (FS-CS-01)

1 tee, 7 plate and 2 pipe specimens containing commonly occurring surface-breaking and weld-body flaws.

- Carbon steel - 35 kg/77 lbs
- Stainless steel - 35 kg/77 lbs
- Aluminium – 18kg/40 lbs

Visual set (FS-CS-02)

3 tee and 7 plate specimens containing commonly occurring visual welding flaws and irregularities.

- Carbon steel - 14 kg/31 lbs

Magnetic particle set (FS-CS-03)

3 tee and 7 plate specimens containing a selection of commonly occurring surface-breaking flaws.

- Carbon steel – 14 kg /31 lbs

Penetrant set (FS-CS-04)

3 tee and 7 plate specimens containing a selection of commonly occurring surface-breaking flaws.

- Carbon steel – 14 kg/31 lbs
- Stainless steel – 14 kg/31 lbs
- Aluminium – 8 kg/15 lbs

Radiographic set (FS-CS-05)

8 plate and 2 pipe specimens containing commonly occurring surface-breaking and weld-body flaws.

- Carbon steel - 35 kg/77 lbs
- Stainless steel - 35 kg/77 lbs

Erosion and corrosion set (FS-CS-06)

8 plate, 1 pipe and 1 elbow specimens containing commonly occurring erosion and corrosion flaws.

- Carbon steel – 32 kg /71 lbs

Dual purpose magnetic and penetrant set (FS-CS-07)

2 tee and 8 plate specimens contain a selection of commonly occurring surface-breaking flaws.

- Carbon steel - 14 kg/31 lbs

Comprehensive ultrasonic testing set (FS-CS-08)

8 plate, 1 pipe and 1 elbow specimens containing commonly occurring surface-breaking and weld-body flaws including some erosion/corrosion.

- Carbon steel - 32 kg/71 lbs

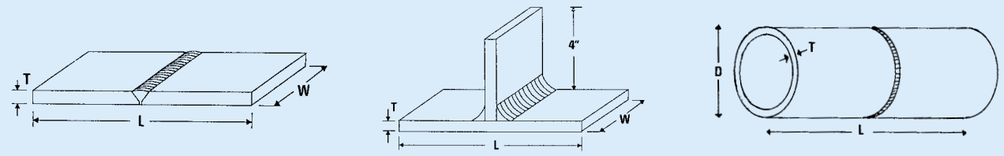
Demonstration set (FS-CS-09)

1 tee, 7 plate and 2 pipe specimens carefully selected from the visual, magnetic, penetrant, ultrasonic and radiographic sets to provide an overview of flaw types and their detection using various non-destructive testing techniques.

- Carbon steel - 35 kg/77 lbs

An example of an erosion and corrosion set (FS-CS-06)

Individual specimens. Dimensions: mm (inch)				
Specimen	**Thickness**	**Width**	**Dia**	**Length**
Pipe (SV)	10 (⅜)	N/A	100 (4)	200 (8)
Tee (SV)	6 (¼)	100 (4)	N/A	200 (8)
Tee (SV)	15 (⅜)	100 (4)	N/A	200 (8)
Plate	6 (¼)	100 (4)	N/A	200 (8)
Plate	10 (⅜)	100 (4)	N/A	200 (8)
Plate	15 (⅜)	100 (4)	N/A	200 (8)



Typical flaws					
Planar flaw		**Root conditions**	**Volumetric flaw**	**Erosion and Corrosion**	**Other weld conditions**
Toe crack	Side wall crack	Incomplete penetration	Porosity	Erosion	Excessive cap
Transverse crack	Lack of side wall fusion	Irregular root penetration	Surface porosity	Corrosion	Weld spatter
Transverse crack	Centreline crack	Root concavity	Slag	Pitting	Mismatch
Root crack	Lamination	Incomplete penetration	Tungsten inclusion	Pinholes	Cold lap
Centreline crack	Crater crack	Lack of root fusion			Concave cap
		Burn through			Undercut
		Excess penetration			Incomplete weld fill

ADVANCED WELD FLAW EVALUATION

Flawed specimens designed and manufactured to meet the requirements of all known internationally recognized qualification programs, such as ASNT, ACCP, API and BS EN ISO 9712.

Our advanced weld flaw evaluation specimens are available either individually or as sets. All sets can be customized to include the individual specimens of your choice.

