



SURFACE VEHICLE STANDARD

J1459™

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Superseding J1459 DEC2009

V-Ribbed Belts and Pulleys

RATIONALE

This latest revision of SAE J1459 accomplishes the following:

- Fixed errors in Table 1.
- Added definitions and diagrams for different types of diameters used.
- Added optional belt dimensioning template.
- Provided correct calculations for pulley ratio calculation via pitch diameter ratio.
- Provided correct calculations for converting center distance to effective length.
- Updated to generic center distance tolerances to align with industry.

1. SCOPE

This SAE Standard covers the dimensioning technique, tolerances, and methods of measurement of V-ribbed belts and mating pulleys for use on automotive accessory drives.

2. REFERENCES

There are no referenced publications specified herein.

3. V-RIBBED BELTS

Although several V-ribbed cross sections are available, this document shall be confined to "PK" (K) section belts which are used in automotive applications, including trucks at least up to Class 3. Belts shall conform to Figure 1.

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4. PULLEYS MATING WITH V-RIBBED BELTS

It is the intention of this document to relate the belt profile to the pulley profile using the variables associated with the 2.50 mm ball used in measuring pulley diameters. Pulleys shall conform to Figures 2, 3, and 4. Figure 2 shows a split pulley section, Figure 3 a folded pulley section—both preferred constructions. Figure 4 shows an optional folded pulley section.

4.1 Pulley Diameter Definitions

The diameter over balls (DOB, or Db) is the only diameter measured on a pulley in the groove/flange area. There are other diameters used that are calculated from this value. The ball diameter is defined as 2.500 mm ± 0.010 mm. See Tables 1A and 1B.

Table 1A - Pulley diameter - 40 degrees groove
(for calculation purposes only - 40 degrees groove)

Diameter	Definition
Effective	Db - 0.990 (Belt Reference Value)*
Groove Tip	Db - 1.875 (Groove Diameter with 0.48R Tip)
Apex	Db - 0.028 (Flank Intersect)
Pitch	Db + 2PBΔg (To Cord Line)

* Effective diameter is always Db - 0.99, as its only reference value used for the belt length callout.

Table 1B - Pulley diameter - 37 degrees groove
(for calculation purposes only - 37 degrees groove)

Diameter	Definition
Effective	Db - 0.990 (Belt Reference Value)*
Groove Tip	Db - 1.805 (Groove Diameter with 0.48R Tip)
Apex	Db + 0.261 (Flank Intersect)
Pitch	Db + 2PBΔg (To Cord Line)

* Effective diameter is always Db - 0.99, as its only reference value used for the belt length callout.

Effective diameter is based on the tip diameter for a 40 degree pulley with 0.25R tip radius, while this standard utilizes a 0.48R tip radius for the pulley. This can be seen in Figure 1:

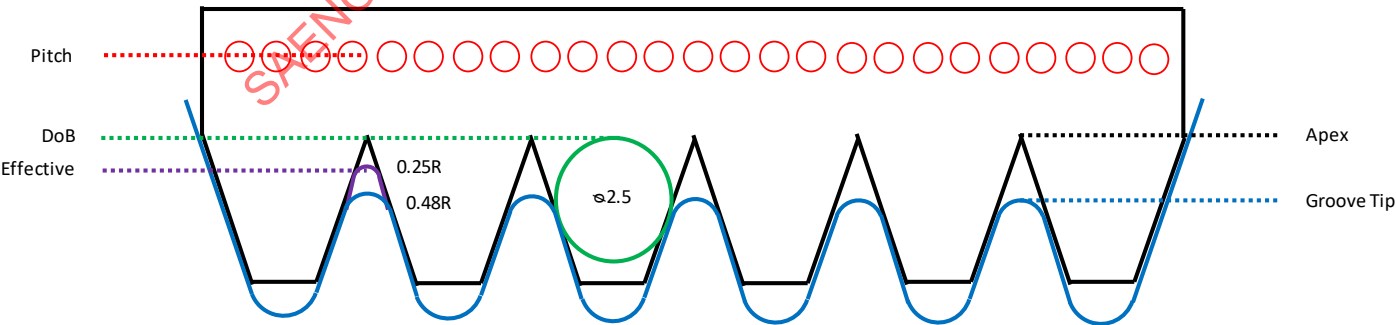


Figure 1 - Belt cutaway

4.2 Pulley Ratio Calculation

A pulley ratio is calculated using the ratio of the pitch diameters of the driver pulley and driven pulley using Equation 1:

$$\text{Ratio} = \frac{D_{\text{pitch,driver}}}{D_{\text{pitch,driven}}} \quad (\text{Eq. 1})$$

4.3 Dimensioning Templates

This section has a belt template drawing, as well as three different pulley template drawings that are to be used.

