



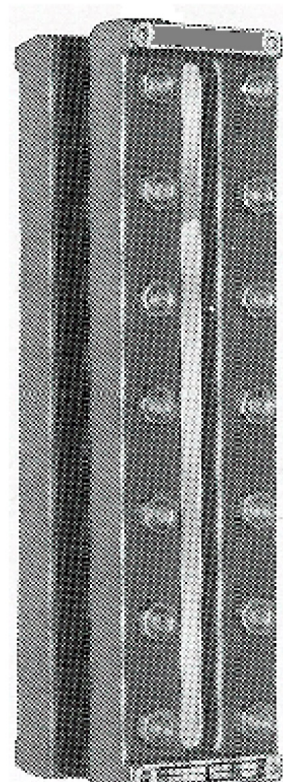
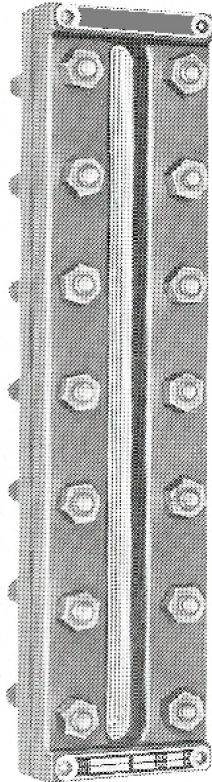
**ARCHON Industries, Inc.**

# Liquid Level Gauges

Models:

**RL, RM, RH, RLC**

**TL, TM, TH, TLC**



## **INSTALLATION / OPERATION / MAINTENANCE INSTRUCTION**

Instruction #:  
Issued:  
Approved:

**1010 Rev B**  
**July 2, 2003**  
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**PPi POWER PLUS  
INTERNATIONAL**

143 McDonough Pkwy  
McDonough, GA 30253

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# PRODUCT WARRANTY

ARCHON Industries, Inc. warrants its products as designed and manufactured by Archon to be free of defects in material and workmanship for a period of one year after the date of installation or eighteen months after the date of manufacture, whichever is earliest. Archon will, at its option, replace or repair any products, which fail during the warranty period due to defective material or workmanship.

Prior to submitting any claim for warranty service, the owner must submit proof of purchase to Archon and obtain written authorization to return the product. Thereafter, the product shall be returned to Archon in Suffern, New York, with freight prepaid.

This warranty shall not apply if the product has been disassembled, tampered with, repaired or altered outside of the Archon factory, or if it has been subjected to misuse, neglect or accident.

Archon's responsibility hereunder is limited to repairing or replacing the product at its expense. Archon shall not be liable for loss, damage, or expenses directly or indirectly related to the installation or use of its products, or from any other cause or for consequential damages. It is expressly understood that Archon is not responsible for damage or injury caused to other

products, building, property or persons, by reason of the installation or use of its products.

THIS IS ARCHON'S SOLE WARRANTY AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This document and the warranty contained herein may not be modified and no other warranty, expressed or implied, shall be made by or on behalf of Archon unless modified or made in writing and signed by the President or a Vice President of Archon.



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## 1.0 About the Manual

This manual has been prepared as an aid and a guide for personnel involved in installation or maintenance. All instructions must be read and understood thoroughly before attempting any installation, operation, or maintenance. Failure to follow any instruction could possibly result in a malfunction of the gage breakage with resulting sudden release of pressure, property damage or physical injury to personnel.

# SAFETY INSTRUCTIONS

**Archon does not have any control over the manner in which its liquid level gage is handled, installed or used. Archon cannot and will not guarantee that a liquid level gage is suitable or compatible for the user's specific application.**



depending on the desired physical and mechanical properties for the gage. Use the exploded parts view in Section 11 as additional reference material.

Chamber – provides a pressure retaining metallic channel for the liquid to enter and be viewed. Slot(s) are machined into the chamber to provide direct visualization of the process fluid.

Gaskets - seal the gap and prevent leakage between the chamber and the glass. Gaskets are available in a variety of materials for compatibility with the media in the gage.

Glass - glass allows for visual observation of the process fluid in the chamber.

