

# M · E · M · O

**Date:** 21 July 2004

**To:** DOMESTIC/EXPORT SALES/WORKSHOP/ENGINEERING  
LIQUIP DISTRIBUTORS

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**Subject:** TECH TALK NO: 57

## MEASUREMENT OF PRODUCT LOSS FROM API's

### **Purpose of tests**

To measure the effect of wear or off-specification dimensions on both API couplers (loading rack side) and API adaptors (truck side).

The effect measured was the amount of liquid lost-to-ground when de-coupling at the completion of the loading process (no drips occurred during loading).

### **Variables**

A standard adaptor and standard but used coupler were mounted on the Liquip road tanker-loading arm-preset meter rig that exactly simulates real life loading conditions. A series of loading coupling & uncoupling operations were carried out and the liquid loss for each uncoupling was measured & averaged. Liquid used was automotive diesel.

The adaptor was then machined to achieve simulated faults of varying poppet positions relative to the adaptor front face: and subsequently the coupler was also machined to artificially produce incorrect poppet position relative to the coupler front face

## Results

The results are shown pictorially on following pages.

Tabulated results are: -

<b>Adaptors</b>	<b>Couplers</b>		
	Coupler with 1mm added to poppet face	Standard coupler	Coupler with 1mm removed from poppet face
1- Adaptor with poppet 1.3mm below face	7mLs	11mLs	10mLs
2- Adaptor with poppet flush with face	46mLs	3mLs	4mLs
3- Adaptor with poppet protruding 0.5mm	230mLs	16mLs	6mLs
4- Adaptor with poppet protruding 1.4mm	1200mLs	210mLs	6mLs

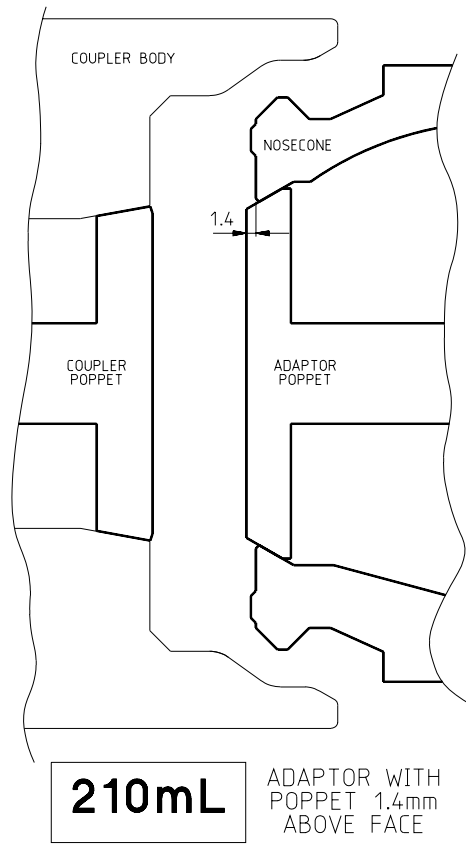
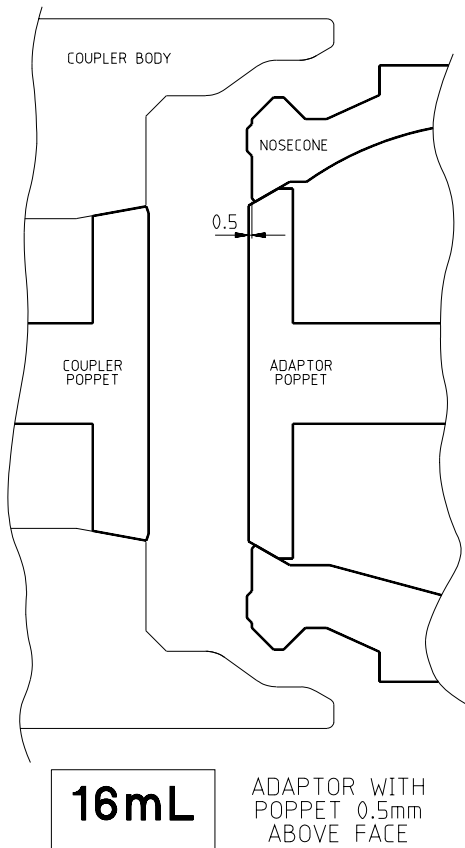
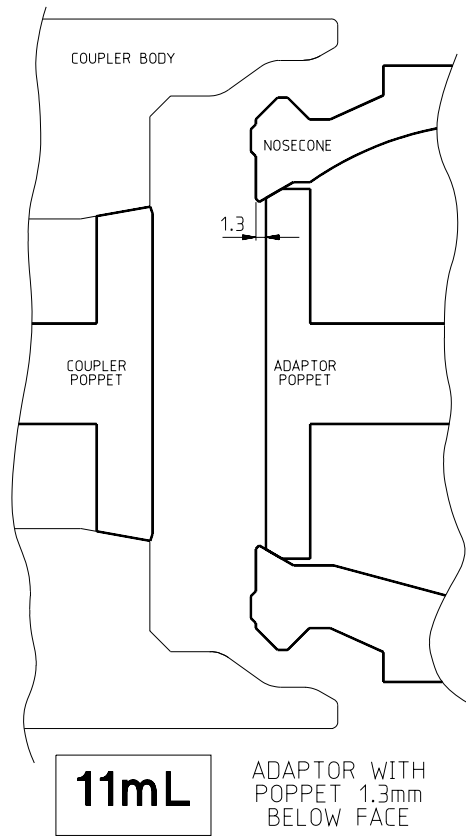
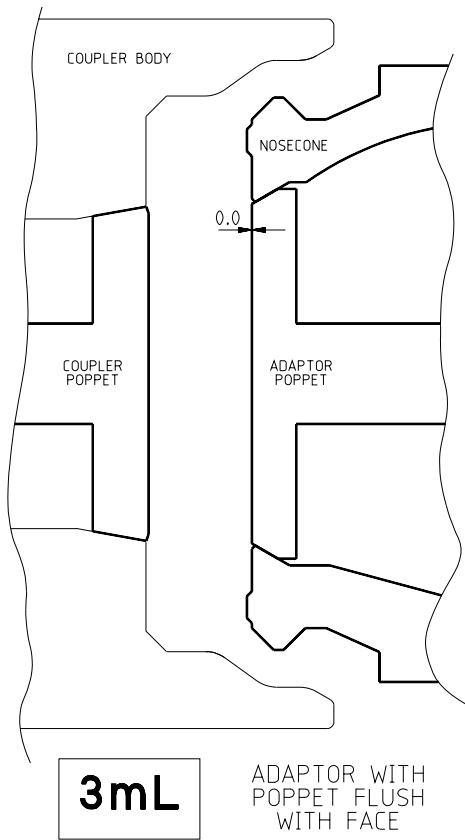
(Note: API standard is maximum 5mL)

