

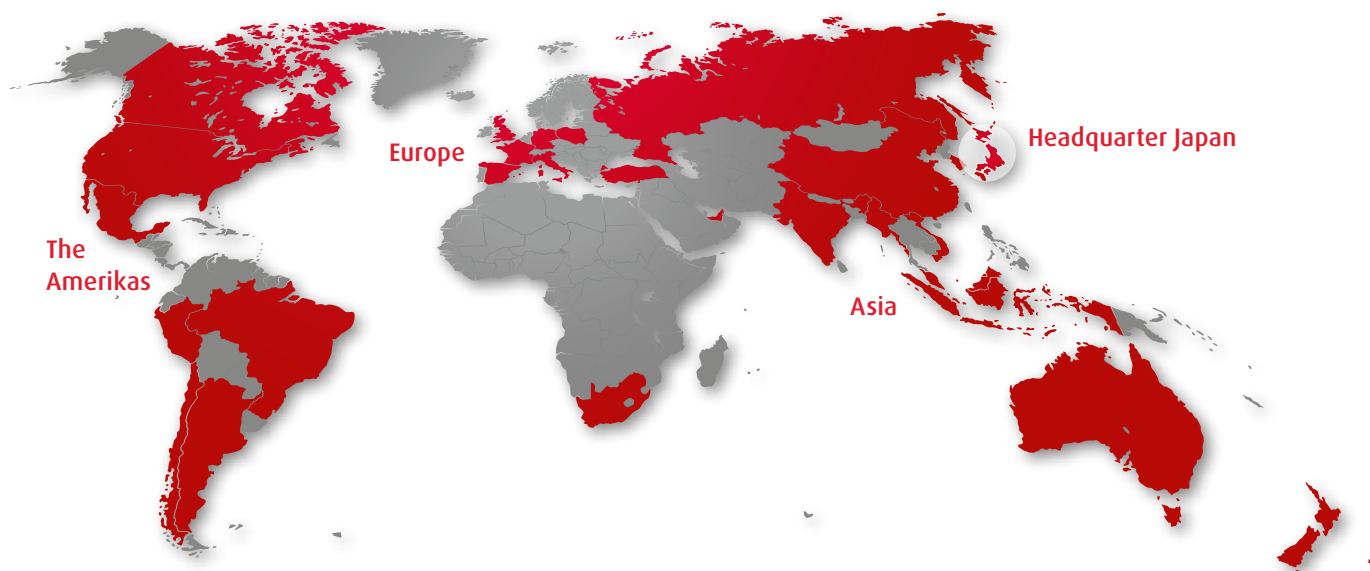
DIN BALL SCREWS  
FOR THE MACHINE TOOL INDUSTRY



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# Our most important product: Our customers' satisfaction

We are among the leading manufacturers for rolling bearings, linear technology components and steering systems worldwide. We can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.



## The NSK Company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context our worldwide research and production facilities are linked together in a global network. Here we concentrate not only on the development of new

technologies, but also on the continuous optimisation of quality – at every process stage. Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

More about NSK under: [www.nskeurope.com](http://www.nskeurope.com)

