

# TEMPERATURE CONTROLS PTY LTD

ACN: 075 298 592 ABN: 76 075 298 592



Quality  
Endorsed  
Company

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ISO9001:2000

Lic 14412

THERMOCOUPLES \* RTD SENSORS \* THERMOWELLS \* EXTENSION CABLES \* LEVEL SWITCHES

CLIENT: MGJV

PLANT: STANWELL  
MAGNESIUM  
PROJECT

JOB NO.: KG000


CLIENT ORDER NO.: CN-SAMPLE

# Sample Calculation

INSTRUMENT  
CALCULATION SHEET  
FOR  
THERMOWELL STRESS

KWIKGATE DOCUMENT NO: KG000-I-CS-0001						PAGE: 1 OF 3
REVISION	DATE	PREP	VERI	APPR	STATUS	REVISION DETAILS
0	11/02/2003	GS	DDI	DDI	For Client Info	
MANUFACTURER NAME : <b>Temperature Controls Pty Ltd</b>						
MANUFACTURER DOCUMENT No. : TC-SAMPLE-01						
CLIENT DOCUMENT NO. : SAMPLE-001						

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 dillic@bigpond.net.au	<b>KwikGate Pty Ltd</b> ACN 72 050 816 227 ph : 61 (0)412 880 800 fax: 61 (0)2 9389 7838	<b>Calculation Sheet for Thermowell Stress</b>		Client Name: MgJV Plant Name: Stanwell Project Name.: Stanwell Magnesium Project Contract No.: CN-SAMPLE	
				UNIT	Rev
<b>GENERAL</b>					
Tag No.	—	31-00-0-TW-413		0	
PID No.	—	31-B-301		0	
Measuring Pt. Description	—	MgCl2aq fm Evap VE-003 to Evap Recirc Pump PU-009A/B		0	
Line/Equipment No.	—	400-PP-31000111-N1-9		0	
<b>DATA SOURCE</b>					
Process Data Source	—	Client Data Sh. No.DS-31-J-TE-413 Sht 1 of 4 Rev.0		0	
Pipe Data Source	—	Client Data Sh. No.DS-31-J-TE-413 Sht 1 of 4 Rev.1		0	
Rated Conditions Data Source	—	Client Data Sh. No.DS-31-J-TE-413 Sht 1 of 4 Rev.2		0	
TW Data Source	—	Temperature Controls Pty Ltd		0	
Stress Data Source	—	AS1210		0	
Referenced Standard	—	ASME PTC 19.3.		0	
<b>VIBRATION LIMITATION (DYNAMIC STRESS) ON STEM LENGTH "L"</b>					
Fluid Velocity	m/s	1.74		0	
TW Bore Diameter	mm	6.5		0	
Stem Major Diameter	mm	28		0	
Stem Minor Diameter	mm	18		0	
Strouhal (wake) frequency		21		0	
Well Material		316		0	
Well Length	mm	330		0	
Operating Temperature Tf	°C	170		0	
Modul of Elasticity @ Tf	Pa	1.908E+11		0	
Specific Weight	kg/m <sup>3</sup>	8025		0	
Constant		2.11		0	
Natural frequency	1/s	122		0	
Frequaney ratio (Max 0.8)		0.174		0	
Maximum permissible Well Length for Frequency ratio=0.8	mm	707		0	
Magnification Factor		0.03		0	
<b>VIBRATION STRESS INSIDE THE TOLERANCE?</b>			ACTUAL FREQUENCY RATIO OF 0.174 IS LESS THEN ALLOWED (DYNAMIC STRESS RELATED) OF 0.8 FOR THE SELECTED THERMOWELL MATERIAL AND LENGTH, FLUID VELOCITY AND OPERATING	<b>YES</b>	
<b>BENDING STRESS LIMITATION (STATIC STRESS) ON STEM LENGTH "L"</b>					
Fluid Velocity	m/s	1.74		0	
Well Material		316		0	
Operating Temperature Tf	°C	170		0	
Magnification Factor		0.03		0	
Allowable Stress @ Tf	Pa	103000000		0	
Density of flowing fluid	kg/m <sup>3</sup>	1350		0	
Operating Pressure Pf	kPag	1000		0	
Constant 1		0.409		0	
Constant 2		37.77		0	
Constant 3		0.120		0	
Maximum Allowed Well Length	mm	2177		0	
<b>BENDING STRESS INSIDE THE TOLERANCE?</b>			ACTUAL THERMOWELL STEM LENGTH OF 330mm IS LESS THEN ALLOWED (STATIC STRESS RELATED) OF 2176.88mm FOR THE SELECTED THERMOWELL MATERIAL, FLUID VELOCITY AND OPERATING COND.	<b>YES</b>	
<b>STATIC PRESSURE RELATED STRESS</b>					
Maximum Rated Pressure P <sub>D</sub>	kPag	1000		0	
Maximum Rated Temperature T <sub>D</sub>	°C	170		0	
Allowable Stress @ T <sub>D</sub>	Pa	103000000		0	
Constant 1		0.409226963		0	
Maximum Allowed Pressure	kPag	42150		0	
<b>MAXIMUM PRESSURE STRESS INSIDE THE TOL</b>			ACTUAL MAXIMUM RATED PRESSURE OF 1000 kPag IS LESS THEN ALLOWED (STRESS RELATED) OF 42150 kPag FOR THE SELECTED THERMOWELL MATERIAL 316.	<b>YES</b>	
<b>VENDOR</b>					
Vendor Name	—	Temperature Controls Pty Ltd		0	
Manufacturer Name	—	Temperature Controls Pty Ltd		0	
<b>REMARKS</b>					
Remark 1	—	This is Sample Calculation for the Client Info.		0	
Remark 2	—	—		0	
Remark 3	—	—		0	
Remark 4	—	—		0	
Remark 5	—	—		0	
KwikGate Pty Limited	KG Job No.: KG000	KG Doc. No.: KG000-I-CS-0001	KG Rev. No.: 0	Page 3 of 3	Doc. Rev.
Temperature Controls Pty Ltd	Mfg. Job No.: TC-SAMPLE	Mfg. Doc. No.: TC-SAMPLE-01	Mfg. Rev. No.: 1	Page 3 of 3	Date
MgJV	Client Job No.: SAMPLE-00	Client Doc. No.: SAMPLE-001	Client Rev. No.: A	Page 3 of 3	11/02/2003