Recommended for

- Advanced training and practice prior to qualifications in:
  - Flaw detection
  - Flaw sizing
  - Flaw interpretation
- Realistic size welds
- Common weld geometries

Methods

- Ultrasonic testing
- Magnetic particle testing
- Penetrant testing
- Visual testing
- Radiographic testing

Materials

- Carbon steel
- Stainless steel
- Aluminum

Individual specimens

Contain two to four different flaw types and are:

- Uniquely numbered
- Supplied with NDE reports
- Supplied with acceptance/ rejection criteria

Secure specimens (for examinations)

Similar to individual specimens, except that:

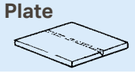
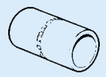
- Specimens are supplied in a sealed container
- Flaw types and distribution are to a specified standard
- Reports are sealed and kept separate from the specimens
- Reports are sent under separate cover to the nominated person

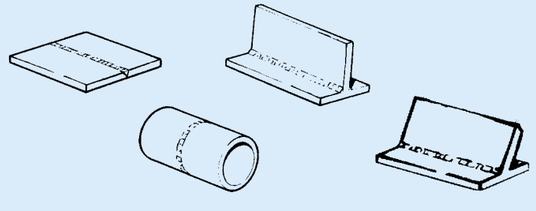
Recommended sets

- Selection of individual specimens, with an average of three flaws per specimen
- At least one example of each flaw type listed in the flaw table
- Minimum total weld length of 360cm (144")

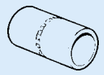
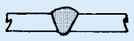
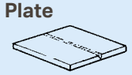
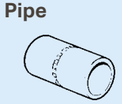
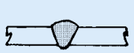
A selection of advanced weld flaw evaluation specimens

Visual specimens

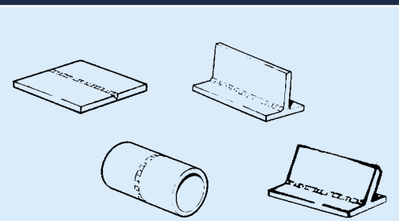
Individual specimens							Typical flaws
Part no.	Specimen type	Weld preparation type	Diameter	Thickness	Size	Approx. weight kg (lbs)	
			Approx. dimensions: mm (inch) or nearest commercial size				
VC-73	Plate 		N/A	10 (⅜)	300x200 (12x8)	5 (10)	Surface porosity
VC-74	Pipe 		80 (3)	10 (⅜)	200 (8) long	4 (9)	Lack of root fusion
VC-75			150 (6)	10 (⅜)	200 (8) long	8 (17)	Root concavity
VC-76			200 (8)	10 (⅜)	200 (8) long	10 (21)	Excess penetration
VC-77			300 (12)	10 (⅜)	200 (8) long	22 (48)	Incomplete penetration
VC-78	Tee 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	Irregular penetration
VC-79	Y 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	Undercut
			Penetration Dia x Thick		**Carrier plate dimensions** L x W x Thickness		Concave cap
VC-80	Nozzle 		100x10 (4x⅜)		400x400x12 (16x16x½)	17 (38)	Excessive cap
VC-81			200x10 (8x⅜)		400x400x12 (16x16x½)	22 (49)	Weld spatter
			Stub Dia x Thick		**Carrier plate dimensions** L x W x Thickness		Crater indication
VC-82	Node 		200x10 (8x⅜)		400x400x12 (16x16x½)	32 (70)	
VC-83			250x10 (10x⅜)		400x400x12 (16x16x½)	37 (81)	

Recommended set		Approx. weight kg (lbs)
	VC-84	45 (100)
	2 x VC-73	
	2 x VC-75	
	1 X VC-77	
	1 x VC-78	
	1 x VC-79	