# High speed, high capacity, low noise

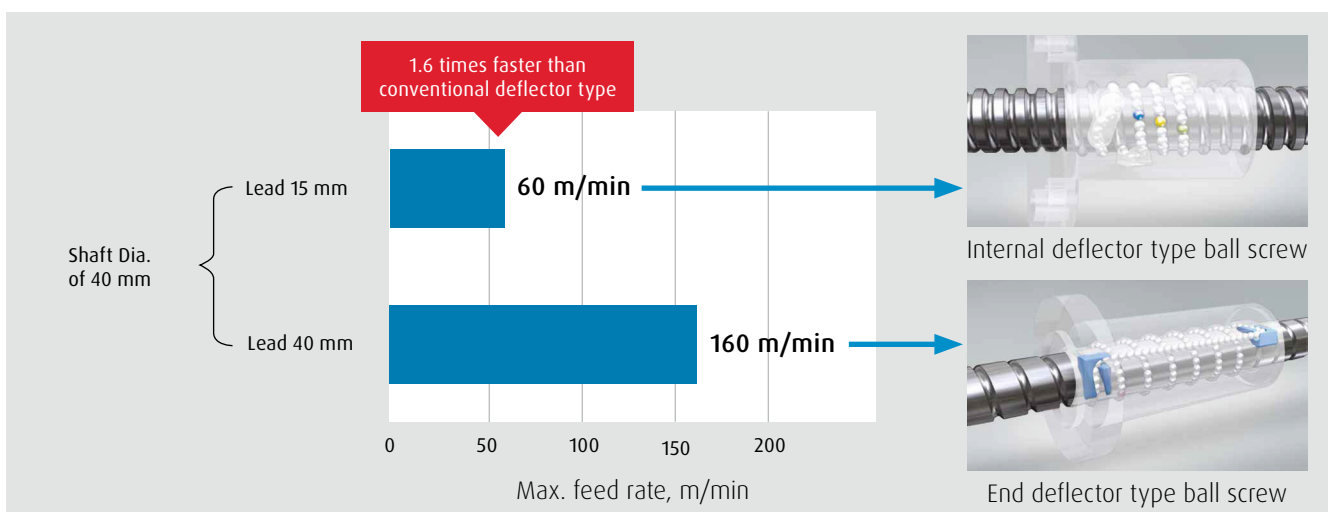


## Features

- › High speed capability
- › High load capacity
- › Low torque variation
- › Low noise
- › Dimensions according DIN-Norm
- › Available from stock for prototypes

## High-speed operation

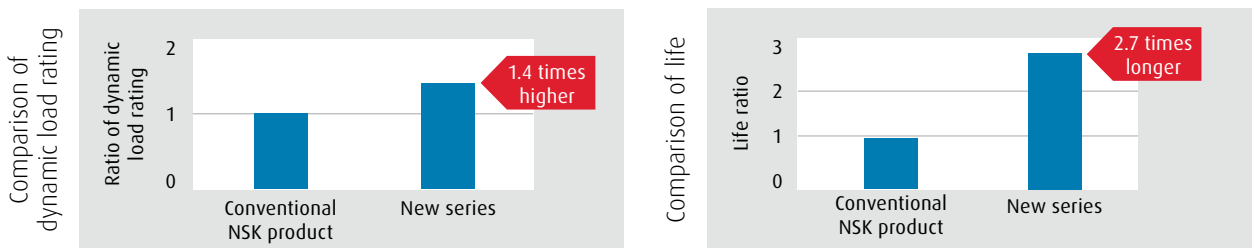
Depending on shaft diameter and lead combination, two types of recirculation system are used. One option is the newly developed internal deflector which is chosen for smaller leads (10 – 30 mm). The other is the end-deflector for higher leads between 20 and 40 mm. Both allow a high  $d \cdot n$  value of 150.000 ~ 160.000.



# New Development Achievement

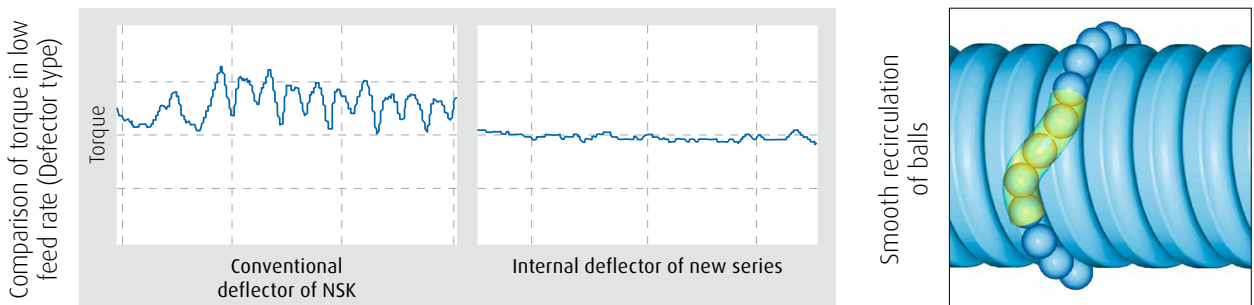
## High load capacity

1.4 times dynamic load rating is achieved by applying special TF bearing steel with dedicated heat treatment to ball screws for machine tools. This TF material has already been applied in the bearing industry several years ago and as well as to our high load capacity ball screws for injection molding machines. It contributes to high cycle operation with long life of ball screws.