## Conclusions

- 1) Tolerances on the coupler poppet should be such that the poppet is flush or slightly recessed... NEVER protruding,
- 2) Tolerances on the adaptor poppet MUST comply with API RP1004 standard of  $\pm 0.38\text{mm}$  with an aim of achieving as near  $\pm$ zero as possible.
- 3) When investigating intermittent excessive-loss incidents when decoupling at a terminal, it is strongly recommended that the first inspection should be of the truck API adaptor.

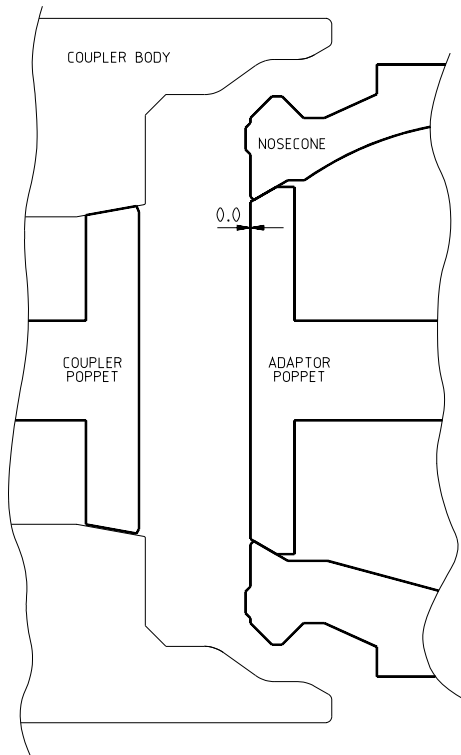
## Notes

- 1) Tests carried out by Scott Bevan during June/July 2004.
- 2) All tests were carried out as in real life with brisk movement during coupling & uncoupling. Losses with extreme wear simulation couples would be much higher if actions were carried out slowly.
- 3) None of the tests caused any leaks during loading. Nor did rocking the coupler up/down/left/right cause any drippage.



