WHY NOT TRY THE WILKINSON COUTTS FITNESS-FOR-PURPOSE (FFP) EVALUATION CHALLENGE?

WILKINSON COUTTS Engineering Ltd.

As trainers in FFP subjects (including API RP 579) we are interested in the effectiveness and accuracy of FFP evaluation techniques. We would therefore like to invite people interested in this subject to have a go at using their evaluation skills to predict the failure performance of a damaged vessel.

WHAT IS THE CONDITION OF THE VESSEL?

The vessel is shown below. We have built various defects into it; the vessel design data and information about the defects are described in this factsheet, in as much technical detail as possible.

WHAT WILL HAPPEN TO THIS VESSEL?

We will shortly be having the vessel tested to destruction using a hydrotest. We will then document and record the failure pressure and the location and mode of failure.

HOW DO I TAKE PART IN THE CHALLENGE?

The objective of the challenge is simply to predict, using the information provided on this factsheet:

- The pressure at which the vessel bursts
- The location and plane of the failure

You may do the assessment using whatever techniques you prefer. Once you have completed your assessment then simply send us your answer to the two questions above, and an indication of the assessment method you used to arrive at your answer.

WHEN DO WILKINSON COUTTS RELEASE THE RESULTS?

We will not publicise individual answers. Once everyone who wishes to has had a try then we will release details of the results of the destructive test in a factsheet. We estimate this will be in early November

The 'winner' be the entrant who most closely predicts the burst pressure and the location and plane of the failure. We will be pleased to publicise details of the winner, and their FFP method on our website / social media sites if they give us permission.

HOW DO I ENTER?

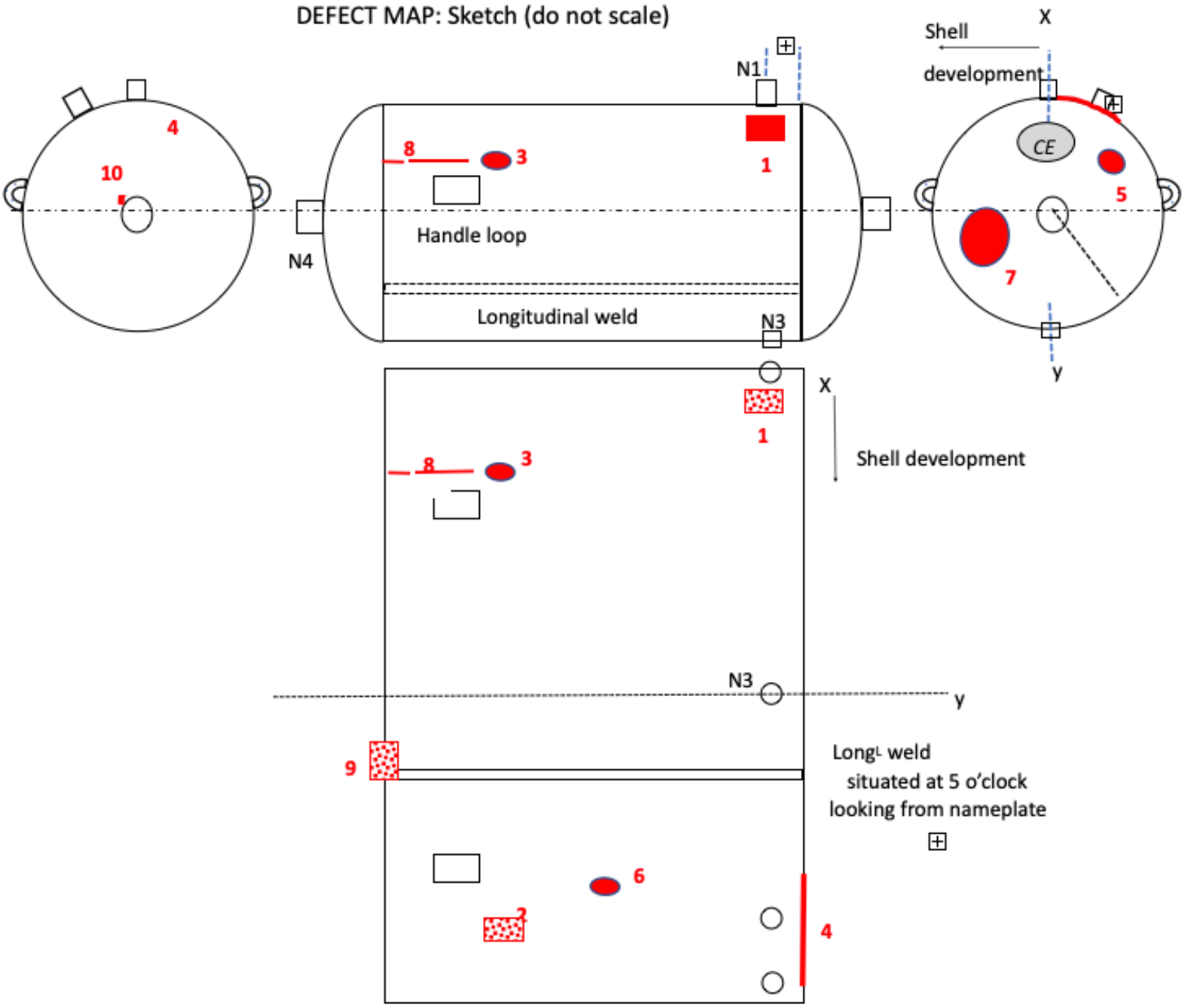
Please send your entries ,or any technical queries you have about the vessel to paul@wilkinsoncoutts.com.

IS THERE A PRIZE?

All entrants will be entitled to a free copy of our new book 'The plant inspector's guidebook' to be published by Wilkinson Coutts in late October.