Magnetic and penetrant specimens

Individual specimens							Typical flaws
Part no.	Specimen type	Weld preparation type	Diameter	Thickness	Size	Approx. weight kg (lbs)	Toe indication
			Approx. dimensions: mm (inch) or nearest commercial size				Root indication
MC-01	Plate 		N/A	10 (⅜)	300x200 (12x8)	5 (10)	Centreline indication
MC-02	Pipe 		80 (3)	10 (⅜)	200 (8) long	4 (9)	Transverse indication
MC-03			150 (6)	10 (⅜)	200 (8) long	8 (17)	Surface porosity
MC-04			200 (8)	10 (⅜)	200 (8) long	10 (21)	Lack of root fusion
MC-05			300 (12)	10 (⅜)	200 (8) long	22 (48)	HAZ indication
MC-06	Tee 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	Crater indication
MC-07	Y 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	
			Penetration Dia x Thick		**Carrier plate dimensions** L x W x Thickness		
MC-08	Nozzle 		100x10 (4x⅜)		400x400x12 (16x16x½)	17 (38)	
MC-09			200x10 (8x⅜)		400x400x12 (16x16x½)	22 (49)	
			Stub Dia x Thick		**Carrier plate dimensions** L x W x Thickness		
MC-10	Node 		200x10 (8x⅜)		400x400x12 (16x16x½)	32 (70)	
MC-11			250x10 (10x⅜)		400x400x12 (16x16x½)	37 (81)	
PC-01	Plate 		N/A	10 (⅜)	300x200 (12x8)	5 (10)	
PC-02	Pipe 		80 (3)	10 (⅜)	200 (8) long	4 (9)	
PC-03			150 (6)	10 (⅜)	200 (8) long	8 (17)	
PC-04			200 (8)	10 (⅜)	200 (8) long	10 (21)	
PC-05			300 (12)	10 (⅜)	200 (8) long	22 (48)	
PC-06	Tee 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	
PC-07	Y 		N/A	10 (⅜)	150x150x300 (6x6x12)	7 (15)	

Individual specimens						
Part no.	Specimen type	Weld preparation type	Diameter	Thickness	Size	Approx. weight kg (lbs)
			Approx. dimensions: mm (inch) or nearest commercial size			
			Penetration Dia x Thick		**Carrier Plate Dimensions** L x W x Thickness	
PC-08	Nozzle 		100x10 (4x⅜)		400x400x12 (16x16x½)	17 (38)
PC-09			200x10 (8x⅜)		400x400x12 (16x16x½)	22 (49)
			Stub Dia x Thick		**Carrier Plate Dimensions** L x W x Thickness	
PC-10	Node 		200x10 (8x⅜) 250x10 (10x⅜)		400x400x12 (16x16x½)	32 (70)
PC-11			250x10 (10x⅜)		400x400x12 (16x16x½)	37 (81)

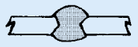
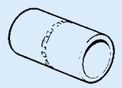
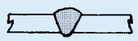
Recommended sets			Approx weight kg (lbs)
	MC-12 Magnetic	PC-12 Penetrant	70 (155)
	1 x MC-01	1 x PC-01	
	2 x MC-03	2 x PC-03	
	2 x MC-05	2 x PC-05	
	1 x MC-06	1 x PC-06	
	1 x MC-07	1 x PC-07	

An example of a magnetic testing tee specimen

An example of a penetrant testing pipe specimen

Ultrasonic specimens

Individual specimens

Part No.	Specimen type	Weld preparation type	Diameter	Thickness	Size	Approx. weight kg (lbs)
			Approx. dimensions: mm (inch) or nearest commercial size			
UC-14	**Plate**		N/A	6 (¼)	300x300 (12x12)	4 (9)
UC-15			N/A	12 (½)	300x300 (12x12)	8 (18)
UC-16			N/A	25 (1)	300x400 (12x16)	23 (51)
UC-17			N/A	20 (¾)	300x300 (12x12)	14 (31)
UC-18			N/A	25 (1)	300x400 (12x16)	23 (51)
UC-19			N/A	30 (1¼)	300x440 (12x17¼)	31 (68)
UC-20	**Pipe**		80 (3)	12 (½)	300 (12) long	7 (15)
UC-21			150 (6)	12 (½)	300 (12) long	14 (30)
UC-22			150 (6)	25 (1)	300 (12) long	28 (62)
UC-23			200 (8)	12 (½)	300 (12) long	18 (39)
UC-24			200 (8)	25 (1)	300 (12) long	37 (82)
UC-25			300 (12)	12 (½)	300 (12) long	27 (59)
UC-26			300 (12)	25 (1)	300 (12) long	56 (122)
UC-27	**Tee** 		N/A	20 (¾)	150x150x300 (6x6x12)	14 (31)
UC-28			N/A	25 (1)	200x200x300 (8x8x12)	23 (51)
UC-29			N/A	25 (1)	200x200x300 (8x8x12)	23 (51)
UC-30			N/A	30 (1¼)	220x220x300 (9x9x12)	31 (68)
UC-31	**Y** 		N/A	25 (1)	200x200x300 (8x8x12)	23 (51)
UC-32			N/A	30 (1¼)	220x220x300 (9x9x12)	31 (68)
			Penetration Dia x Thick		**Carrier plate dimensions** L x W x Thickness	
UC-33	**Nozzle** 		100x12 (4x½)		500x500x25 (20x20x1)	43 (94)
UC-34			200x12 (8x½)		500x500x25 (20x20x1)	54 (120)
UC-35			100x12 (4x½)		500x500x25 (20x20x1)	43 (94)
UC-36			200x12 (8x½)		500x500x25 (20x20x1)	54 (120)
			Stub Dia x Thick		**Carrier plate dimensions** L x W x Thickness	
UC-37	**Node** 		200x20 (8x¾)		500x500x25 (20x20x1)	75 (165)
UC-38			250x20 (10x¾)		500x500x25 (20x20x1)	103 (228)