Contained fluids may be pressurized and can unexpectedly exit vessel connections due to apparatus or material failure. Safety glasses should be worn when installing a liquid level gage. Failure to do so could result in serious physical injury to personnel.

## 2.0 Introduction

Archon liquid level gages are used to allow direct visualization of liquid level in vessels.

By peering through the glass, it is possible to monitor color, clarity, and level of a glass/liquid interface. Gauges are available in varying lengths and configurations (end connect, side connect, multiple sections, NPT or flange connections, etc.). Using reflex glass or illuminators (accessory) can enhance visual indication.

### 2.1 System Description

Archon gauges are comprised of six basic components. Each component may vary slightly,

Cushion – acts as a protective buffer between the glass and the cover. For proper sealing cushions must be as hard as or harder than the gasket material.

Cover - protects the glass assembly from external hits and provides a flat, rigid surface that is used to evenly compress the gage assembly.

Bolting – compresses the components between the covers (transparent gages) or cover and chamber (reflex gages).

Shield (optional) – used to prevent the process media from contacting glass.

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### 3.0 Available Models

See Appendix I for description and pressure and temperature ratings of Archon Models RL, RLC, TL, TLC, RM, TM, RH and TH.

The pressure and temperature ratings may deviate from the tables shown in the Appendix if the gasketing materials of construction and/or bolting are other than those specified. Higher and/or lower temperature ratings are available with different materials of construction.

To determine the maximum allowable working pressure for specific temperature within the design limits stated in the tables, the user should refer to Archon dimension sheets, or when provided, the specifically stated design limits on Archon product proposal.

NOTE: under no circumstances should shields be used in reflex style gauges. Installation of shields in reflex type gauges will keep the liquid from coming in contact with the refractive prisms, thereby prohibiting visualization of the liquid level in the gauge.



NOTE:  
**NEVER** exceed these design ratings or application data. Exceeding design ratings or application data may result in mechanical failure of gauge components resulting in death, serious personal injury and property damage.

### 4.0 Inspection

Upon receipt of a liquid level gauge, check all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation. Notify carrier immediately and request damage inspection.

An Archon standard [1] section **Reflex** level gauge (Model RL, RLC, RM or RH) consists of: (1) chamber, (1) gaskets, (1) borosilicate flat glass, (1) cushion, (2) covers, (1) nameplate and (3 to7) u-bolting sets for RL, RM or (6 to 14) bolting sets for RLC, RH, depending on the size.

An Archon standard [1] section **Thru-Vision** level gauge (Model TL, TLC, TM or TH) consists of: (1) chamber, (2) gaskets, (2) borosilicate flat glass, (2) cushions, (2) covers, (1) nameplate and (6 –14) bolting sets, depending on the size.

### 4.1 Glass Inspection

Check the glass for any visible cracking prior to installation. Ensure that the glass is protected during storage, handling and installation. Glass that is not protected will be vulnerable to dust tools and any other objects that may scratch, chip or break the glass.



**DO NOT** use glass that is chipped or even slightly scratched. Glass surface defect weaken the glass which may result in glass breakage and fluid loss under pressure resulting in serious personal and property damage.

### 4.2 User Rating Inspection

The user should confirm that:

- 1) Liquid level gauge model and assembly stamped on the nameplate conforms to the description on the user's purchase order.
- 2) Operating conditions described in the purchase order agree with actual operating conditions at the installation site.
- 3) Actual operating conditions at his installations site are within the application data shown on



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the Archon Technical Data Bulletin or product proposal referred to above.

- 4) Materials of construction of the liquid level gauge are compatible with both the contained media and surrounding atmosphere in the specific application.

## **SAFETY INSTRUCTIONS**

**If the size, model or performance data of the liquid level gauge as received does not conform to any of the criteria above, do not proceed with installation. Contact an authorized Archon Distributor for assistance. The incorrect gauge can result in unacceptable performance and potential damage to the gauge.**

### **5.0 Installation**

Qualified personnel who are familiar with equipment of this type should only undertake installation. They should have read and understood all of the instructions in this manual. The user should refer to Archon dimension sheets or Archon product proposal to obtain dimensional information for the specific size and model liquid level gauge.