NOTE: Flange geometry is important to enable a mis-seated belt to center itself once the pulley starts to rotate.

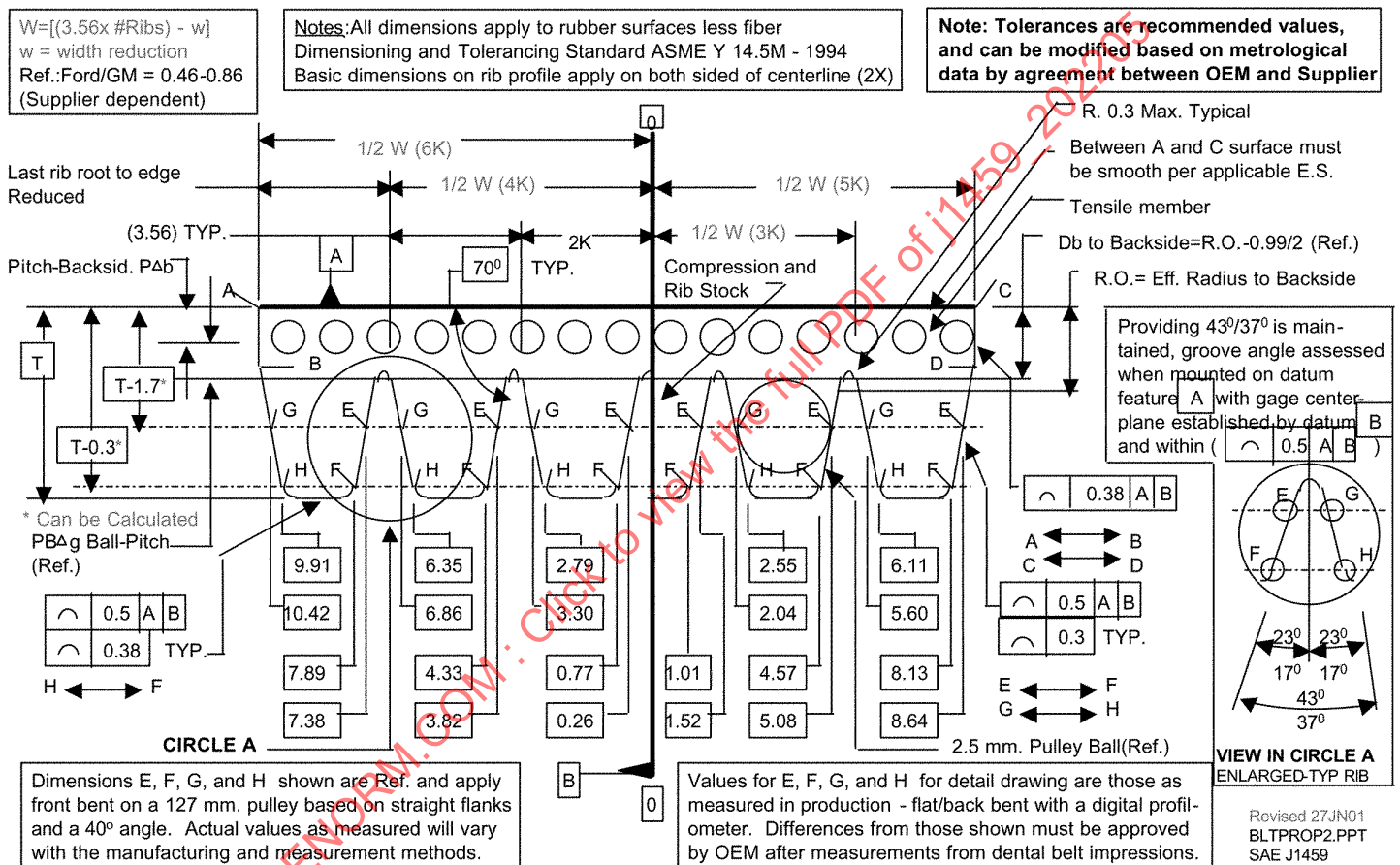


Figure 2 - Belt dimensioning template

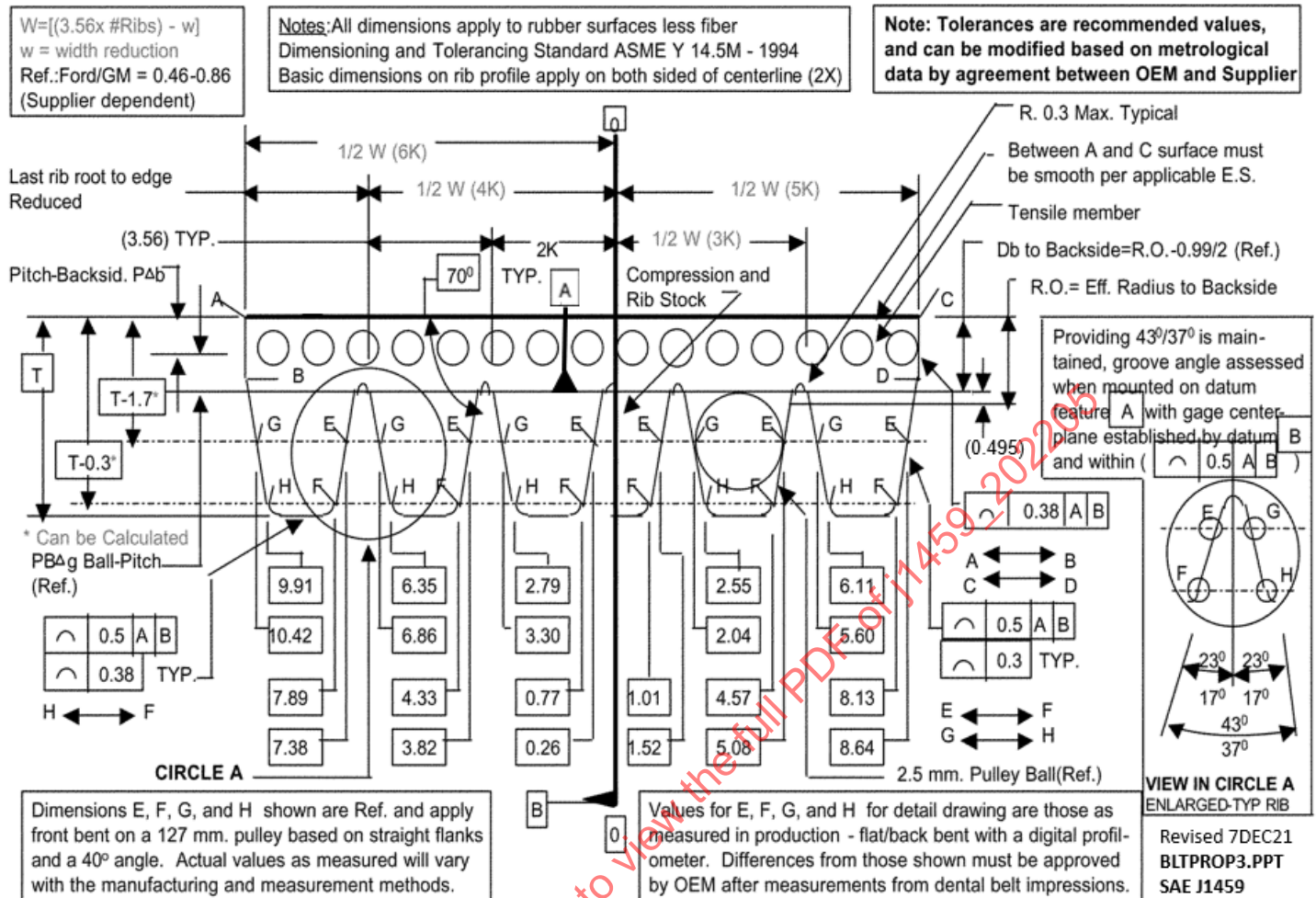


Figure 3 - Optional belt dimensioning template

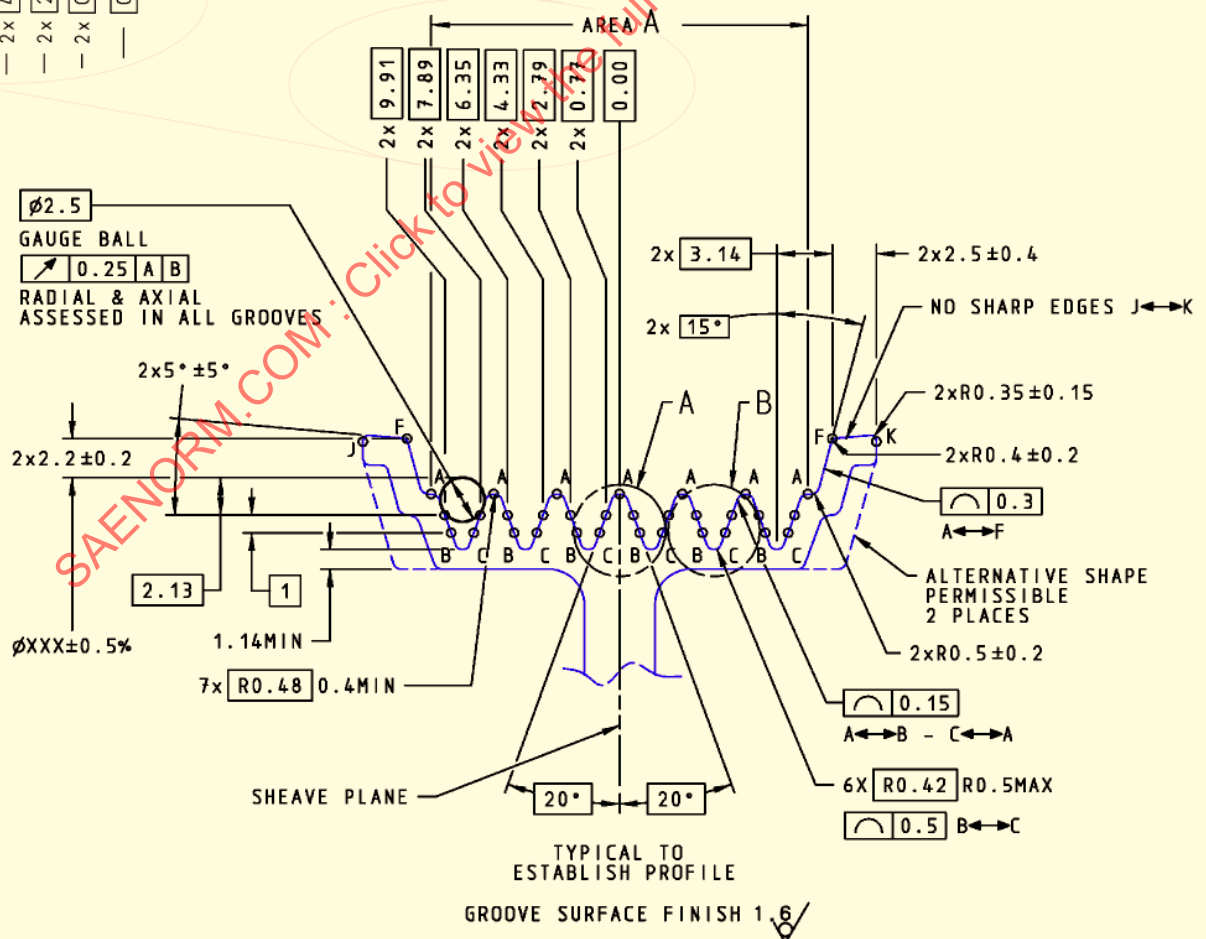


Figure 4 - “Split” pulley dimensioning template (6) groove shown (typical)

Notes:

1. This template applies to pulleys with DoB >70mm except where shown
2. All dimensions apply unpainted
3. Dimensioning and tolerancing to ASME Y 14.5M-1994
4. Digital profilometer/vision system required for production metrology
5. Points B & C must be on a line at a greater diameter than the tangent point of the root radii
6. Points D & E must be on a line at a greater diameter less than the tip radii

Y and Z are functions of material thickness and supplier processes; to be defined numerically on the drawing.