Typical flaws


Toe crack


Root crack


Sidewall crack


Centreline crack


Transverse crack


Incomplete penetration (SV)


Incomplete penetration (DV)


Porosity

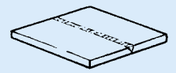
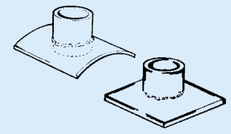
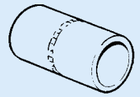
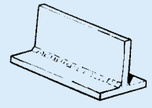
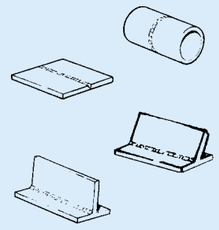

Lack of root fusion

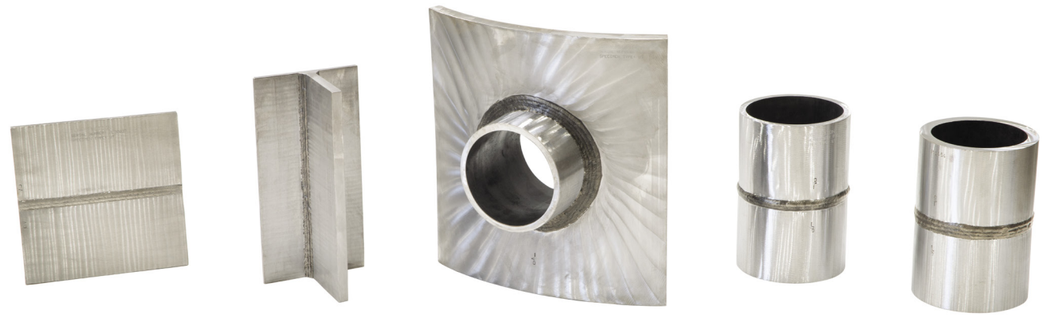

Lamination

Lack of side wall fusion

Slag

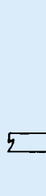
Recommend sets

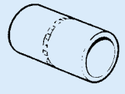
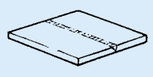
Specimen types	Contents	Approx. weight kg (lbs)	Specimen types	Contents	Approx. weight kg (lbs)
Set 2 UC-39 	3 x UC-15 1 x UC-16 3 x UC-17 2 x UC-18 3 x UC-19	229 (505)	**Set 5 UC-42** 	2 x UC-33 2 x UC-34 2 x UC-35 2 x UC-36	412 (907)
Set 3 UC-40 	2 x UC-20 1 x UC-21 1 x UC-22 1 x UC-23 1 x UC-24 1 x UC-25 1 x UC-26	193 (426)	**Set 6 UC-43** 	2 x UC-37 2 x UC-38	357 (786)
Set 4 UC-41 	4 x UC-27 2 x UC-28 2 x UC-29 2 x UC-30	211 (464)	**Set 7 UC-44** 	1 x UC-16 1 x UC-19 1 x UC-24 1 x UC-25 1 x UC-26 1 x UC-27 1 x UC-30 1 x UC-31	242 (532)