Archon recommends that all liquid level gauges installation be provided with gauge valve sets equipped with ball check shut-off. Gauge valve sets are designed to isolate the gauges from the pressure vessel when it becomes necessary to drain or service the gauges. The ball check shut-off is designed to retard leakage of the contained fluid in the event of gauge glass breakage.

The number of different types of gauge and valve installations is too great to adequately detail in an installation manual. It is, therefore, the user's responsibility to assure that the knowledgeable installation personnel plan and carry out installation in the safe manner. The following procedures are some of the installation guidelines that should be employed.

#### **5.1 Piping Strain**

The gauge should be mounted and connected so that it does not support any piping weight. Piping not properly supported, independent of the gauge, may not subject the gauge to stress that can cause leaks or glass breakage. Support brackets are available as an accessory.

### **5.2 Differential Thermal Expansion**

High mechanical loads may be imposed on a gauge by expanding and contracting pipes due to hot or cold service. Such mechanical loads on the gauge must be minimized by the use of expansion loops in the system. Failure to allow for expansion or contraction can result in leaks or glass breakage.

### **5.3 Mirror Viewing**

For added safety, a system of indirect viewing by means of mirrors should be installed to protect personnel from hazards of possible gauge failure.

### **5.4 Nut Retorquing**

Nut re-torque is vital to the operation of a liquid level gauge because gaskets take permanent set under initial bolt loading at assembly. Tightening of nuts before installation to values specified in Table 1 is necessary to insure pressure-retaining capabilities of liquid level gauge to specific design ratings. The user must refer to the liquid level gauge model and assembly number and to the purchase order or tag to determine materials of construction.



**Failure to comply with the proper torque-ing sequence or force/height value can lead to leakage, gasket blow-out or glass breakage resulting in gage failure, serious injury and/or property damage.**

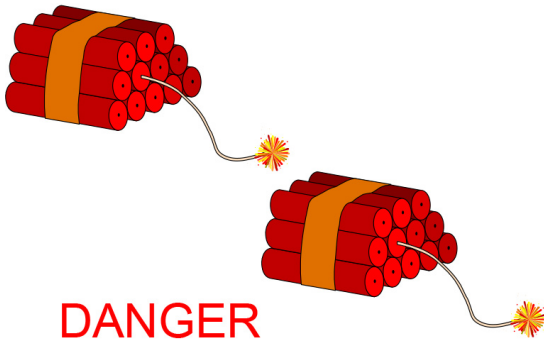


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NOTE: Depending on gage size there may be less bolting than shown in Figure 1. Start at the center and follow “Z” pattern outward to the limit of bolting on a special gage.

## 6.0 Operation

Before initializing liquid level gage operation, check that all installation procedures have been completed. Use only qualified, experienced personnel who are familiar with liquid level gage equipment and thoroughly understand the implications of the tables and all the instructions. Check to determine that all connections are pressure tight. Assure that nuts have been retorqued to their proper values as specified in these instructions. Inspect to be sure that the glass is clean and free of any damage such as cracks, scratches, pits and chips.



Liquid level gage installations should be brought into service slowly to avoid excessive shock or stress on the glass. Rapid pressurization or sudden changes in temperature may cause glass breakage. To avoid excessive thermal shock or mechanical stress on glass, the connecting valves should be opened slightly, and the gage temperature and pressure allowed to slowly equalize. If the valves are equipped with ball checks, the valves must be opened all the way after the pressure and temperature have equalized to permit operation of the automatic ball checks in the event of failure. Failure to follow the recommended operating procedures can result in death, severe personal injury and/or property damage.

Take all precautions necessary to handle the possibility of leakage during the test. Hydrostatically pressure test all installations to at least 100PSIG but less than design pressure and correct any leakage before proceeding.