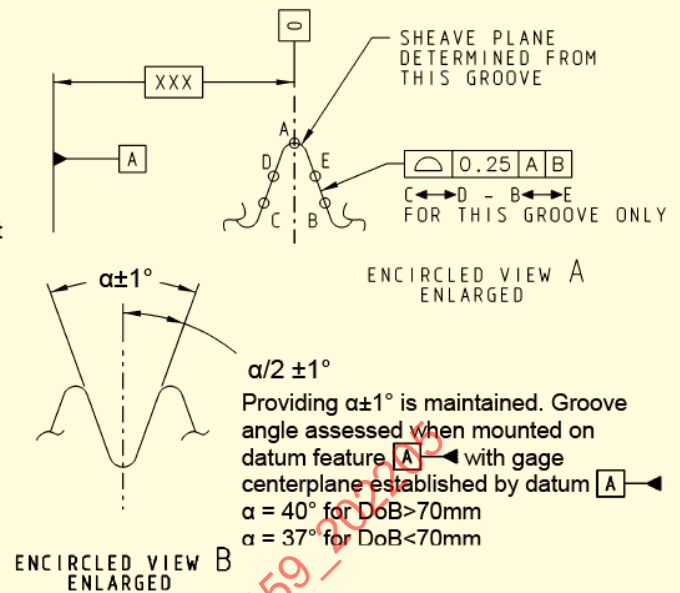
Coating must be smooth and even within AREA A

Tolerances are recommended values, and may be modified based on metrological data by agreement between OEM and supplier

Unless otherwise specified:

Max imbalance = $44/R$ g-cm (R = highest pulley ratio for this pulley)

