

IFI

COMMENTARY ON NUTS

NUTS

INTRODUCTION

In 1971 ANSI initiated a program which became known as: "A Study to Develop an Optimum Metric Fastener System". Included as a part of this examination was a review of the relationship of dimensions, materials, and strengths to nut designs which would produce optimum nut performance when mated with various property classes of externally threaded metric fasteners.

Major analytical studies led by Canadian Engineer, Errol Alexander, influenced a number of countries to combine their research resources under the umbrella of the ISO/TC2 technical committee. Working cooperatively, a system of ISO metric strength grades for nuts was developed. The foundation of this system was that even under the most adverse combination of factors, during mass assembly operations, if a bolt/nut combination is inadvertently over tightened, at least once in every ten installations, the bolt will fracture. This fracture force fully alerts the operator that the installation practice needs immediate correction. Once installed and

in service, the normal failure mode if the assembly is overstressed, will be bolt fracture, not thread stripping. Properly used, the system offers the safest bolt/nut assemblies that good engineering and economics can provide.

Nut Styles. The ISO work led to the development of two styles of hex nut; Style 1 and Style 2. The single dimensional difference between these two styles is that Style 2 is approximately 10 percent thicker. Style 1 non-heat treated nuts are designated Class 5 (see ASTM A563M page B-68) and are designed for proper mating with externally threaded products of Property Classes 5.8, 4.8 and 4.6. Style 2 non-heat treated nuts are designated Class 9 and are suitable for mating with externally threaded products of Property Classes 9.8, 8.8, 5.8, 4.8 and 4.6. Style 1 heat treated nuts are designated Class 10 and are suitable for mating with externally threaded products of Property Class 10.9 and lower strengths. Style 2 heat treated nuts are designated Property Class 12 and are suitable for mating with externally threaded products of Property Class 12.9 and lower strengths. A summary is included in Table 1.

Table 1 Mating of Metric Hex Nuts: Style 1 and Style 2

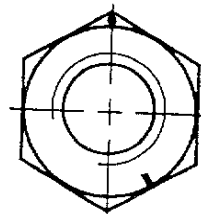
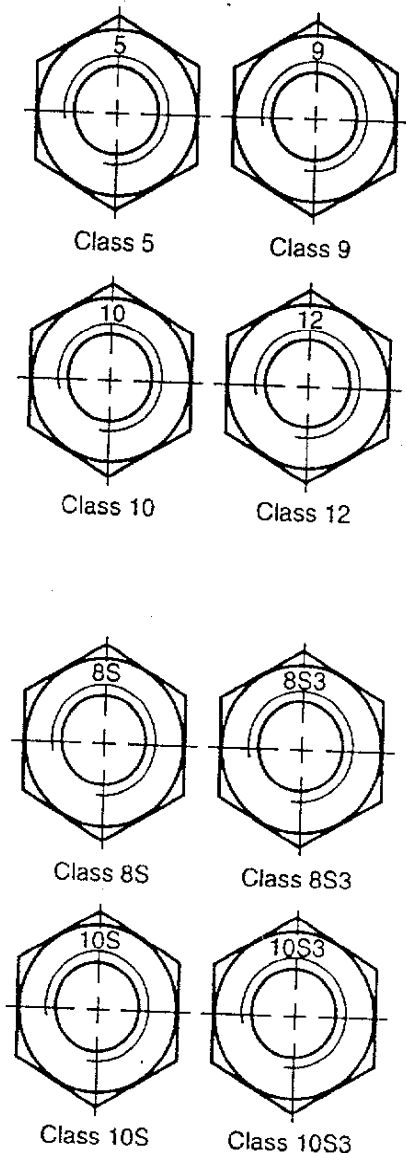
Style of Hex Nut	Class Designation	Condition	Mating With Property Class
Style 1	5	non-heat treated	5.8, 4.8 and 4.6
	10	heat treated	10.9, 9.8, 8.8, 5.8, 4.8 and 4.6
Style 2	9	non-heat treated	9.8, 8.8, 5.8, 4.8 and 4.6
	12	heat treated	12.9, 10.9, 9.8, 8.8, 5.8, 4.8 and 4.6

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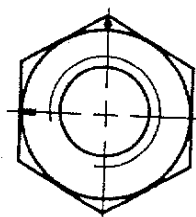
Nut Marking. Nuts intended for use in North America should be marked in accordance with the provisions of ASTM A563M, page B-68, or in accordance with ISO 898/2.

The applicable clock-face system marking of 898/2 includes:

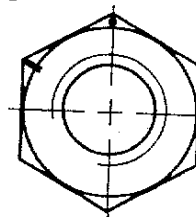
ASTM Mandatory Nut Marking



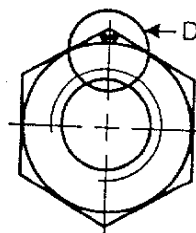
Class 5



Class 9

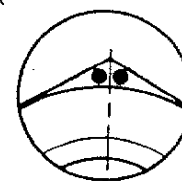


Class 10



Class 12

← Detail X



Detail X
Class 12

While other grades of nuts are included in ISO 898/2 they are not recommended for use in North America.

The Classes 8S and 8S3 and 10S and 10S3 are exclusively reserved for heavy hex nuts whose dimensions are defined in ANSI B18.2.4.6M, page D-29. The S designates a structural nut and the 3 indicates a weathering grade of steel. These steel chemistries and the respective proof load requirements for these nuts are included in ASTM A563M, page B-68.

Provisions for marking of hex jam nuts and slotted hex nuts are included in Appendix X2 of ASTM A563M, page B-78.