## 7.0 Maintenance



**Use only qualified experienced personnel who are familiar with liquid level gage equipment and thoroughly understand the implications of the tables and all the instructions. DO NOT proceed with any maintenance unless the liquid level gage has been relieved of all pressure or vacuum, has been allowed to reach ambient temperature and has been drained or purged of all fluids. Failure to do so can cause serious personal injury and property damage.**

The rate at which components degrade is dependent upon a variety of conditions. Pressure, temperature and process media all influence that rate at which gage components deteriorate. Higher temperatures can accelerate the deterioration of gaskets, cushions, glass and metals. Acids and similar chemicals can break down the integrity of almost any material. Concentration of chemicals can accelerate the corrosion rate. ARCHON Industries, Inc. cannot create a blanket maintenance schedule for every application.

The end user is the most familiar with the process media and conditions and must be responsible for creating a maintenance schedule. The user must create maintenance schedules, safety manuals, and inspection details for each liquid level gage. Realistic maintenance schedules can only be determined with full knowledge of the services and application situations involved. These will be based upon the user's own operating experience with their specific application.



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If bolting, gasketing or glass on any section of a multi-section gage is disturbed; all sections must be checked for integrity and retorqued or repaired as necessary.

On all installations, the user for purposes of maintenance should regularly evaluate the following items:

- 1). Glass, for cleanliness and signs of damage or wear
- 2). Shields, if used, for signs of clouding, wear or deterioration
- 3). Gage, for signs of leakage around gaskets or at connections and
- 4). Gauge, for signs of internal or external corrosion.

## 7.1 Maintenance

**GLASS** should be given regular and careful attention. Keep glass clean using a commercial glass cleaner and a soft cloth. Inspect the surface of the glass for any clouding, etching or scratching or physical damage such as bruises, checks or corrosion. Glass that is damaged is weakened and may break under pressure. Shining a light at approximately a 45-degree angle will aid in detecting some of these conditions. Typical damaged areas will glisten more brightly than the surrounding glass because the light is reflected.

Detection of any damage, problem areas or surface wear is sufficient evidence to take the liquid level gage out of service. **DO NOT** proceed with operation of the liquid level gage until the glass has been replaced with a glass replacement kit following the assembly instructions in Section 8.

**SHIELDS** showing any sign of clouding, wear or deterioration is an indication that the gage glass has been exposed, or could soon be exposed to the contained fluid. Immediately take the liquid level gage out of service. **DO NOT** proceed with operation of the liquid level gage until shields and glass have been replaced by following the disassembly –reassembly instructions in Section 8.

**GASKET LEAKS** must be repaired immediately. **DO NOT** proceed with operation of a liquid level gage until gaskets have been replaced by following Section 8 assembly instructions.

**CONNECTION LEAKS** at a flanged or threaded connection should be corrected by tightening the bolting at the connection or by taking the liquid level gage out of service and wrapping the connection threads with Teflon tape on all male pipe threads.

**CORROSION** may occur if the user has selected an improper material for the liquid level gage application. It is the responsibility of the user to choose a material of construction compatible with both the contained fluid and the surrounding environment. If internal or external corrosion is present, the user must immediately perform an investigation. It may be necessary to contact an authorized ARCHON Industries, Inc. distributor to better determine the origin of the corrosion.

## 7.2 Troubleshooting

**Problem:** glass becomes prematurely etched or clouded in service

**Cause:** fluid being handled is not compatible with the glass or shields

**Solution:** replace the glass and install shields, which will not be affected by contained fluid

**Problem:** glass continually breaks in service despite careful attention to maintenance procedures

**Cause:** thermal shock, hydraulic shock, mechanical loads, exceeding design ratings or a combination of these

**Solution:** check entire system to determine possible sources of loads. Check application to determine actual operating conditions and contact an authorized ARCHON Industries, Inc. distributor on how to proceed.



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## 8.0 Removal – Disassembly – Reassembly



Use only qualified, experienced personnel who are familiar with liquid level gage equipment and thoroughly understand the implications of the tables and all the instructions. **DO NOT** proceed with any maintenance unless the liquid level gage has been relieved of all pressure or vacuum, has been allowed to reach ambient temperature and has been drained or purged of all fluids. Failure to do so can cause serious personal injury and property damage.