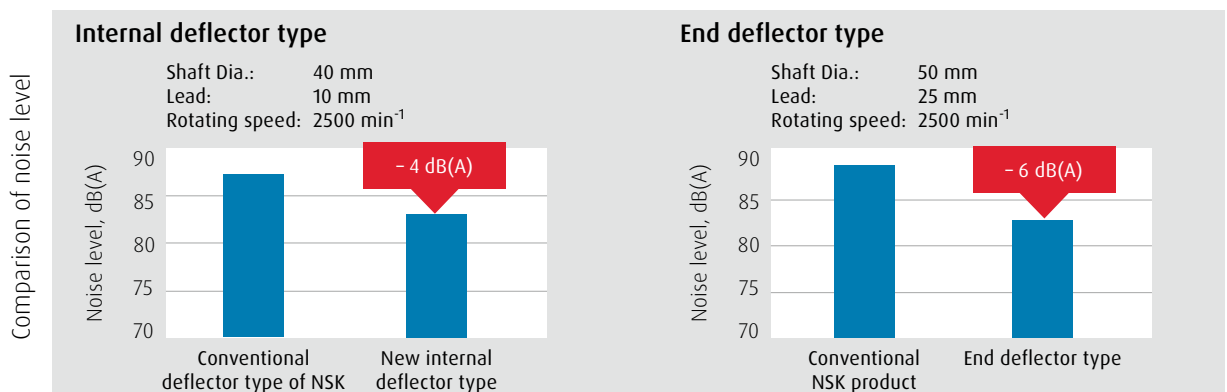
## Newly developed internal deflector for low torque variation

By using our own simulation technology for ball motion NSK has developed improved ball recirculation systems. The low torque variation contributes to the improvement of the surface profile of machined work pieces.



## Low noise

Low noise technology that has previously been used for the end deflector type has now been applied to the new internal deflector type. Other low noise technology that reduces the noise from raceway can be applied to this series when the specified accuracy grade is C3 or higher. Please contact NSK when this feature is needed for accuracy grade C5.



# TF Steel technology

## TF Steel technology now used for BS series

We are applying our existing TF bearing steel technology to increase the robustness and lifespan of our new DIN ball screw series. Using this material enables us to extend our ball screw life by avoiding external early flaking due to stress at impressions.

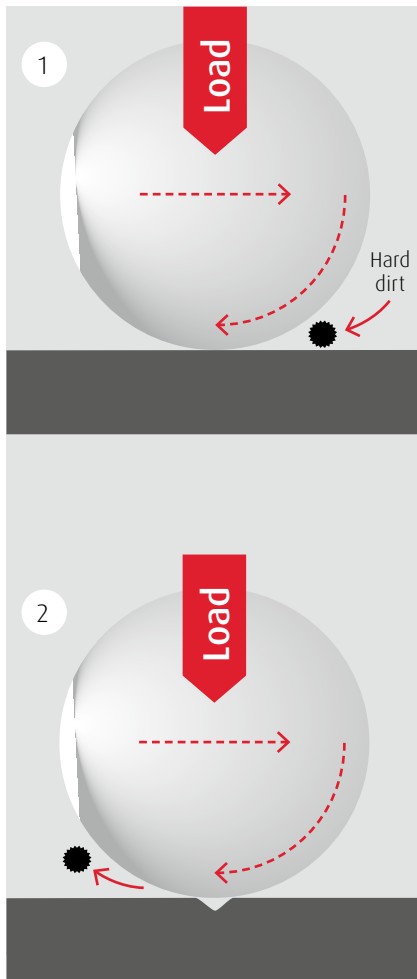
### Properties of the TF material

- › Fine distribution of carbides and carbonitride particles
- › Remaining austenite is checked properly to have the best combination of hardness and strength
- › Due to this fact, excess material can be pushed back into the surface and thus avoids recurring tensions