The winner of the challenge may nominate a delegate to attend a Wilkinson Coutts Training course (ASME-cert, API cert etc) free of charge (value £1700-£2500)

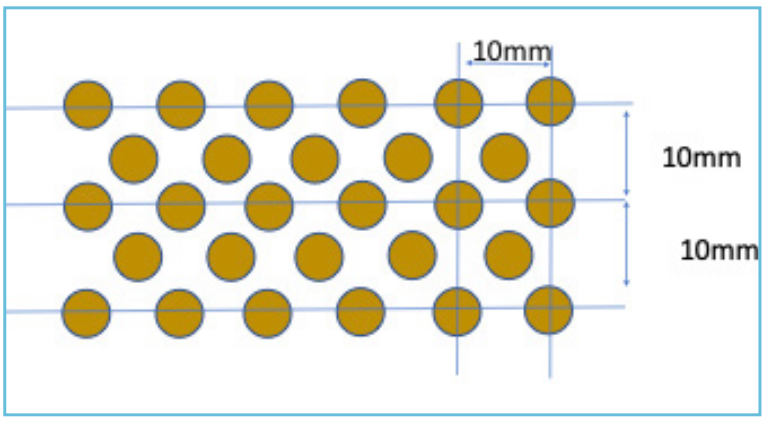
VESSEL DATA	
OD	290mm
Shell Thickness Nominal	2.5mm
Head Thickness Nominal	2.5mm
Stated corrosion allowance	0
Shell length	685mm
Head shape	Torispherical
Head depth	70mm
Nozzle N1, N2	Dia 30mm
Drain nozzle N3	Dia 20mm
Material	Low carbon steel EN 10207 P235S Normalised
Design code	EN 286-1 and CE marked
Date of manufacture	2003
Specified Minimum Yield strength (SMYS)	SMYS = 265 MPa at 20 degC Proof strength Rp 0.2=171 MPa at 100 °C Impact strength, %E and %A to EN 286-1
Specified Tensile Strength	360-480 MPa at 20 degC
MAWP	11 barG
PRV set pressure	7 barG
MDMT	-20/+150 degC
Joint efficiency E	1.0
Volume	50 litres


DEFECT MAP: Sketch (do not scale)
Shell development
X
N1
4
10
8
3
1
Handle loop
N4
Longitudinal weld
N3
CE
5
7
y
X
1
Shell development
8
3
N3
y
9
Longl weld
situated at 5 o'clock
looking from nameplate
6
2
4

DEFECT DATA

DEFECT NUMBER	TYPE	SEVERITY / INFORMATION	REFERENCE
1	Pitting array	Array of 28 depressions 3.5mm dia at surface	See photo / sketch 1
2	Pitting	Area of pitting 3.5mm dia	See photo/sketch 2
3	Hammer dent	Dent 2.5mm deep smooth-edged	See Photo 3
4	Weld grinding	Linear defect 110mm long x 2mm wide. Max depth 1.5mm for 20cm in length. Remainder is 1.0mm deep	See photo 4
5	Head hammer dent	Elliptical dent 40 x 25mm max 3mm deep. Smooth- edged.	See photo 4,5
6	Local wall thinning: shell	Thinning 10mm long 1.0 max depth. Smooth- edged	See Photo 6
7	Head wall thinning (nameplate end)	Elliptical shape: major axis 90mm, minor axis 50mm. Maximum depth 0.5mm	See Photo 7
8	Grinding marks on shell	Marks 30mm and 60mm long. Max depth 0.7mm and groove radius 1mm	See sketch 8
9	Pitting on tee-weld cap	4 pits dia 4.5mm, each 3mm deep on 3mm high weld reinforcement	See photo 9
10	Linear defect (grind mark) on nozzle N4 weld	Undercut is 90 degrees of arc, max 0.5mm deep into shell and 1.0mm deep into weld metal. Groove radius 1.5mm	See photo 10

PHOTO 1: PITTING ARRAY



Pits made by 3.5mm dia drill with 118-degree point angle. Día of depression at surface = 3.5mm

PHOTO 2: PITTING ARRAY

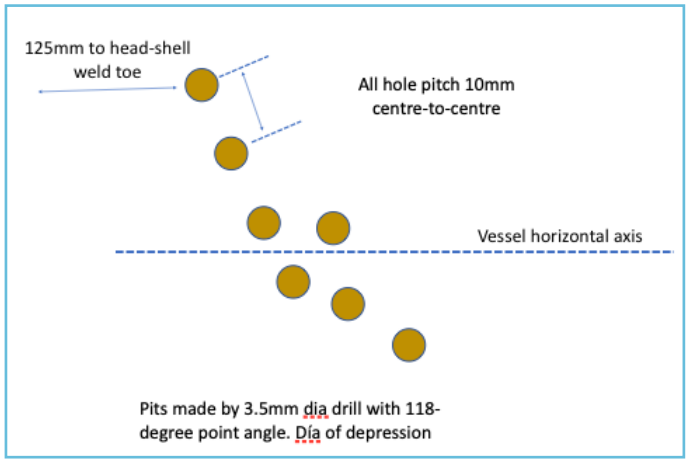


PHOTO 3: DENT

Dent size 45mm x 20mm x 2.5mm deep. Smooth edges

PHOTO 4,5: WELD GRINDING MARK (4) AND HEAD DENT (5)

PHOTO 6: LOCAL WALL THINNING

PHOTO 7: HEAD WALL THINNING (NAMEPLATE END)

PHOTO 8: SHELL GRINDING MARKS

PHOTO 9: WELD CAP PITTING

PHOTO 10: NOZZLE N4 WELD GRIND DEFECT