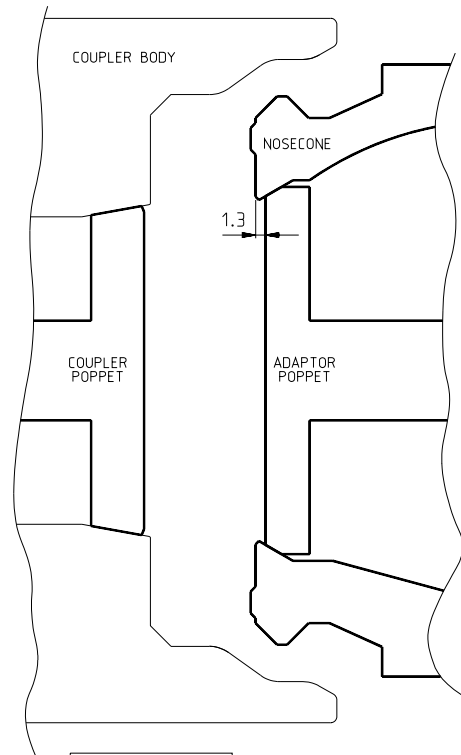
## STANDARD COUPLER POPPET

X200204



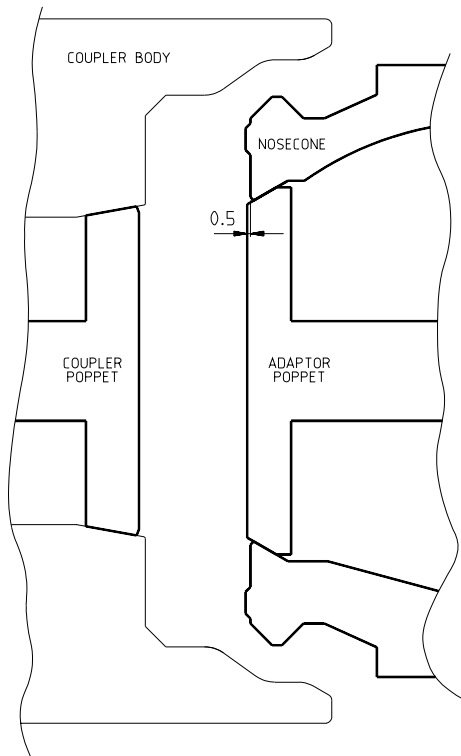
**4mL**

ADAPTOR WITH  
POPPET FLUSH  
WITH FACE



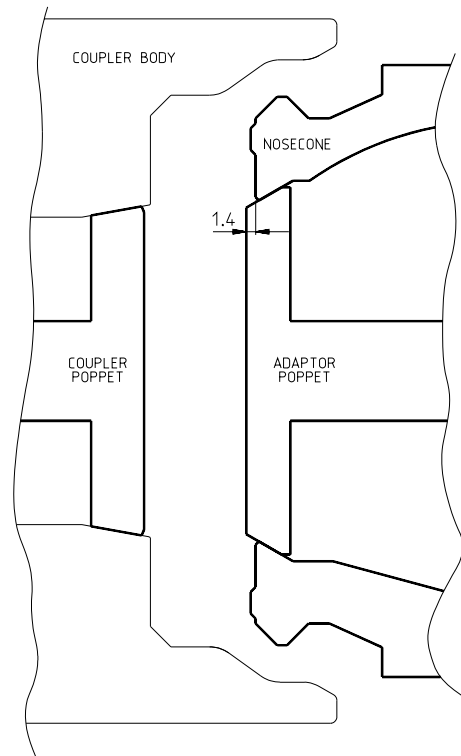
**10mL**

ADAPTOR WITH  
POPPET 1.3mm  
BELOW FACE



**6mL**

ADAPTOR WITH  
POPPET 0.5mm  
ABOVE FACE

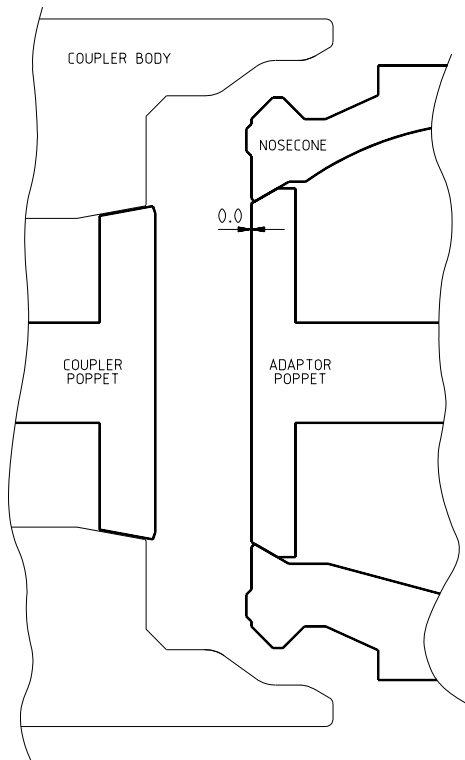


**6mL**

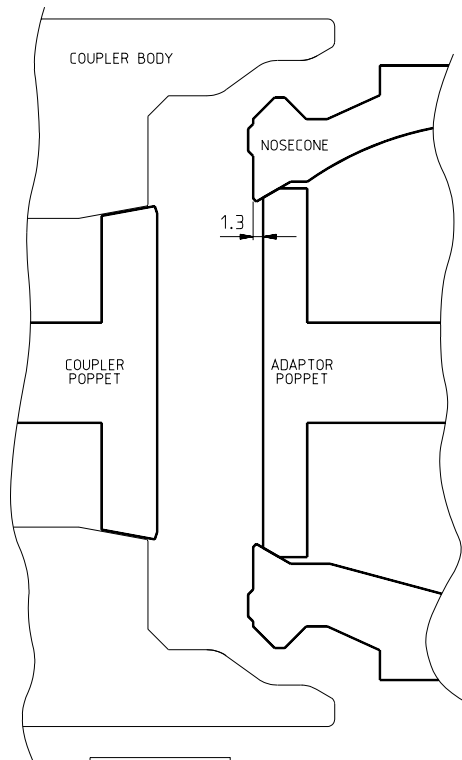