### 8.1 Disassembly

Secure workbench longer than the liquid level gage, and sufficiently wide to lie out parts as they are removed.

- 1) Lay gage on bench so nut side of fastener is up.
- 2) Hold gage firmly, and loosen nuts starting at both ends of each section and then proceeding from both ends to the center of each section as shown in Figure 1.
- 3). Nut Loosening Sequence
  - remove nuts
  - tap covers with rubber hammer as needed to loosen and remove cushions, glass, shields (if any) and gaskets
  - tap liquid chamber or remaining covers as necessary with rubber hammer to break loose and remove remaining components
  - remove, destroy and dispose of all glass, cushion, gaskets, and shields.

**Under no circumstances should these components be re-used or installed on a gage.**

NOTE: If size of gage is smaller than shown, follow zig-zag sequence from the ends until bolting is loosened.



Once used cushions, gaskets and shields are permanently deformed by compression and if re-used, may cause leaks and high stress points resulting in glass breakage. Glass may contain hidden damage and internal stresses causing personal and property damage.

### 8.2 Inspection of Glass Seating Surfaces

Clean the glass seating surfaces on the liquid chamber and cover with a soft metal scraper (preferably brass) to remove all burrs, rust and remnants of the previous gaskets and cushions. Exercise extreme care to avoid gouging or scarring and cushion seating surfaces.

Use of known flat piece of metal the same approximate length as the glass or a new piece of glass and a thickness gage to check flatness of each glass seating surface on liquid chamber and under cover. Surface must be flat within 0.002 inch. If any one surface is found to be beyond a tolerance of 0.002 inch, the entire gage must be disposed of and replaced. Gasket seating surface must have a final surface finish of 450 to 500 AARH.



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**WARNING**

Flatness of glass seating surface outside 0.002-inch tolerance specified is an indication of the gage having overstressed through repeated exposure to mechanical, thermal, or hydraulic shock during its previous service. Operation of a liquid level gage, which has been overstressed, will result in abnormal stresses on the glass that may cause glass to break. If surface finish is not in the 450-500 AARH range, gasket may extrude under pressure with resulting sudden release of pressure, leakage of contained fluid, serious personal injury, or property damage.

Glass seating surfaces should NOT be machined to achieve seating tolerance. The Chamber and cover are designed for a critical thickness to achieve the pressure / temperature ratings. Machining glass-seating surfaces may result in non-compliance to the necessary thickness due to material removal.

### 8.3 Reassembly

If all glass seating surfaces are found to be within the 0.002 inch (0.051mm) tolerance described in the previous section, proceed to obtain new glass, gaskets, cushions and shields (if used) and proceed to reassemble as follows (refer to exploded parts view in Section 11 if needed):

- 1). Clean threads on bolt and nuts to remove all paint, rust and scale. Apply a light coat of oil to the threads.
- 2). For gages TL, TM, TH, RH, insert bolts through half the cover and lay out covers along bench, side by side, with liquid chambers. Use chambers to space covers and line them up with vision slots.
- 3). For gages RL and RM, lay out covers along bench, side by side, with liquid chambers. Use

chambers to space covers and line them up with vision slots.

- 4). Install one cushion inside each cover.



**WARNING**

Separate installation instructions are supplied with replacement glass. All instructions supplied with the glass must be followed, as there are precautions to be taken when handling gage glass. Among the precautions is avoidance of bumping or sliding glass against any surface and inspection of individual pieces. Failure to follow any of the replacement gage glass installation instructions could result in glass breakage with resulting sudden release of pressure, personal or property damage.

- 5). Install rubber band around each piece of glass, then place glass centered inside each cover.
- 6). Install shields, if used, and gasket on glass being careful to keep components centered
- 7). Place liquid chamber on the gaskets (shields-if used) making sure all components are aligned with vision slot.
- 8). For reflex gages RL and RM, install U-bolts in place by tapping as needed with rubber hammer, being careful not to lose alignment with vision slot.
- 9). For reflex gages RL and RM, quickly turn over assembly onto back side of U-bolts. Assemble nameplate, washer, and nuts to U-bolts. Tighten nuts with fingers. Using a torque wrench, tighten nuts in five **ft-lb** increments, following the sequence in Figure 1 until the torque values shown in Table 1 are reached.