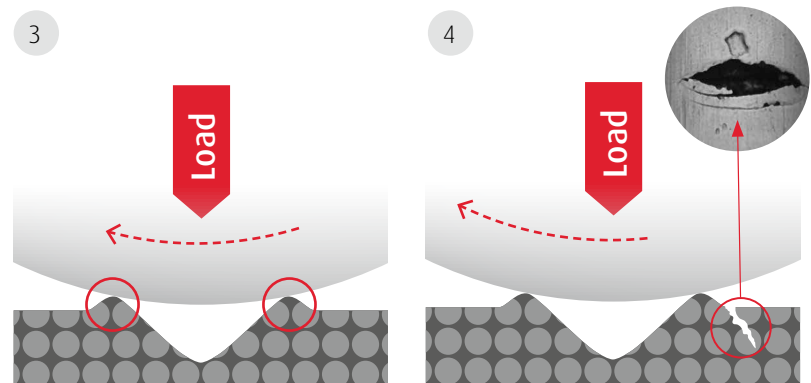
### Advantages of the TF material

- › Far better lifespan in polluted environments
- › Longer life even under normal conditions
- › Better resistance against surface damage
- › Reduced failure caused by broken parts released from impressions

## TF steel relieves the stress concentration due to hardness and toughness

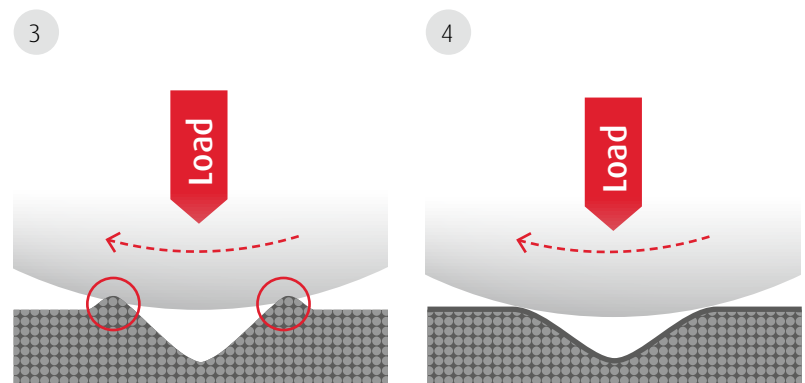


### Conventional steel



Crack will occur from the stress around the impression

### TF-Steel



No extra stress present

## Theory of decreasing the stress concentration around the impression

# Specifications

## Series range and allowable feed rate

### DIN standard nut Dia. range

Unit: m/min

Shaft Diameter	Lead					
	10 mm	15 mm	20 mm	25 mm	30 mm	40 mm
32 mm	50	75	100	—	—	—
40 mm	40	60	80	100	120	160
50 mm	32	48	64	—	—	—
63 mm	23	35	47	—	71	—

### DIN extended nut Dia. range

Unit: m/min

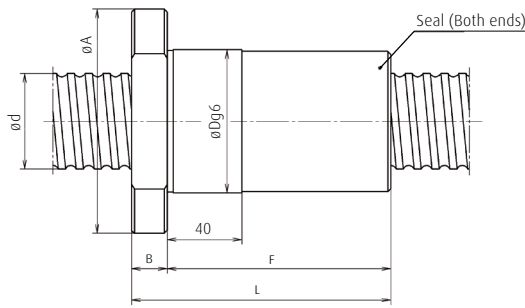
Shaft Diameter	Lead					
	10 mm	15 mm	20 mm	25 mm	30 mm	40 mm
32 mm	—	—	100	—	—	—
40 mm	—	—	80	100	120	160
50 mm	—	—	—	80	96	128
63 mm	—	—	—	—	—	—

**Remarks** Maximum allowable feed rate (m/min) is calculated from allowable rotating speed. Review of critical speed is required. Please contact NSK when the speed exceeds the maximum allowable dn value  $\varnothing 32 \sim \varnothing 50$ : 160.000,  $\varnothing 63$ : 150.000.

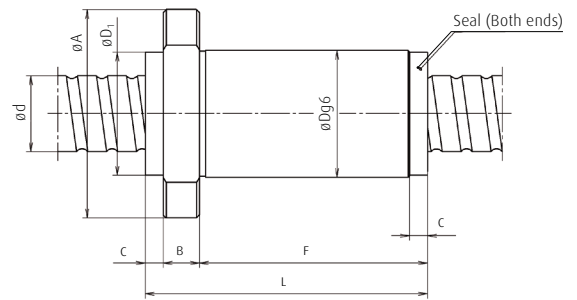
## Preload system

The standard preload system is offset preload.