Stamped surfaces $\boxed{\text{1.6 A B}}$



Pulleys with DoB <70mm

- 2x	9.92	
= 2x	7.88	
- 2x	6.36	
- 2x	4.32	
- 2x	2.79	
- 2x	0.76	
-	0.00	

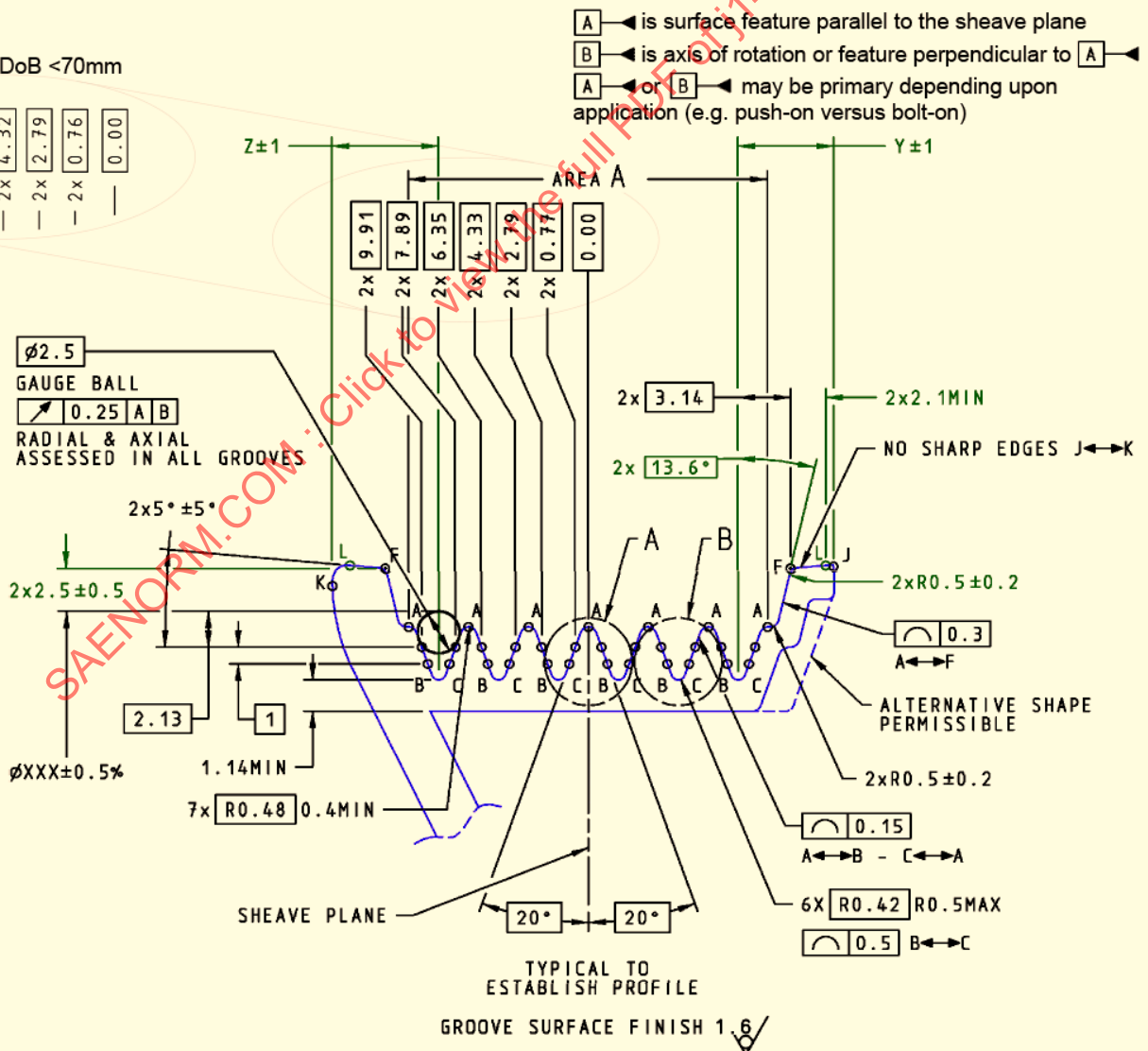


Figure 5 - "Folded" pulley dimensioning template (6) groove shown (typical)

Notes:

1. This template applies to pulleys with DoB >70mm except where shown
2. All dimensions apply unpainted
3. Dimensioning and tolerancing to ASME Y 14.5M-1994
4. Digital profilometer/vision system required for production metrology
5. Points B & C must be on a line at a greater diameter than the tangent point of the root radii
6. Points D & E must be on a line at a greater diameter less than the tip radii

Y and Z are functions of material thickness and supplier processes; to be defined numerically on the drawing.

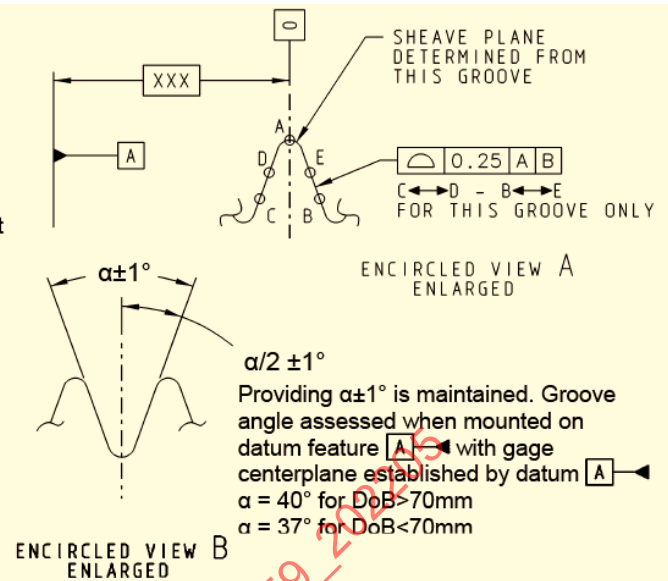
Coating must be smooth and even within AREA A

Tolerances are recommended values, and may be modified based on metrological data by agreement between OEM and supplier

Unless otherwise specified:

Max imbalance = $44/R$ g-cm (R = highest pulley ratio for this pulley)

Stamped surfaces 1.6 A B



A ◀ is surface feature parallel to the sheave plane
B ◀ is axis of rotation or feature perpendicular to **A** ◀
A ◀ or **B** ◀ may be primary depending upon application (e.g. push-on versus bolt-on)