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NOTE: Depending on gage size there may be less bolting than shown in Figure 1. Start at the center and follow “Z” pattern outward to the limit of bolting on a specific gage.

- 10). For RH and transparent gages, install gaskets in place, and shields if used.
- 11). Install one cushion on each piece of glass
- 12). Install rubber band around each piece of glass, then place glass centered inside each cover.
- 13). Install covers in place being careful to maintain components alignment inside.
- 14). Install nuts to studs.  
Tighten nuts with fingers.  
Using a torque wrench, tighten nuts in five **ft-lb** increments, following the sequence in Figure 1 until the torque values shown in Table 1 are reached.

Refer to Section 5 for installation and Section 6 for operation of liquid level gage when returning to service.

### 9.0 Disposal at End of Useful Life

ARCHON Industries, Inc. Liquid Level Gauges are used in a variety of fluid applications. By following the appropriate government and industry regulations, the user must determine the extent of preparation and treatment the gage must incur before its disposal. A Material Safety Data Sheet (MSDS) may be required before disposal services accept certain components.

Metals, glass, and polymers should be recycled whenever possible. Refer to order and ARCHON Industries, Inc. Material Specification sheets for materials of construction.

### 10.0 Telephone Assistance

If you are having difficulty with your liquid level gage, notify ARCHON Industries, Inc. You may also contact the factory direct at (800) 554-1394 and ask for an applications engineer. So that we may assist you more effectively, please have as much of the following information as possible when you call:

- Model #
- Name of the company from whom you purchased your liquid level gage
- Invoice # and date
- Process fluid
- Operating pressures
- Operating temperatures
- A brief description of the problem
- Troubleshooting procedures that failed

If attempts to solve your problem fail, you may be requested to return your liquid level gage to the factory for intensive testing. You must obtain a Return Authorization (R.A.) number from ARCHON Industries, Inc. prior to returning anything. Failure to do so will result in the unit being returned to you, without being tested, freight collect. To obtain a R.A. number, the following information (in addition to that above) is needed:

- Reason for return
- Person to contact at your company
- “Ship To” address

We recommend that you return the entire unit for testing. There is a minimum charge of \$75.00 for evaluation of non-warranty units. You will be contacted before any repairs are initiated should the cost exceed the minimum charge. If you return a unit that is covered by the warranty, but is not defective, the minimum charge will apply.

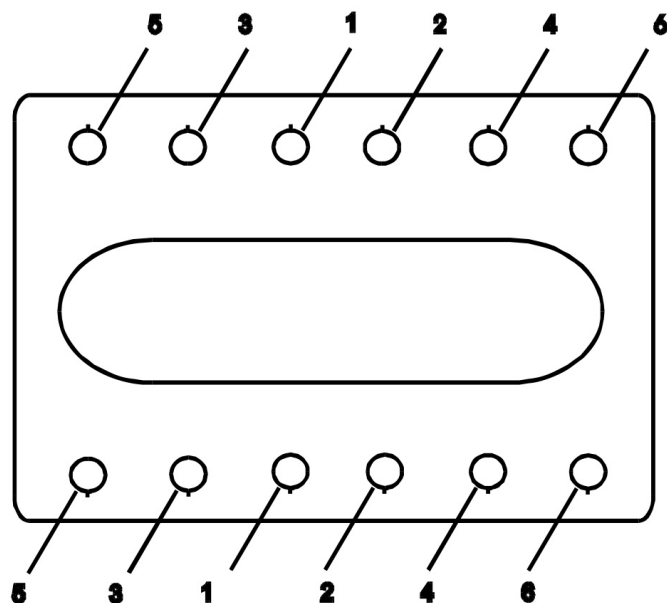


FIGURE 1

Model	Sizes	Glass	Torque
TL TLC TM TH	All sizes	Transparent	40 ft. lbs. (Lubricated)
RL RLC RM RH		Reflex	

Torque Values for Rectangular Sight Windows  
TABLE 1