An example of some ultrasonic specimens

Radiographic specimens

Individual specimens							Typical flaws
Part no.	Specimen type	Weld preparation type	Diameter	Thickness	Size	Approx. weight kg (lbs)	
			Approx. dimensions: mm (inch) or nearest commercial size				
RC-50	Plate		N/A	6 (¼)	300x200 (12x8)	3 (6)	Toe crack
RC-51			N/A	10 (⅜)	200 (8) long	5 (10)	Root crack
RC-52			N/A	15 (⅝)	200 (8) long	7 (15)	Transverse crack
RC-53			N/A	20 (¾)	200 (8) long	9 (21)	Porosity
RC-54			N/A	25 (1)	200 (8) long	13 (26)	Lack of root fusion
RC-55			N/A	30 (1¼)	150x150x300 (6x6x12)	14 (31)	
RC-56	Plate		N/A	6 (¼)	300x200 (12x8)	3 (6)	Incomplete penetration
RC-57			N/A	10 (⅜)	300x200 (12x8)	5 (10)	
RC-58			N/A	15 (⅝)	300x200 (12x8)	7 (15)	Excess penetration
RC-59			N/A	20 (¾)	300x200 (12x8)	9 (21)	
RC-60			N/A	25 (1)	300x200 (12x8)	13 (26)	Root concavity
RC-61			N/A	30 (1¼)	300x200 (12x8)	14 (31)	
RC-62	Pipe		25 (1)	3 (⅛)	300x200 (12x8)	0.3 (0.7)	Slag
RC-63			50 (2)	5 (3⁄16)	200 (8) long	1 (2)	Undercut
RC-64			80 (3)	6 (¼)	200 (8) long	2 (5)	
RC-65			150 (6)	6 (¼)	200 (8) long	4 (10)	Tungsten inclusion
RC-66			150 (6)	12 (½)	200 (8) long	8 (18)	
RC-67			200 (8)	12 (½)	200 (8) long	11 (25)	Mismatch
RC-68			200 (8)	20 (½)	200 (8) long	18 (40)	
RC-69			300 (12)	12 (½)	200 (8) long	17 (37)	Burn through
RC-70			300 (12)	250 (1)	200 (8) long	33 (74)	

Recommended set		Approx. Weight kg (lbs)
 	RC-71	78 (172)
	2 x RC-50	
	1 x RC-55	
	1 x RC-56	
	1 x RC-61	
	3 x RC-62	
	2 x RC-63	
	1 x RC-64	
	1 x RC-70	

Standard specifications

Sonaspection reserves the right to alter specifications shown at any time.

Types/Range	The range of flaws available depends on the type of testing being used. See appropriate flaw table for full details.
Flaw size range	Flaw length from 10mm (⅜") to 45mm (1¾") Flaw through wall height 3mm (⅛") to 6mm (¼")
Flaw tolerances	Flaw length ±3mm (⅛") Flaw height ±2mm (5⁄64") Distance from datum ±3mm (⅛") Depth from surface ±2mm (5⁄64")
Material types	For plate, tee and Y specimens carbon steel material conforms to EN 10025. Pipe specimens are to ASTM, ANSI, API or similar (nozzles and nodes are a combination of both). All pipe sizes are measured outside diameter.
Inspection	All materials are subject to 100% visual and non-destructive examination to ensure that they are free from flaws which may interfere with product performance.
Material tolerances	Weld length for plates, tees and Ys, all 300mm (12") ±5%. Weld length for pipes, nozzles and nodes, all as per diameter. Thickness ±10% Diameters ±10%
Surface finish	Parent material adjacent to weld will be a suitable finish for testing the weld profile, either 'as-welded' or ground flush.
Final inspection	All specimens are subject to in-house visual and non-destructive examination. This work is carried out by experienced and approved technicians.
Corrosion protection	All specimens are coated with a clear corrosion-resistant material before leaving the factory.
Packing	All export orders are suitably packed.

CASTING AND FORGING

A series of small and lightweight specimens which contain typical flaws found in cast and forged components.

Our casting and forging specimens are designed for practical training to provide experience in basic flaw detection, sizing and interpretation. Available either individually or as sets, our specimens also provide representative geometries and an awareness of reporting difficulties.

In addition to our standard specimens, we can work with you to create customized specimens on request.

Recommended for

- Training and practice prior to qualifications in:
  - Basic flaw detection
  - Basic flaw sizing
  - Flaw interpretation
- Understanding representative geometries
- Gaining an awareness of reporting difficulties

Methods

- Ultrasonic testing
- Magnetic particle testing
- Penetrant testing
- Visual testing

Materials

- Carbon steel
- Stainless steel
- Aluminum

Our standard specimens

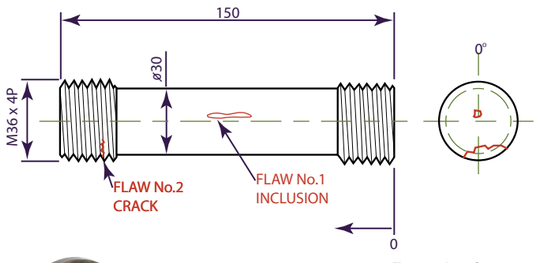
- Flange
- 2 Ingots (various sizes)
- Stud
- Wasted bolt
- Tee
- 4 Spigots (various sizes)
- Recessed flange
- Tapered ingot

