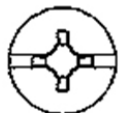


Inspecting Combination Screw Drive Systems

by Larry Borowski



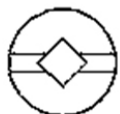
Type I / Slot



Type IA / Slot



Hexalobular / Slot



Type III / Slot



External hex / Slot



External hex / Type I

Combination drive system designs have been in existence for many years now. Some of these designs have gained very wide use in applications where consumer products may at some time need to be serviced by the end customer. There was a time where combination drives failed to be recognized in an industrial standard, but that has changed in the past couple of years. Unfortunately, not every combination drive is covered in current industrial standards. Furthermore, the combination drives that are covered do not include details on all possible head design/drive possibilities. However, **the more common drives are covered in ASME B18.6.3, which does provide some guidance to the industry as a whole. These currently include the Type I/Slot, the Type IA/Slot, and the Type III/Slot combination drives.**

Combination drive systems are those that mate together a primary driving system with a secondary driving system on one screw. The primary drive system is the one that is intended to be used during factory assembly of products. The secondary drive system is the one intended for use by the end user of the product if service is required. The secondary drive system is typically the slotted recess. When drive systems are combined it is difficult, if not impossible, to inspect both designs for all characteristics as though they were made separately. The reason being that the slot removes enough material from the primary drive to make some recess performance tests invalid. These tests include, but are not limited to recess wobble, recess depth, and recess strength.

In the event that you are producing a combination drive not covered in the current ASME standards, I make the following two suggestions for avoiding the potential acceptance disagreements over the inspection of combination drive systems:

- 1. Manufacture the parts to the purchaser's print that details the drive system inspection criteria. If the purchaser does not have a print I suggest the screw manufacturer supply a print with these details on it. The purchaser and manufacturer should formally agree on this matter before production starts.**
- 2. If there is no print and one cannot be provided by either the purchaser or manufacturer I suggest the primary drive system be inspected as though it were made by itself and the secondary drive system dimensions should be considered "reference dimensions".**



This chart lists the most commonly used combination drive systems and what I suggest should be considered the primary and secondary drive system in each design:

Combination Recess	Primary Recess	Secondary Recess
Type I / Slot	Type I (*)	Slot
Type IA / Slot	Type IA (*)	Slot
Type III / Slot	Type III	Slot
Type III / Type I	Type III	Type I
Hexalobular / Slot	Hexalobular	Slot
External hex / Slot	External hex	Slot
External hex / Type I	External hex	Type I

(*) The one exception to this suggestion is that combination ASME Type I / Slot and ASME Type IA / Slot recesses should not be inspected for recess wobble.

Listed below is a table of the commonly used industrial standards to determine the requirements for the primary drive systems: NAS, JIS, and DIN standards also have information on the primary drive systems, but to the best of my knowledge do not cover any combination type drives.

Drive System	Industrial Standards
Type I recess	<ul style="list-style-type: none"> ASME B18.6.3 ASME B18.6.5M ASME B18.6.7M
Type IA recess	<ul style="list-style-type: none"> ASME B18.6.3 ASME B18.6.5M ASME B18.6.7M
Type III	<ul style="list-style-type: none"> ASME B18.6.5M ASME B18.6.7M
Hexalobular	<ul style="list-style-type: none"> ISO 10664 ASME B18.6.3
External hex	<ul style="list-style-type: none"> ASME B18.6.3 ASME B18.6.5M ASME B18.6.7M

Product assemblers are continually becoming more critical of the components they order and receive. Screw manufacturers should be very careful to have agreements about how screws will be inspected before screw production is started. The areas such as screw combination drive systems where industrial standards do not exist, or simply cover a small portion of possibilities are very susceptible to quality disputes.

It is always safest to manufacture screws to a purchaser's print, but if one does not exist, the screw manufacturer should provide one. If a print is not available from either party at least come to an understanding about inspection and acceptance before production begins. Not taking these precautions can result in some very unpleasant situations, including possible part rejection, after parts have been received by the screw assemblers. ■