ADAPTOR WITH  
POPPET 1.4mm  
ABOVE FACE

## COUPLER POPPET RECESSED 1mm

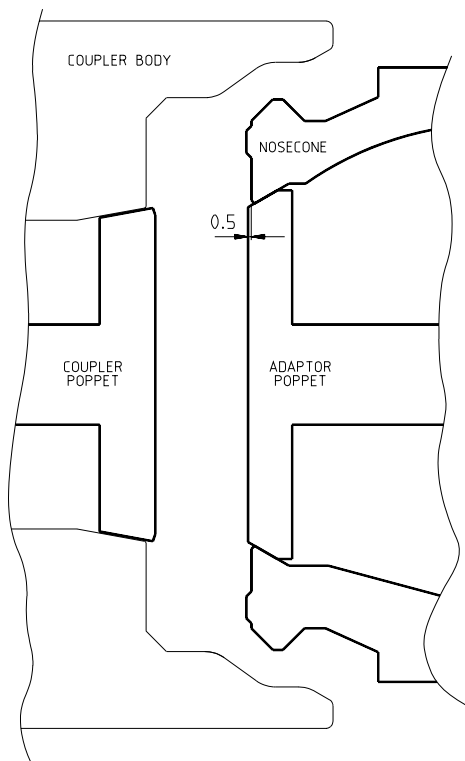
X200204



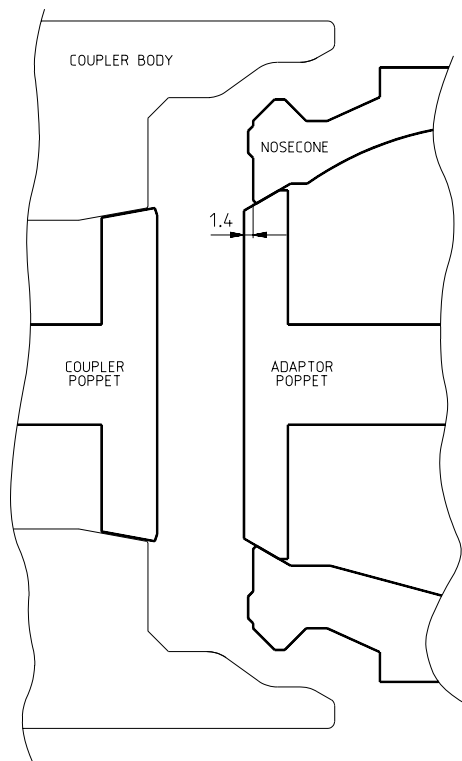
**46mL** ADAPTOR WITH POPPET FLUSH WITH FACE



**7mL** ADAPTOR WITH POPPET 1.3mm BELOW FACE



**230mL** ADAPTOR WITH POPPET 0.5mm ABOVE FACE



**1200mL** ADAPTOR WITH POPPET 1.4mm ABOVE FACE

## COUPLER POPPET PROTRUDING 1mm

X200204