Individual specimens

- Contain up to 3 flaws
- Are unique, no two specimens are the same
- Are individually numbered and supplied with:
  - Drawing/NDE report
  - Testing and acceptance criteria
  - Certificate of conformance

Recommended set (014)

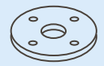
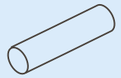
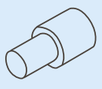
- 12 individual specimens
- Contain an average of 20 flaws
- Total weight of 59kg/130 lbs
- NDE reports
- Testing and acceptance criteria
- Certificate of conformance



Example of a wasted bolt

A selection of casting and forging specimens

Flawed casting/forging specimens

UT/MT/PT/VT individual specimens			
Part no.	**Specimen type**	**Dimension**	**Weight**
001	**Flange** 	250mm diameter x 20mm thick	7 kg / 15.5 lbs
002	**Ingot** 	50mm diameter x 200mm long	3.1 kg / 6.8 lbs
003	**Ingot** 	100mm diameter x 50mm thick	3 kg / 6.6 lbs
004	**Stud** 	20mm diameter x 120mm long head – 50mm diameter x thread length – 30mm	0.6 kg / 1.3 lbs
005	**Wasted bolt** 	36mm diameter x 150mm long thread length – 25mm	0.85 kg / 1.9 lbs
006	**Tee** 	100mm x 150mm x 10mm	2.2 kg / 4.9 lbs
007	**Spigot** 	100mm diameter x 75mm diameter x 150mm long	7.1 kg / 15.6 lbs
008	**Spigot** 	150mm diameter x 50 diameter x 55mm long	4.5 kg / 10 lbs
009	**Spigot** 	50mm diameter x 40mm diameter x 100mm long	1.2 kg / 2.6 lbs
010	**Spigot** 	75mm diameter x 50mm diameter x150mm long	3.75 kg / 8.3 lbs
011	**Recessed flange** 	200mm diameter x 40mm thick recess – 100mm diameter x 10mm deep	9.15 kg / 20 lbs
012	**Tapered ingot** 	200mm diameter x 175mm diameter x 75mm thick	16.55 kg / 36.5 lbs

BEND TEST SETS

A range of bend test specimens that show the impact weld flaws can have on the structural integrity of a welded joint.

Our specimens are supplied as a set of five bars. Each bar measures 10mm wide x 200mm long and is available in either 12, 15 or 20mm wall thickness. They are manufactured to contain one flaw type from the list below and then each bar is bent until the weld starts to fail, and the flaw is exposed.

Recommended for

- Demonstrating the potential impact of weld flaws in a joint

Methods

- Visual testing

Materials

- Carbon steel

Set contents

- Bar 1 – Lack of side wall fusion (LoSWF)
- Bar 2 – Slag
- Bar 3 – Clear
- Bar 4 – Lack of root fusion (LoRF)
- Bar 5 – Toe crack

A selection of bend test bar specimens

CRACK SIZING BARS

A range of carbon steel or stainless steel bars, useful for crack sizing and characterization.

Our crack sizing bars have mechanically induced cracks running the full 30mm length of the weld. They come in a range of wall thicknesses (WT) and percentage crack through wall heights (TWH). We can customize our crack sizing bars to your specific requirements.

Our crack sizing bars can be purchased individually or as a recommended set. Each set contains four bars with a WT of either 12mm, 20mm, 25mm or 30mm, and TWH of 10%, 25%, 50%, and 75%, summarized in the table below.

Recommended for

- Crack sizing also applicable for API
- Crack characterization

Methods

- Ultrasonic testing

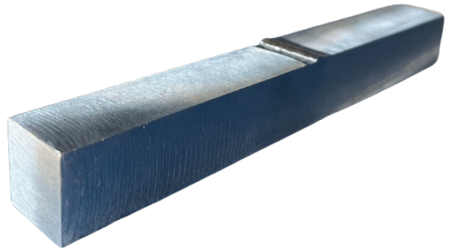
Materials

- Carbon steel
- Stainless steel

Document package contents

- As-built drawing
- Material certificate
- Consumable certificate
- QA release note

Recommended crack sizing bar sets					
Set	WT	TWH			
1	12mm	10%	25%	50%	75%
2	20mm	10%	25%	50%	75%
3	25mm	10%	25%	50%	75%
4	30mm	10%	25%	50%	75%



An example of a crack sizing bar