Pulleys with DoB <70mm

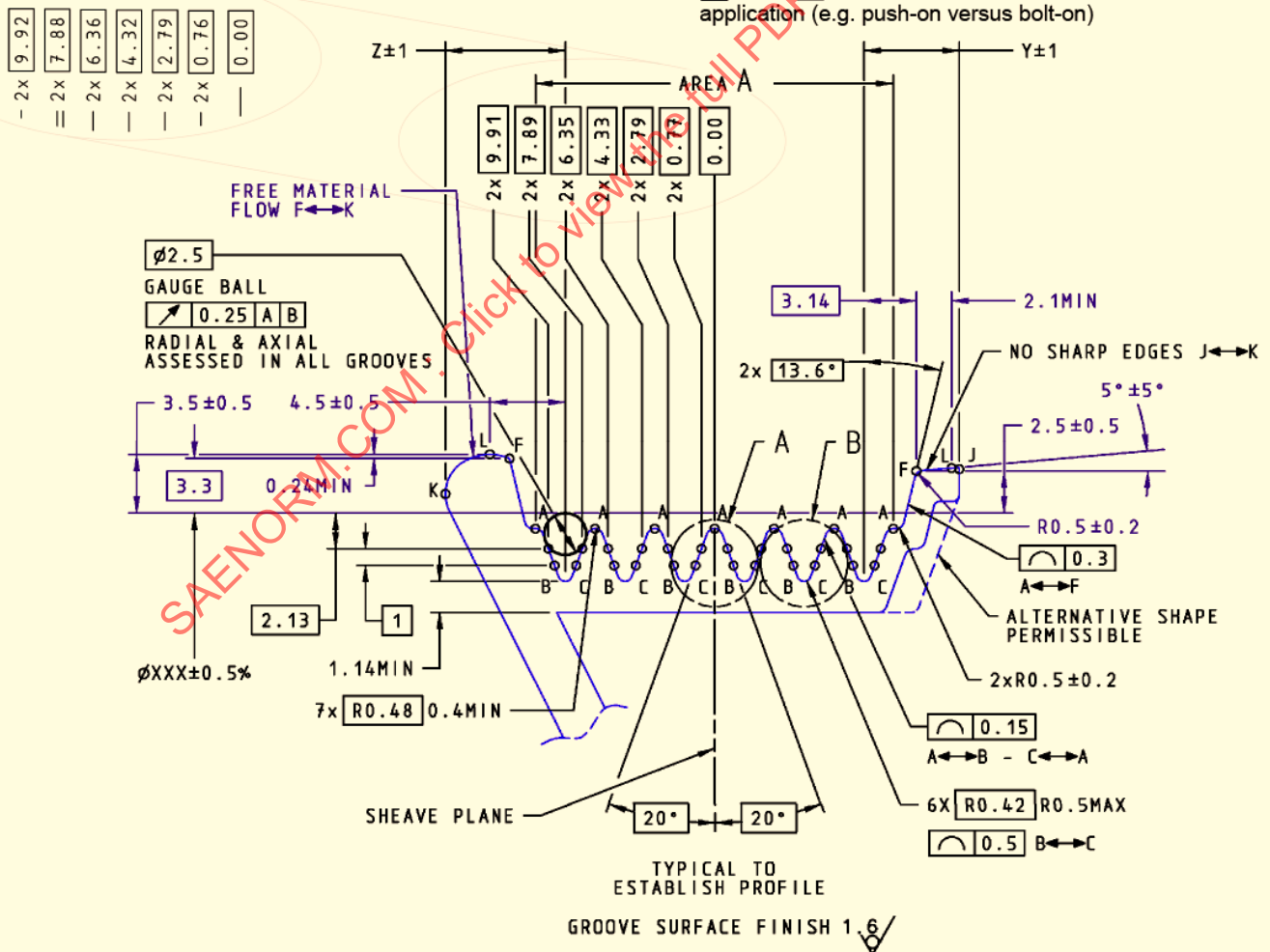


Figure 6 - “Folded” pulley dimensioning template (6) groove shown (alternate for thinner material)