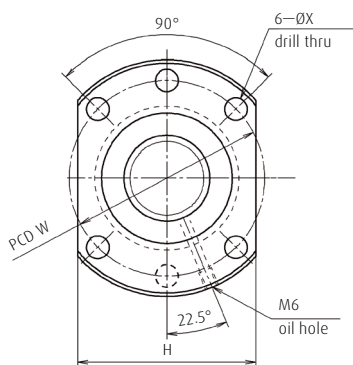
## Dimensions



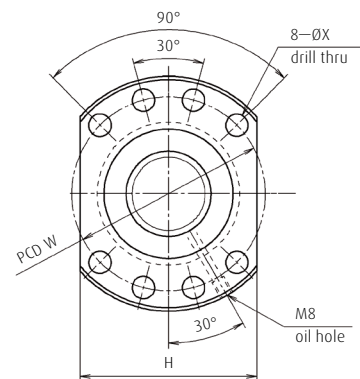
ZSD (Internal deflector type)



ZSS (End deflector type)



Shape I (Shaft Dia. = 32)



Shape II (Shaft Dia. > 32)

Unit: mm

Model No.	Shaft dia.  d	Lead  l	Effective ball turns Turns × Circuits	Basic load rating (N)		Ball nut dimensions										DIN standard nut Dia.	DIN extended nut Dia.
				Dyna- mic C <sub>a</sub>	Static C <sub>0a</sub>	L	D	D1	A	B	C	F	W	X	H		
ZSD3210-10	32	10	1×5	58700	83 200	156	50	-	80	12	-	144	65	9	62	•	
ZSD3215-6	32	15	1×3	37500	49 700	148	50	-	80	12	-	136	65	9	62	•	
ZSD3220-4	32	20	1×2	26200	32 900	132	50	-	80	12	-	120	65	9	62	•	
ZSS3220-4E	32	20	3.7×1	50000	71 800	121	56	55	86	14	10.5	96.5	71	9	65		•
ZSD4010-8	40	10	1×4	73400	103 000	137	63	-	93	14	-	123	78	9	70	•	
ZSD4015-6	40	15	1×3	57000	77 100	155	63	-	93	14	-	141	78	9	70	•	
ZSS4020-4ES	40	20	3.7×1	55000	89 900	102	63	62	93	14	5	83	78	9	70	•	
ZSS4020-4E	40	20	3.7×1	65400	102 000	126	70	69	100	14	10.5	101.5	85	9	75		•
ZSS4025-4ES	40	25	3.7×1	54600	90 300	122	63	-	93	14	5	103	78	9	70	•	
ZSS4025-4E	40	25	3.7×1	64900	102 000	145	70	69	100	14	10.5	120.5	85	9	75		•
ZSS4030-4ES	40	30	3.7×1	55500	90 700	141	63	-	93	14	5	122	78	9	70	•	
ZSS4030-4E	40	30	3.7×1	66300	103 000	164	70	69	100	14	10.5	139.5	85	9	75		•
ZSS4040-3ES	40	40	2.7×1	41300	65 700	134	63	-	93	14	-	120	78	9	70	•	
ZSS4040-3E	40	40	2.7×1	49300	74 600	150	70	69	100	14	10.5	125.5	85	9	75		•
ZSD5010-8	50	10	1×4	82700	133 000	140	75	-	110	16	-	124	93	11	85	•	
ZSD5015-8	50	15	1×4	94400	145 000	191	75	-	110	16	-	175	93	11	85	•	
ZSD5020-8	50	20	1×4	94000	145 000	240	75	-	110	16	-	224	93	11	85	•	
ZSS5025-4E	50	25	3.7×1	72600	129 000	145	82	81	118	16	10.5	118.5	100	11	92		•
ZSS5030-4E	50	30	3.7×1	72100	128 000	164	82	81	118	16	10.5	137.5	100	11	92		•
ZSS5040-3E	50	40	2.7×1	55500	94 200	163	82	81	118	16	10.5	136.5	100	11	92		•
ZSD6310-10	63	10	1×5	115000	220 000	164	90	-	125	18	-	146	108	11	95	•	
ZSD6315-8	63	15	1×4	177000	309 000	198	95	-	135	20	-	178	115	13.5	100	•	
ZSD6320-10	63	20	1×5	214000	385 000	286	95	-	135	20	-	266	115	13.5	100	•	
ZSD6330-6	63	30	1×3	137000	230 000	269	95	-	135	20	-	249	115	13.5	100	•	

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